

Oregon Cadastral Map System

A comprehensive explanation of the system
approved by the 1953 Legislative Assembly
(HB 232) with special attention to the:

- Concepts and Standards (Volume 1)
- Technical and Cartographic Procedures (Volume 2)
- Maintenance Process (Volume 3)
- Highways and the Law of Dedication (Volume 4)
- Mapping Riparian Lands (Volume 5)

Concepts and Standards

First Edition
June 2003

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INTRODUCTION

This manual has four goals. The first is to prepare a base for understanding the concepts and standards of the State Standard Cadastral Map System. The second, prompted by numerous requests from county assessors, is to provide the technical fundamentals of cadastral cartography for the training of new cartographers. The third goal is to provide necessary but often hard to find cadastral, legal and cartographic reference material in one readily accessible volume: reference material such as conversion tables, geodetic tables, critical formulae, riparian charts, abbreviations, glossary of terms.

The fourth goal is to provide a balanced picture of the science and art of cadastral cartography; to show that this branch of mapping extends far beyond what has often been misconstrued as a mere drafting task. Cadastral cartography is an intellectual activity that requires a working knowledge of the fundamentals of a host of sciences and related professional activities, rather than merely an exercise of reading deeds and drawing lines.

Cadastral cartography is the oldest form of mapping known to modern man, dating back to approximately 4000 B.C. Today, it dominates the cartographic world – not necessarily in a scholarly sense, but in sheer volume of maps produced. Yet, very little has been published about cadastral cartography. That which has been published is so narrow in scope (dealing primarily with map format and content) as to render it useless as far as the technical elements of cadastral cartography are concerned.

This manual does not contain everything one would need to know about cadastral cartography. Rather, it is a base of information for identifying and understanding problems, and for making intelligent decisions on how to handle those problems. Basics alone will not suffice as a means of mastering the intricacies of cadastral cartography. We recommend extensive study of the sciences and professions related to this branch of cartography: higher mathematics, surveying, boundary control and legal principles, photogrammetry, computer-assisted graphics, real estate, real property law, micrographics, general cartography, geodesy, geography and ad valorem taxation. The bibliography provided in the manual will guide you to many excellent books on many of these subjects.

The first part of the manual, through Chapter 3, deals primarily with concepts and standards of the State Standard Cadastral Map System. The remaining chapters deal with methods and procedures.

The cadastral map has always been a mainstay of property taxation and a critical element of governmental land data systems. Chapter 1 provides background information on the development of cadastral cartography, and the development of the State Standard Cadastral Map System.

Chapter 2 discusses cadastral map standards, which have been developed over a period of 23 years. Some standards were not incorporated in the county map systems developed in the early stages of the statewide mapping program, but new maps being added to the system should conform to the standards. If this is done systematically, the county map system eventually will become standard.

Chapter 3 deals with the standard tax lot number. Like the map standards, tax lot number requirements have changed slightly since their inception.

One of the most difficult problems confronting new cartographers, and some map users, is understanding the elements of direction. Chapter 4 outlines the fundamentals of the six major systems of angular measure. It discusses items such as meridians, declination, quadrants, azimuths, deflection angles, plotting angles and bearings with a drafting machine, etc.

The rectangular survey system forms the geographical base of the cadastral map system. It is used extensively as the base for deed descriptions. Chapter 5 explains most of the fundamentals of the rectangular survey, and emphasizes specific elements that have been a constant source of problems in map construction and maintenance. In addition, the chapter provides specific legal opinions that must be considered in the mapping and maintenance process.

Until a few years ago, there was little need for cartographers to be concerned about surveying. Now, the map-user community demands extreme accuracy in the geometry of the land-parcel polygons displayed on the map and this can be obtained only by utilizing surveys. Furthermore, the inclusion of the cadastral survey in the mapping process has resulted in increased map life, fewer taxpayer complaints and increased efficiency in the maintenance function. It is not essential for the cartographer to be a surveyor, but it is important to know about this science of measurements because the same science is applied in the cartographic process. Chapter 6 introduces the basics of surveying; the types of surveys; the problems encountered and methods used in making field surveys. It places special emphasis on survey precision, accuracy, and sources and types of errors. These are survey elements that cartographers should understand, but often do not. Moreover, the error and quality factors in surveying are, with few exceptions,

applicable to cadastral cartography. The chapter only touches on this complex science. The full scope of surveying, necessary to the registered surveyor, involves advanced and complex principles that extend far beyond the scopes of this publication.

The use of the state plane coordinates, as a mathematical base of the cadastral map system is a relatively new procedure – at least new to the Oregon Standard Cadastral Map System. It is a required base in all present Oregon Department of Revenue map projects – but rarely used in the counties. Chapter 7 explains the plane coordinate concept. It begins with an introduction to the development of map projections and coordinates: describes the map projection concepts (i.e., the Lambert Conic Conformal Projection, Universal Transverse Mercator Projection, etc.); explains the basic Cartesian coordinate principles; and defines the Oregon Coordinate System and related Oregon Revised Statutes.

Chapter 8 explains highway right of way surveys and their importance in establishing map control. The aim of the chapter is to assist the new cartographer in interpreting the highway route survey drawings and in plotting the highway traverse. The same principles will apply to nearly any public or private road traverse, and often to railroad. Additional information on highway curves and curve formulas may be found in the appendix.

The cartographer must be adept in the mathematics of cadastral cartography. Mathematics is seldom a problem for the journeyman, but new cartographers – especially those with only drafting experience – usually find that they have forgotten many important mathematical rules and formulas. Chapter 9 reviews the mathematical rules and procedures needed to complete cadastral computations. Special emphasis is placed on survey problems such as balancing angles; computing areas; computing coordinates; conversion to geodetic coordinates; spiral curve computations; and traverse closure. Mathematical tables not readily available at commercial outlets are included in the addendum.

The doctrine of riparian rights is deeply imbedded in Federal and Oregon law and is now surfacing as one of the more important, or valuable, property rights. Chapter 10 deals with the riparian right doctrine, one of the most debated subjects of real property law. Because of the complexity of this subject, we have gone to great lengths to document the authority for nearly

every principle contained in the chapter (this may be found in the footnotes). And, we have provided a special bibliography on riparian rights material.

Chapter 11 deals with cartographic drafting; specifically the tracing function.

Chapter 12 provides the elements of map control and a suggested step by step procedure for establishing good control. It places special emphasis on the mathematical base of the cadastral map system, the Oregon Coordinate System, and it includes a comprehensive list of sources for map control data.

Chapter 13 explores the cadastral map and record maintenance function. It defines important maintenance criteria and discusses the ramifications of each.

One problem that faces most cartographers is that of having an easy, quick reference source to the many mathematical tables needed for cadastral cartography. The appendix provides most of the tables that are either out of print, incomplete in existing text and reference books, or are hard to find. However, tables that are readily available from commercial outlets, such as tables of natural tangents, natural sine and cosines, square root, reciprocals, circumference, area of circles, exponential functions, etc., have been excluded from the appendix. The appendix also supplies a key to abbreviations that are either used on the cadastral maps, or that will be encountered in the mapping process. Also included in the appendix are math symbols, spiral formula elements of a single curve and circle, trigonometric functions, rectangular survey guides, riparian rights' charts, an index of Oregon's navigable waterways and estuaries, etc.

The glossary in this manual is designed to develop a consistency in cadastral vocabulary and to supply the general meanings of the many words and phrases used in cadastral cartography. Each definition has been checked with legal reference sources and is meant to define the majority opinion; but, it is not necessarily applicable in every case, nor will the courts always agree with some definitions – especially if the circumstances surrounding a particular case are slightly different from those on which the definition is based. Therefore, the glossary must be used with care and only for mapping purposes. Never use this information to provide legal counsel to a taxpayer. An attorney must provide that.

Assessment and Appraisal Division

Preface

The statewide cadastral map system is explained in five volumes:

- Vol. 1 Concepts and Standards
- Vol. 2 Technical and Cartographic Procedures
- Vol. 3 Maintenance Process.
- Vol. 4 Highway and the Law of Dedication.
- Vol. 5 Mapping Riparian Lands

Planned future additions are:

- Estates in Land, Title, and Deed Interpretation.
- Mapping by Computer, and Geographic Information Systems
- Photogrammetry and the Cadastral Map.

The purpose of this series is to supply tax administrators with background on the map system, map standards, technical procedures, and legal principles that must be considered in mapping the rights, title and interests in real property.

The information will be useful for training cartographers and other assessment officials. It also will be a valuable reference source for assessors, appraisers, cartographers and the map user community. Finally, it will supply a balanced picture of the science and art of cadastral cartography.

The Cartographic Unit has high hopes that the five-volume series will furnish a basis for equitable assessment and taxation of locally assessed real property. It is intended that the information presented will contribute to and promote further development of the cadastral map system.

Volume 1 deals primarily with:

- A brief history on cadastral cartography and cadastral maps.
- Problems leading to the legislative acts to create a uniform mapping system in Oregon.
- The philosophy of those who designed and developed the foundation of today's map standards.
- The graphic standards and map specifications.
- An explanation of the standard tax lot numbers (the parcel identifier of the system).
- The general index for the five-volume series.

Volume 2 contains the technical elements applied in cadastral cartography, such as *direction*, an element that has proven to be confusing to new cartographers and to the map-user community. The six major systems of direction (or angular measure) are outlined in **Chapter 1**. Information is included on meridian,

declination, quadrants, azimuth, deflection angles, and plotting angles and bearings with a drafting machine.

Sections, or subdivisions of sections, established by the United States Rectangular Survey granted most of the land in Oregon. Even land granted under the Donation Law was indirectly tied to the survey (as is land conveyed by reference to subdivisions that are tied to the survey). Consequently, the Rectangular Survey is the common denominator in most land records (deeds, surveys, subdivision plats, etc.). For this reason, it is the base of the map number part of the state standard tax lot number, and the base for map areas and scale.

Chapter 2 supplies those elements of the survey system that cartographers must know, and map users should know. In addition, the chapter provides those principles of law that must be considered in the mapping and map maintenance process.

"A survey does not create title; it only defines boundaries." (U.S. v. State Investment Co., 264 U.S. 206, 68 L. Ed. 639; 285 F. 128-Eighth Circuit Court). "Noman's land" has become a mere figure of speech. All lands have ownership. With ownership comes rights-boundaries, surveys, and, in some situations, case law. Boundaries, more than ownership, is the objective of the mapping effort because the boundaries are what limit the extent of ownership. **Chapter 3** is presented to not only acquaint you with surveys, but to instill in the cartographer an appreciation of the problems confronting the surveyor.

Chapter 4 contains an explanation of coordinate systems, such as the Oregon State Plane Coordinate Systems. This is a key element of the standard cadastral map system because the plane coordinate system provides our map system with the ability to achieve tight, accurate mathematical control. Map projection (such as the "Lambert Conic Conformal" and the Universal Transverse Mercator Projection); plane coordinates, basic Cartesian coordinate principles, and the Oregon State Plane Coordinate System form the outline of this chapter.

The surveys of major transportation routes (oil, power, gas, as well as highway) are useful for mathematically bridging other public and private surveys. Yet the language of the route surveys is somewhat confusing to cartographers, and the spiral and compound spiral curves often seem impossible to plot. **Chapter 5** is designed to take the mystery out of the route map, and to provide solutions to the more difficult curve problems. Hopefully, this chapter will allow county cartographers to make better use of the surveys of county roads, state highways, railroad right of way, transmission lines, and pipelines.

Today's electronic calculators and computers have eliminated the burden of making manual calculations. No longer does a cartographer need to manually compute the square of any number, or wrestle with a slide rule to close a traverse.

But little things like the concept of *significant figures*, *rounding of numbers*, and *mathematical operations* remain important in cadastral cartography. Moreover, if a cartographer works in an office that does not have sophisticated electronic computation hardware, it will be necessary to know how to close a traverse, compute latitude and departure, compute the length of one or more sides of a triangle, and compute areas and coordinates.

Hopefully, **Chapter 6** will supply enough information for that cartographer to perform, at least, the basic mathematical operations.

Automatic mapping system has eliminated much of the tedious manual drafting tasks. However, some local map maintenance operation does not have such luxuries. Moreover, even with such equipment at the cartographer's disposal, it remains necessary for him or her to use drafting hardware, instruments and techniques. Consequently, it was necessary to provide some drafting basics in this publication in **Chapter 7**.

Volume 3 contains guidelines for maintaining cadastral map systems to state standards. However, it falls short of providing helpful suggestions for managing section, as well as the environmental and design criteria for a drafting room operation (which is the same for a cartographic operation). This oversight will be corrected in the future.

The objective of Volume 4 is to improve the way that the dedicated public lands and highways are being mapped and assessed, and to set the record straight on rights, title and interests in the public ways and state highways. This volume was six years in the making (about three years researching legal sources and three years in the writing). It is a comprehensive explanation of "highways and the Law of Dedication." The manual will be useful in identifying problems where legal assistance should be obtained, and it will provide an approach to resolving many of the less complex problems.

This volume contains a generous supply of case law of the Oregon Supreme Court, the principles and rules of law announced by that Court, and citations to nearly every Oregon Supreme Court case dealing with dedication, public ways, eminent domain, nuisance, user, misuser, etc., as well as many landmark cases before the high courts of other common law states.

Volume 5 deals with mapping riparian lands. This volume:

- Includes a review of the doctrine of riparian rights.
- Contains a discussion of the important rules and principles of law applicable to riparian lands and rights.
- Provides case law considering the ownership of riparian lands.
- Touches on riparian lands and the public trust doctrine.
- Offers solutions to some of the complex problems in mapping and assessing riparian lands.

The glossaries provided in this series are designed to instruct as well as define. The primary objective is to develop consistency in the language of cadastral cartography. It is not only essential to know what a term means, but how it relates to a problem or situation, how the court applies the term, and, when necessary, how the term is misused in certain cases. Each definition has been checked with legal authorities, and is usually the prevailing definition.

It is important for you to understand that everything about cadastral cartography is not contained in these five volumes. The omission of certain state of the art processes should be obvious. Aside from that omission, these publications still supply only that information necessary to construct, maintain or understand the standard cadastral maps.

Consequently, extensive study is recommended of the sciences and professions related to the this branch of cartography: trigonometry, calculus, computer sciences (specifically automated mapping and computerized geographic land data processes), advanced surveying, boundary control and legal principles, photogrammetry, real estate, real property law, and the like is recommended.

Oregon Department of Revenue

Standard for Digital Cadastral Maps

July 1, 1996

Introduction

This standard is a supplement to the *Oregon Cadastral Map System* manual (the manual) published by the Oregon Department of Revenue. It is to be used with the manual to assist in preparing maps on a computer system. It applies to maps maintained for the use of the County Assessor in appraising property and providing taxlot information to the public. Users should refer to both the manual and this standard for complete information on the creation and maintenance of their maps.

The manual was prepared to set a standard for cadastral mapping in the State of Oregon. It is based on manual mapping techniques with some reference to computer-aided mapping. This supplemental standard was created in response to the number of public bodies creating Geographic Information Systems (GIS) and having trouble conforming the output to the standards in the manual. This standard is flexible enough to allow the Assessor to work with other agencies in creating a dynamic GIS while providing the users with a standard map that will be recognizable across the state.

It is important to realize that these digital maps will see extensive use by people outside the assessor's office. It is recommended that assessors undertaking remapping or establishing a GIS work with other users of their maps to incorporate features they will need. Such features may include complete hydrography coverage, zone boundaries, etc.

Any exceptions to this standard must be approved in writing by the Cartographic Unit of the Department of Revenue. It is noted that this standard will be applied only to remapping projects that are undertaken after this standard goes into effect. Counties who are mapping manually or have projects under way as of the effective date of this standard may use this standard or continue to follow the manual. A project that involves scanning existing maps into the computer is not considered remapping.

Control

All maps will use the best geodetic control available. Control points will be identified with a Bureau of Land Management reliability code. (See Appendix A.) The codes may be included as attributes, tags, database links, or unique symbols. The more data that

can be associated with a point, the better that point will serve in the future. The reliability codes are:

Code	Control Reliability
1	1 foot or less
2	3 feet or less
3	10 feet or less
4	40 feet or less
5	100 feet or less
9	Unknown

When a county is being remapped, the maps should be built on NAD-83/91 State Plane Coordinates using international feet. This will facilitate information exchange.

Minimum Map Requirements

The following features are the minimum requirements for maps maintained for the Assessor's Office. Other data may be included as required for the work of the office in any particular county. The graphic examples show how the feature should be plotted on the map.

It should be noted that a GIS will require that each parcel form a closed polygon. Cartographers must keep this in mind when drawing the maps and assure that all line intersections are broken and that there are no gaps or overlaps. It is standard practice in digital mapping to separate all cartographic features into consistent and clearly defined layers or levels.

In an effort to accommodate other users, an attempt should be made to leave about fifty feet of the lot adjacent to the street vacant, except for bearings and distances.

Lines are specified by two weights:

weight 0 = .005"

weight 1 = .01"

The relationship between the weights is the important factor if the user's hardware makes plotting these exact weights impractical. Property boundaries are shown as solid lines. All other lines are patterned.

Text will be placed in one of three fonts. All will be standard sans-serif text. The three fonts are:

ROMAN

ITALIC

HOLLOW OR SHADOW

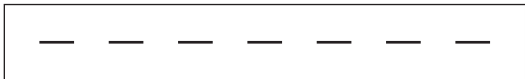
Either Hollow or Shadow font is used; they are not mixed. Text may be specified as Light, Normal, or Bold. Text sizes, where specified, are in inches on the printed map.

Map Features

Control Points which are used in creating the map are identified as to accuracy and, where possible, with the source. They are not required to be printed on the map.

Section Lines from the Public Land Survey System are used only when needed.

Weight 1, dashed



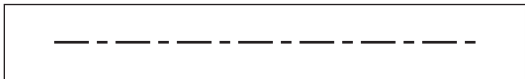
Public Road Right-of-Way Lines show the legal right-of-way independent of physical features; they always form a property boundary.

Weight 1, solid



Public Road Centerlines are kept in the file if they are used for constructing the map. It is not required that they be printed on the map.

Weight 0, Centerline Symbol



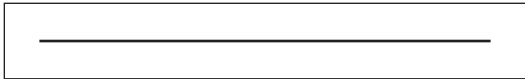
Public Road Name Text includes the legal name, the common name, previous names, and county road numbers. It is placed within the right-of-way, scaled to the street width with a maximum size of .2".

Roman, regular font



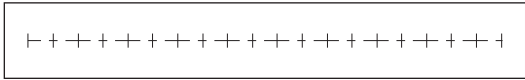
The **Railroad Right-of-Way** forms a property boundary.

Weight 1, Solid



Railroad Centerline or track is usually shown as a single symbol in the center of the right-of-way unless more detail is required, in which case individual tracks and spurs may be shown.

Weight 0



Railroad Name Text is shown within the right-of-way.

Roman, regular font



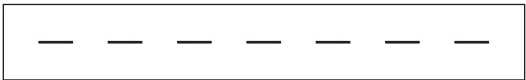
Hydrography. All waterlines, both single and double line, will be shown with a symbol similar to the USGS seasonal stream pattern. Waterlines are never used to show property boundaries. If the property boundary is the same as the waterline it must be added as a separate parcel boundary line.

Weight 1, Waterline linestyle



Meander Lines are shown if deeds or surveys reference them.

Weight 1, dashed



Hydrography Text, Italic, Regular font

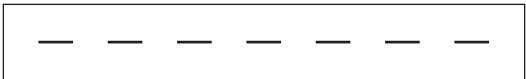


Parcel (Taxlot) Boundary Lines, Weight 1, Solid



Original Lot Lines are used in subdivisions where the original lot line is not the current taxlot line.

Weight 1, dashed



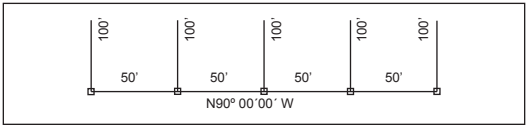
Supplemental Boundary Lines are former boundary lines other than the original lot lines that are shown because they may be referenced on deeds or surveys.

Weight 1, dashed

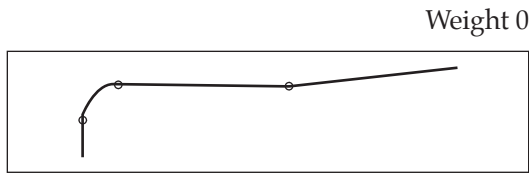


Lot Corners are .04" squares placed at each of the original lot corners in a subdivision or partition plat, parallel with the bottom of the map.

Weight 0



Tangent Points or **Direction Changes** are shown with a .05" circle.

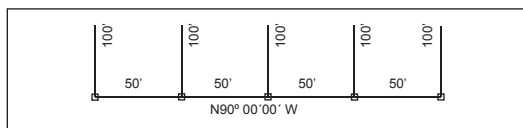


Bearing Text shows the bearing of a line and is placed parallel to the line.

Roman, Regular, .05"

Distance Text shows the length of a line and is placed parallel to the line.

Roman, Regular, .05"



Survey Numbers are placed in cooperation with the County Surveyor. If the Assessor's office is maintaining survey numbers they may refer to the manual mapping standards.

Taxlot Information consists of up to four items which are placed as a block of data parallel to the bottom of the map, and away from the street, in the following order:

Street Address is not required to be placed by the assessor's office.

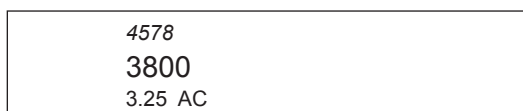
Italic, Regular, .075"

Taxlot Number, Roman, Bold, .1"

Acreage is placed when required by the manual. Acreages should never be calculated from the map when it is possible to calculate them from a deed description or survey.

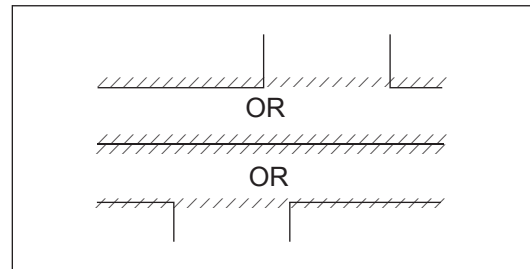
Roman, Regular, .075"

A **Centroid** may be placed as a part of this block before or after the other elements.



The **Subdivision Line** may be placed on one or both sides of the line where subdivisions meet. The ticks may be on one side of the line or across the line. This results in three acceptable placements. Subdivisions, Partition Plats, and Condominiums are treated the same way. The linestyle consists of short diagonal lines. The recommended size is .05" at a 45° angle spaced .075" apart.

Weight 0

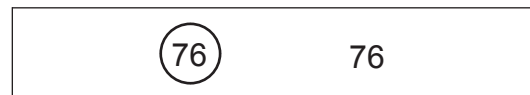


Subdivision Name is either Hollow or Shadow text, and it should be consistent throughout the county. It is sized to fit with a maximum size of .24".



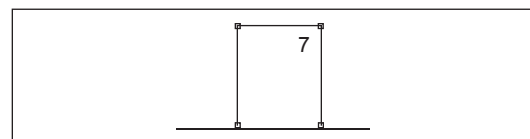
Partition Plat Names are treated the same as subdivisions. Only the number is needed to identify the partition plat. Parcels are treated the same as lots.

The **Block Number** is placed as Roman, Regular, .125", in a circle near the center of the block and parallel with the bottom of the map, or it is placed Bold without a circle.

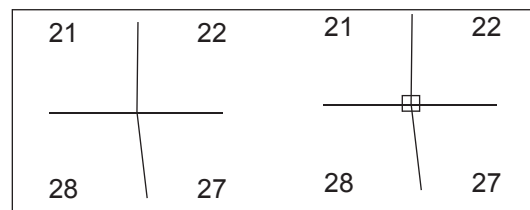


The **Lot Number** is placed once in a corner of the lot away from the street and parallel with the bottom of the map.

Roman, Regular, .08"



Section Corners are identified with .5" long weight 1 lines following the section lines. If a distinction is shown, found corners have a .1", weight 0, open box centered on the corner. Text is roman, regular, .1", placed parallel with the bottom of the map.



Approximate

Found

Government Lot Numbers. On 2000 scale maps only the lot number and acreage is shown. On larger scale maps the word ‘LOT’ precedes the number. Acreage is shown on all maps from 2000 to 200 scale.

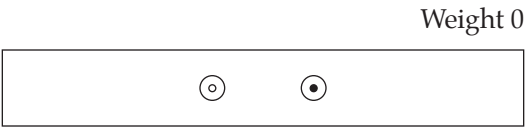
Roman, Regular, .08"

4	LOT 4	LOT 4
35.04	35.04	
1"=2000'	1"=800' -	1"=100'
	1"=200'	or less

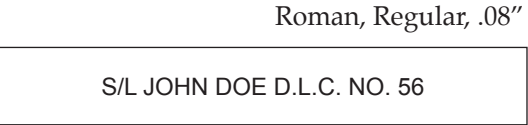
D.L.C. Lines are plotted as a long (.5") dash. They are not printed where other lines follow the D.L.C.



D.L.C. Corners will be shown with a .05" circle inside a .15" circle. The inner circle will be solid if it shows a found corner.

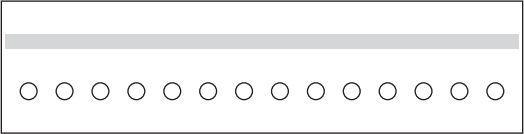


D.L.C. Text. All D.L.C. lines will be labeled so that the line or corner will be identified in each printed map.



Map Index Boundaries. Some means must be provided for showing adjacent maps and creating map indexes.

Code Boundary Lines will be shown with either a .1" wide light gray line or as a series of circles .1" in diameter and .1" apart.



Code Text will be shown for every code area on each map.



Map Size. Maps prepared for counter use will be on paper from 18"x20" to 18"x24". Standard scales as specified in the manual will be used.

Title Sheet design is left up to the county. The abbreviated map title must appear in the upper and lower right corners of the map. The county name and abbreviated map title must appear in the map area so that they will show when the map is reduced 50% on 8 1/2"x11" paper. The following items will appear on each map:

- County Name
- Full Map Name
- Abbreviated Map Name
- Disclaimer
- Map Scale

Appendix A

Reliability Codes

This standard uses BLM codes. The following information will help in converting from other code systems.

Bureau of Land Management control reliability code:

Code Control Reliability

1	1 foot or less	First order triangulation or GPS* stations (Order AA, A, B, C1)
2	3 feet or less	Second & third order triangulation stations. Doppler positions, and some GPS* values (Order C2-1, C-2-, C3)
3	10 feet or less	Photo-generated coordinates, survey ties to triangulation or GPS* stations and inertial positions
4	40 feet or less	Digitized control for 7 1/2 minute quadrangles, and resource grade resource grade GPS* receivers
5	100 feet or less	Digitized control from 15 minute quadrangles and resource collection grade GPS* receivers
9	Unknown	

*Coordinate values obtained from GPS receivers will vary in accuracy and reliability depending on the methods of data collection and post processing utilized.

National Geodetic Survey Quality Ratios for Global Positioning System (GPS) techniques:

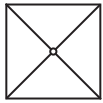
Order AA	1 pp billion
Order A	1 pp 10 million
Order B	1 pp 1million
Order C1	1 pp 100,000
Order C2-1	1 pp 50,000
Order C2-2	1 pp 20,000
Order C3	1 pp 10,000

Federal Geodetic control Subcommittee distance accuracy standards for conventional surveys:

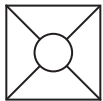
First Order	1:100,000
Second Order, Class I	1:50,000
Second Order, Class II	1:20,000
Third Order, Class I	1:10,000
Third Order, Class II	1:5,000

RELIABILITY CODES

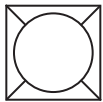
CODE 1
1 ft or less



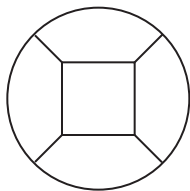
CODE 2
3 ft or less



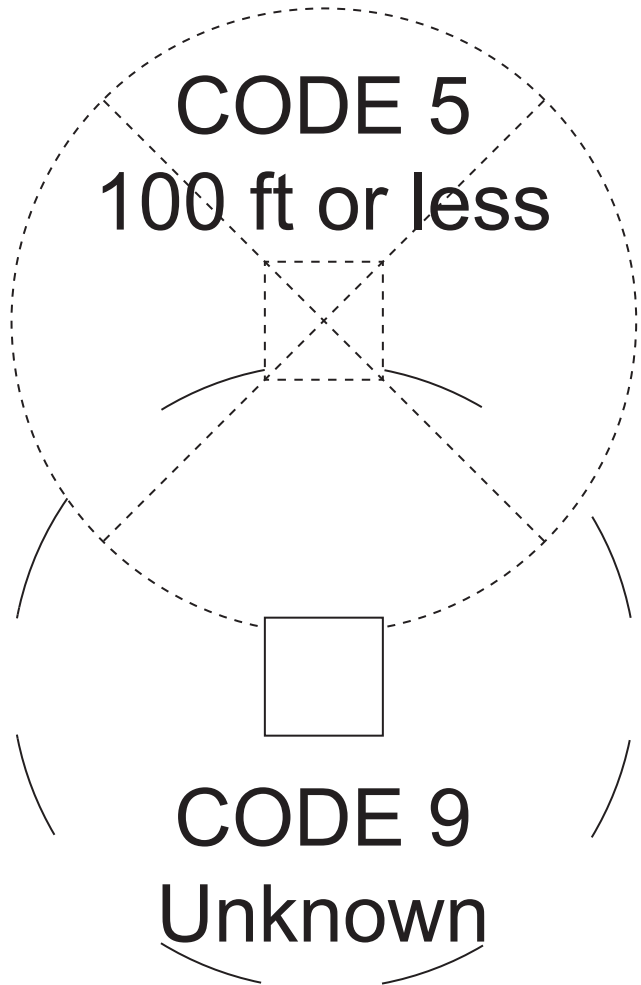
CODE 3
10 ft or less



CODE 4
40 ft or less



CODE 5
100 ft or less



CODE 9
Unknown

*The only way to sort out the
confusion in the land records
is to proceed with the surveying
and evaluation of each land
parcel in the Empire.*

*A good cadastre will constitute a
complement of my code as far as
land possession is concerned.*

*The cadastral maps must be
sufficiently accurate and
complete so that they can
determine the boundaries
between properties to prevent
litigation.*

Napoleon Bonaparte 1807

CHAPTER 1

CADASTRES AND CADASTRAL MAPS

Based on translation by Dr.T.J. Blachut;
Photogrammetric Research, National Research
Council of Canada. 1975 Molds Proceedings.

Introduction

Assessment cadastre. The complete inventory of real property, the cadastral maps and map records; ownership lists; assessment roll; statements of value, etc.; used to apply equitable ad valorem taxes on such property.

Cadastral. Relating to cadastre or to an element of a cadastre. The term also refers to a survey to measure the size, shape, location and extent of a land parcel.

Cadastral cartography. The science and art of making cadastral maps.

Cadastral map. A map that shows the size, shape, location, and extent of each land parcel in a prescribed geographical map area. (See: Standard cadastral map.)

Cadastre (general). “A record of interests in land, encompassing both the nature and extent of these interests.”¹ The root of the word is in the late Latin *capitastrium*, meaning poll tax register. The history runs via the Italian *catastro*, the early Italian *catistico*; from the late Greek work *katastichon*, meaning notebook; from the Greek *kata*—by, plus *stichos*—row line. The English *cadaster* is rarely used.

Cadastre (historical). A detailed register inventory; statement of public record of lands; their extent, ownership, locations and value, executed by government as the base of a taxation system. One of the more famous cadastres was the *Domesday Survey* executed by the Normans under the conqueror of England, William, Duke of Normandy. The record of that survey, contained in two volumes, is known as the *Domesday Book*.² The survey, initiated in 1085, was an exceptionally efficient inventory of nearly every landholding in England. It included the extent, value, and source of title of each landholding, showing all title and boundary changes that took place after William’s conquest.³

Cadastre (in common law). An official statement of the quantity and value of real property in any district; made to justly apportion the taxes on such property.⁴

Land Parcel. A tract of land, lot or contiguous lots, block or contiguous blocks, section of a township or contiguous sections, owned by one party at one time, for which there is a unique and complete bundle of rights. A land parcel can be enclosed by one unbroken boundary line. Public easements—as in dedicated streets and alleys and **most** county roads—do not divide servient estates. From a technical point of view, land in one ownership at the same time can be considered a single parcel even though divided by a road, street or alley (much the same as if it were

divided by a private easement). For assessment and taxation purposes, such land is treated as separate parcels where the use, values, or identities are separate. **Note:** Under one ownership” means that no part of the land is subject to any taxes due, conveyance, or separate interest, different from that of the remainder of land.

Legal cadastral. The land title recording system.

Real property (general). Sir William Blackstone (1723-1780), English jurist, law professor, Justice of the Court of Pleas, and author of *Commentaries on the Laws of England*, divided property into two classes: *personal property* and *real property*. Neither classification has definite meanings (except as regards certain sections of the Oregon Revised Statutes). However, *personal property* is *easily movable* property of a personal nature, a right to personal things, or an interest less than a freehold interest in realty.⁵ *Real property* is a term used to describe *lands, tenements and hereditaments*. In effect, real property is *movable property*, including any right, title or interest in real property.⁶

Standard cadastral map (Oregon). A map that meets the graphic and technical requirements specified and outlined in the four volumes of the Oregon Cadastral Map System.

This chapter provides the general standards for the Oregon Cadastral Map System. It includes a brief history of the system, *i.e.* from the advent of property taxation, to the problems leading up to legislation to develop a uniform map system, and finally to the present statewide cadastral map system. To quote the Honorable Justice Holmes:

“Upon this point a page of history is worth a volume of logic.”

History, 1859-1951

In 1859, at the beginning of statehood, state and local government were funded by property taxes. In 1909, the Legislature created the State Tax Commission to resolve the problems that plagued the property tax system. However, the commission was poorly staffed and had little statutory power to straighten out the mess in the tax system.⁷

In 1929, the Legislature gave the Tax Commission the authority and staff to secure statewide property tax equity.⁸ The commission’s 1929-1930 biennial report outlined a program to achieve assessment uniformity. One statement in that report said:

“This program contemplates employment of standardized methods in making appraisals and inven-

tories to determine true value of particular properties for the purpose of taxation.”

Inventories were incomplete because there was no complete map system in this state.

The need for a complete cadastral map system was described by Wallace S. Wharton⁹ at the 1947 annual convention of the Oregon County Assessors Association. Mr. Wharton outlined the basic program the commission would follow to achieve uniformity in ad valorem taxation.¹⁰ Sections two and three in his outline were:

“2. Establish uniformity of tax records, including the working records.

“3. Maximum development and use of adequate maps, including aerial photographs.”

The 1947 Legislative Assembly recognized the “quagmire” the property tax system was in. Consequently, it eliminated property taxation as a source of state revenue. It then directed the commission to provide in-service training for assessors and tax collectors, and to help assessors reappraise all property.¹¹

In 1949, the Tax Commission began preparing basic cadastral maps. The only standards were in regard to map size and scale.¹²

By 1951, studies showed that training and assistance programs were not improving assessment conditions. In a Valuation Division (now the Assessment and Appraisal Division) Bulletin,¹³ the assessment cadastre was singled out as the key to achieving equalization in ad valorem taxation. The report placed special emphasis on the cadastral maps *“because they specify the most important physical properties with which the assessor deals. Without the maps the other records are almost useless.”*

By 1951, the deterioration of the property tax system had gone too far. The Legislature began to address the problem by providing for a statewide reappraisal program. House Bill 702, signed April 26, 1951, provided for appraisal assistance to counties, but failed to make provision for mapping.

Once the reappraisal program was in progress, two things became evident: (1) the real property inventories were incomplete, and (2) the assessor’s maps were inadequate for appraisal use. As one appraiser reported:

“It is almost impossible to appraise the land in absence of reliable maps to locate, identify and determine the size, shape, and extent of land parcels.”

Another problem became apparent: there was no accuracy or uniformity between the existing map

systems, and little uniformity within many of those systems.

The Pre-reappraisal Map Systems

Before talking about the program to develop “better” uniform cadastral maps, something must be said in defense of the original “assessors maps,” “legal maps,” “ownership maps,” or “tax maps” (as they were referred to).

Early Oregon assessors had to design and draw their maps. They stated that the primary purpose of the maps was to discover, identify, and inventory real property. “It was nearly impossible to know that a land parcel needed to be appraised, assessed and taxed if there was no evidence to show that it existed as a separate parcel of land.”¹⁴

These maps contained good features, but often they were:

- not uniform in size,
- incomplete,
- inaccurate,
- lacking good horizontal control, and
- not dependable for reflecting the true right, title and interests in real property.

There also were other faults with these original map systems. But in all fairness to the people who created and produced those systems, other things should be considered.

First, “in the nineteen thirties and forties, when most of these maps were developed, assessor’s budgets were inadequate for any high-level, large-scale mapping project; any mapping that was in a budget was usually a low priority item.”

Second, there were no written map standards or instructions on how to make a cadastral map.

Third, the reference sources used in today’s mapping systems were not readily available (such as high-quality aerial photography, orthophotographs or satellite imagery, up-to-date 7.5-minute U.S.G.S. quadrangles and triangulation nets, extensive land parcel surveys, improved subdivision plats and standards, state-of-the-art route maps and surveys based on state plane coordinates).

Fourth, most of the instruments and equipment used in today’s mapping projects were not available. Available equipment was too expensive for most counties to acquire.

Fifth, few people designing, creating, and maintaining the original map systems had any formal training

in cartography, surveying, real property law, and the like.

Sixth, “most of the original map systems were made at a time when land was relatively plentiful, land holdings were large, the population was small, land values were low, property taxes were relatively lower than today, and the maps were seldom used by anyone but assessment personnel and title companies.”¹⁵ This resulted in little justification for concern about the accuracy, dependability or completeness of “tax maps.”

However, several counties produced surprisingly high-quality, complete map systems. Ideas produced by these systems helped form the design elements of today’s model “State Standard and Cadastral Map System.”

The Reappraisal Mapping Program

Many factors combined to effect the demise of the old map systems, but the four major factors were: (1) the maps were not uniform within the state and even within some counties, (2) the overall accuracy was poor, (3) the maps were incomplete, and (4) the maps were not up to date. These problems surfaced as a result of the reappraisal program. They were identified as one of the deep-rooted causes of tax inequality in the ad valorem taxation.¹⁶

Once the deficiencies in the map systems were “officially” acknowledged, the State Tax Commission and most county assessors agreed that equalization and uniformity could not be achieved by appraising alone. Map standards had to be developed and employed in a massive statewide mapping program. This program is so massive that it will be near 1995 before every county has been brought to the statewide standards.

With assistance from several counties, the Tax Commission began to develop map standards in 1952. A legislative interim tax study committee concluded that the problem demanded immediate attention. On April 2, 1953, the governor signed House Bill 232 which authorized the Tax Commission to “. . . install, and assist in preparation and maintenance of maps, plats or standardized record systems **as prescribed** by the department, in the offices of assessors and tax collectors.”¹⁷ It also provided for “the department and county courts to enter into agreements for the sharing of the expenses of such appraisals and installations including salaries and expenses of department employees engaged therein.”¹⁸

In the September 1953 A&T Bulletin, the importance of maps was again emphasized:

“The value of a comprehensive set of tax maps for the assessor’s use can hardly be overestimated. The assessor who has a fine set of maps to back up his assessment record will find his position immeasurably strengthened. Without such maps the normal activities of the office are delayed and handicapped.”

The A&T report also recognized one important fact about cadastral maps:

“No quick, cheap method has yet been found for providing these maps. For most counties, the mapping program should be considered not in terms of man-months, but in terms of man-years.”

The June 1954 A&T Bulletin contained an article by Edward Birkenwald.¹⁹ He summarized the importance of cadastral maps in two paragraphs:

“Assessors know, and all taxpayers should know, that property must have been discovered or found in order to comprise a part of the assessment cadastre. Likewise, if taxable property is omitted from that cadastre, as from not having been found, they should be aware that some taxpayers will pay more and some less than their fair share of the cost of government.

“Without the assistance of some device which shows each lot (parcel) of land, in a town, placed correctly with respect to every other parcel, no one can have assurance that all property has been listed. It is well to keep in mind that property must be found before it can be listed and then valued. The name of this device, a basic tool of the assessor, is the tax map.”

In 1954, a legislative interim tax study committee concluded that the new maps were far too valuable to the assessment program and too expensive not to be maintained to state standards. The committee recommended:

*“The state should provide for the preparation and maintenance of adequate maps for county assessment purposes. This can be done by maintaining a staff of draftsmen under sound **technical** direction...”*

By 1987, the Oregon Department of Revenue’s Cartographic Unit, in cooperation with 34 of the 36 counties, had prepared and installed the Oregon Cadastral Map System in each of the 34 counties. This involved drawing “from scratch” 33,092 cadastral maps of 95,414 square miles. All but Multnomah and Marion counties have been brought to state standards.²⁰

In addition to the foregoing accomplishments, three counties have been mapped twice, adding 3,174 maps to bring the grand total of maps produced under the mapping program to 36,266.²¹

General Map Standards

Oregon's reappraisal program was one of the first to include a statewide mapping effort to bring all assessment maps to one uniform set of standards. In 1953, there were no model cadastral map systems to show what the "ideal" map should be. Moreover, the intellectual community had yet to "discover" cadastral cartography. There were no studies on multipurpose cadastres, geographic information systems or parcel identifier systems that would be helpful in developing standards. So the State Tax Commission, assisted by all 36 counties, had to develop the procedures and standards. The general and technical standards outlined in the September 1953 Tax Commission A&T Bulletin were:

General (1953)

1. Each county must have a complete set of uniform, standard maps that accounted for **all** real property in the county (assessable and nonassessable, taxable and nontaxable).
2. All deeds must be reviewed to develop a complete real property inventory.
3. The U.S. Rectangular Survey—specifically the township, section and section subdivision—must be the foundation of map areas and map boundaries.
4. The parcel identifier was to be a serial number.

Technical

1. Map size would be 18 by 20 inches. The size was determined by how large a map would have to be to accommodate a $\frac{1}{4}$ $\frac{1}{4}$ section at 1" = 100' scale.²² The scales of the $\frac{1}{4}$ section map, the section map and the township map were based on the map size.
2. The maps were to be traced on linen tracing cloth. Although ink was used for most tracings, it was not mandatory. A few maps were traced in pencil, but that technique proved more expensive than ink.
3. Map scales were designated as:
 - a. 1" = 100'. $\frac{1}{4}$ $\frac{1}{4}$ sections, usually populated urban areas; business, commercial and industrial areas; or other areas where map detail and content is such as to make this the more feasible scale.
 - b. 1" = 200'. $\frac{1}{4}$ section; usually suburban or industrial areas or other areas where this scale is appropriate. The 1" = 200' map could also be used as index maps of 1" = 100' scale maps.
 - c. 1" = 400'. Section; usually rural, industrial, but could be ranch, timber or desert in situations

where some lands are smaller than 40 acres, or where some property lines do not conform to sectional subdivision lines. This scale can be used to map undeveloped subdivisions (as defined in ORS Chapter 92), and is used to index 1" = 100' and 1" = 200' scale maps.

- d. 1" = 2000'. Township; usually ranch, timber, urban, where property lines conform to township, section, $\frac{1}{4}$ section, or $\frac{1}{4}$ $\frac{1}{4}$ section lines. It is permissible to put some large metes and bounds parcels on this scale of map if there is a reasonable means to show the traverse detail on the map. It is also permissible to show patented mining claims on this scale of map. However, a 1" = 800' scale detail map had to accompany the township map. Township maps also served as the index map for 1" = 400' scale section maps and, when necessary, for 1" = 200' scale maps.
4. Letter designations for $\frac{1}{4}$ and $\frac{1}{4}$ $\frac{1}{4}$ section maps were to be
 - a. A = NE $\frac{1}{4}$
 - b. B = NW $\frac{1}{4}$
 - c. C = SW $\frac{1}{4}$
 - d. D = SE $\frac{1}{4}$
 - e. AA = NE $\frac{1}{4}$ NE $\frac{1}{4}$
 - f. AB = NW $\frac{1}{4}$ NE $\frac{1}{4}$
 - g. AC = SW $\frac{1}{4}$ NE $\frac{1}{4}$
 - h. AD = SE $\frac{1}{4}$ NE $\frac{1}{4}$
 - i. BA = NE $\frac{1}{4}$ NW $\frac{1}{4}$
 - j. BB = NW $\frac{1}{4}$ NW $\frac{1}{4}$
 - k. BC = SW $\frac{1}{4}$ NW $\frac{1}{4}$
 - l. BD = SE $\frac{1}{4}$ NW $\frac{1}{4}$
 - m. CA = NE $\frac{1}{4}$ SW $\frac{1}{4}$
 - n. CB = NW $\frac{1}{4}$ SW $\frac{1}{4}$
 - o. CC = SW $\frac{1}{4}$ SW $\frac{1}{4}$
 - p. CD = SE $\frac{1}{4}$ SW $\frac{1}{4}$
 - q. DA = NE $\frac{1}{4}$ SE $\frac{1}{4}$
 - r. DB = NW $\frac{1}{4}$ SE $\frac{1}{4}$
 - s. DC = SW $\frac{1}{4}$ SE $\frac{1}{4}$
 - t. DD = SE $\frac{1}{4}$ SE $\frac{1}{4}$

Note: These designations are still part of the map standards.

5. Map prints had to be bound, 100 pages to the binder, and available for reference by the public.
6. Subdivision indexes were required that would serve as a cross-index of lot and block numbers to the new maps.

Some maps being used today will meet those standards, yet are seriously deficient for assessment and taxation purposes. Those maps, of course, do not meet the present (1989) cadastral map standards.

The course to today's standards could be considered as natural and logical. As the mapping program progressed, needs and problems were identified. Appraisers who were using the maps in the reappraisal program were the first to provide feedback, constructive criticism, and suggestions. County cartographers would have to maintain the system and respond to questions about the maps. They supplied input on

problems with the existing maps, and provided input on standards that would resolve those problems. Title companies, county surveyors, assessors, county clerks, private surveyors and other map users also contributed to the development of the present system.

New laws or amendments to existing laws have required revisions of the standards.

For example, a 1977 amendment to the timber tax laws provided that Western Oregon timber be taxed as severed, rather than when standing (the Western Oregon Severance Tax–W.O.S.T.). Since Eastern Oregon timber was subject to a yield tax, there was no longer a need for a special interest number for standing timber taxed to a party other than the landowner. The standard “T1” number was omitted as part of the tax lot number.

The Oregon Condominium Act presented a problem in providing a tax lot number for units being tax-lotted separate from the land, and for identifying “common areas.”

The Oregon Beach Zone Act required cadastral map standards for identifying ocean shore land that was west of the 16-foot-elevation vegetation line. That part of a taxable party’s land lying below the 16-foot line became exempt from taxation because of the public easement over the ocean shore.

New technology also played an important role in the development of the map standards. The application of computer-assisted mapping required an examination of map content. Every element on a map occupied space in computer map files. It was necessary to eliminate information that was redundant, rarely used, or cosmetic. Computer-driven plotters provided large savings in map drafting, but have one drawback. The plotters cannot print as small as a good draftsman. The standards had to change to allow for the omission of data that required tiny printing.

State-of-the art computers capable of creating computerized geographic information files are now used in the mapping process. This and other technology will demand that the standards stay abreast of the new technology.

Even though the standards have been amended, the changes have been so minor that map users were unaware that anything changed. Even though ever-present elements can cause changes in the standards, it is necessary to publish and adhere to the standards as they exist at the time. Here are today’s general standards and comments and clarifications regarding the standards.

1. **Primary objective of the Oregon cadastral map:**
To develop, install, and maintain an affordable, uni-

form, accurate, and complete statewide cadastral map system as part of the goal of achieving the equalization in the assessment of all locally assessed real property at the statutory level.

Comment. That objective is the key to understanding the general cadastral map standards. *These standards are designed to solve a problem as we perceive that problem, i.e. nonstandard, incomplete, seriously deficient, or out-of-date maps, records and real property inventories. These problems make it difficult to discover newly created land parcels, to appraise real property, to assess all taxable real property to the current owners, to administer tax relief programs, and to collect taxes.*

There is a lot of debate today about requirements of the Oregon Cadastral Map System. One side argues for high-level orthophotography, employment of surveys executed at high-level accuracy standards only, and map accuracy that meets the National Map Accuracy Standards. The other side argues that the map base be survey-oriented, and contends that **all** available sources be used in the cadastral map process. This is the Department of Revenue’s position. Our responsibility is not by choice. It is assigned by the Legislature, and does not extend beyond assessment and taxation.

2. **Primary purposes of the Oregon Cadastral Map System:** *For the discovery, identification, inventory, appraisal, assessment, and taxation of all taxable real property.*

Comment. One misconception about the map system is that it is intended to establish legal title or legal ownership. We have explained the problem the map system was designed to solve. “Legal title” and “legal ownership” were not part of that problem. The cadastral map will never be capable of offering indisputable evidence that the boundaries and ownerships are legal. Such questions are for attorneys and courts of equity

3. *All cadastral maps used for the discovery, identification, inventory, appraisal, assessment, and taxation of real property in Oregon must conform to these general standards, the graphic standards, and the technical standards published by the Oregon Department of Revenue, and as provided for by ORS 305.100.*

The standards affecting cadastral maps are updated periodically to reflect changes in the statutes and new technology. Maps prepared under prior standards will be recognized as “standard” for assessment and taxation. However, each county is responsible for upgrading its maps to current standards as soon as possible. Changes in the standards which create deficiencies to assessment and taxation programs require immediate action.

4. Map content, size, scale, area, symbology, and information requirements are designated in "Graphic Standards" (Chapter 2, Volume 1, "Oregon Cadastral Map System: Concepts and Standards").
5. The parcel identifier of the Oregon Cadastral Map System is the Standard Tax Lot Number (as outlined in Chapter 3, Volume 1). The tax lot number must be used on the maps, appraisal records, the assessment roll, tax lot card, and all other assessment records which require a parcel identifier.

Other parcel identifiers may be used for purposes other than assessment and taxation. These numbers must **not** appear on the cadastral maps and map records. If they are noted on other assessment records, they are not to be "in lieu of" the standard tax lot number.

6. The technical standards are the statutory and common law principles and rules that govern:
 - a. Right, title and interest in real property.
 - b. Public ways, state highways, and all other dedicated lands.
 - c. Subdivisions, condominiums, land partitioning.
 - d. Assessment and Taxation.
 - e. Riparian lands and boundaries.
 - f. Real property boundaries, corners, and monuments.
 - g. State plane coordinates.
 - h. Common law and statutory rules of law, rules of construction, and rules of intent.
 - i. U.S. Rectangular Survey System (when applicable).
 - j. Surveys and surveying (when applicable).
 - k. State, county, and city lands (when applicable).

The technical standards also include the accepted practices, standards, and rules associated with: drafting, photogrammetry, mathematics, surveying, and cartography as applied to cadastral cartography and the Oregon Cadastral Map System.

7. It is the intent of these general standards that all real property in this state be mapped on standard cadastral maps and accounted for in the real property inventories of the individual assessor's offices.

"All real property in this state" includes exempt and nonassessable real property, taxable real property, governmental, and private, from the smallest parcel to the largest.

The inventory must include taxable interests less than fee-simple-absolute title, such as "mineral rights."

8. The geographic "reference" base of the cadastral map system is the U.S. Rectangular Survey System. The survey system is the foundation of the standard map boundary, and is the key identifier in the tax lot number.

Comment. The Rectangular Survey was chosen as the basis for the map number, and subsequently for the tax lot number. One of the State Tax Commission's goals, prompted by requests from counties, title companies, and surveyors, was to develop an **identifier** that was also a good "people number." It required an identifier that had some element that people could easily recognize. The other key goal was to have an identifier that had some geographic significance.

The township, range, section, $\frac{1}{4}$ section, and $\frac{1}{4}$ $\frac{1}{4}$ section of the U.S. Rectangular Survey met those demands. This number appears on most deeds, survey, subdivision plat, large scale maps, and the majority of the other parcel documents, records, and instruments. It is a number that is easily recognized by people who work with land records, and, for some inexplicable reason, it is a number that is easy to remember. It identifies the township and range the parcel is in. In urban areas, the survey-based map number will identify the location within a section.

Some other numbers have distinct advantages over the survey-based number. For example, the state plane coordinate-based centroid provides a precise location of the approximate center of a parcel of land. However, those numbers have their own peculiar problems, and they rarely appear on deeds, surveys, subdivision plats, local plats, and the other miscellaneous documents, records, and instruments. Some numbers are superior numbers for entry and retrieval in computer files. But these numbers appear on few records, and are not good "people-numbers." Since computers can be programmed to recognize any number, the State Tax Commission, now the Department of Revenue, maintained that concern should be for the people who must work with the parcel identifier from day to day.

9. The geometric base of the map system is the survey control consisting of a framework of monuments, corners, and points that have been identified, located or established by independent private and governmental horizontal land surveys.
10. Mathematical control of the geometric base is to be maintained by using the Oregon State Plane Coordinate System as the base for plotting survey monuments, corners, and points.
11. Bearings shown on the cadastral map are to be based on the geodetic meridian (e.g. north is "true north"). Grid or magnetic bearings may be noted on the maps; however, when noted they must be identified as "GRID" or

“MAG” (for magnetic). If a bearing is based on a local grid, it should be so identified on the map.

12. *The English system of measure—the inch, foot, yard, mile—is the standard system of measure on the cadastral maps. Other systems of measure, such as chains, rods, furlongs, etc., may be noted on the maps; however, they are to be identified as “ch.,” “rds.,” “fur.” The measurement must show the conversion to feet (see the graphic standards).*

Comment. It has been suggested that the maps should be converted to the metric system. This suggestion has been opposed by most map users. The opposition is not because there’s resistance to change. It is because very few surveys, deeds, plats, etc., are in metric measurement and/or scale. The Department of Revenue Cartographic Unit knows of fewer than a dozen documents where the measurements are metric. The decision was made that the metric system will not be adopted in the cadastral map system until such time as **most** reference data is metric.

13. *The basic unit of the cadastral map is the “land parcel.” Regardless of the many definitions of “parcel,” “land parcel” in context with this requirement is defined as: “That portion of land that is to be assessed separately from other land.” The graphic standards will outline specific requirements.*
14. *The method of cadastral map development will be “iterative.” Mapping is to be based on all information available, taking into consideration all source documents (route surveys, private property surveys, Army Corps of Engineers surveys, BLM transmission line surveys, Forest Service surveys, U.S. Rectangular and mineral surveys, deeds, aerial photographs and photogrammetric products, topo and quadrangle maps, etc.). In this system, the maps are a product of not only each of the many reference sources, but also of an analysis of the combined reference sources. The resultant maps are **always** superior to the unanalyzed individual reference source because the analytical process of the combined data resolves problems and ambiguities that cannot be resolved by the individual sources.*

Comment: Could all of this complex process be simplified by preceding the mapping with a comprehensive survey of all parcels?

The answer is, “yes” and “no.” Such a survey, if practical and cost-effective, would be helpful in resolving problems. However, the survey could never be used in lieu of all of the source data just discussed.

When resolving boundary problems (for mapping purposes), a cartographer must consider many of the facts considered by a court of law. The only factors not considered would be testimony and evidence

that is usually not available to the cartographer. Such factors as *junior and senior rights, junior and senior surveys (which are unrelated to junior and senior rights), intent of parties, the situation, statutory and common law rules and principles, rules of construction, rules of law, etc.*, must enter into the decision-making process. No decision can be made without considering **all** available evidence.

Other reasons a new survey could not be used in lieu of all source data are:

- a. No survey can guarantee that all parties will accept that survey. Consider:

“A boundary line fixed by a surveyor employed by various property owners, or others, is not binding upon an owner who was not a party to the surveying, and who never agreed to the line fixed by the surveyor.”²⁶

Although a property owner is estopped by his or her own survey, that owner is not bound by any survey not agreed to by him or her. Consequently, the owners would not be bound by a county or state survey. Such surveys would not eliminate boundary conflicts.

- b. Regardless of the degree of precision which measurements are taken, there is no guarantee that the surveyor has found the right corner, has run a traverse on the correct line, has oriented bearings to the correct line, tied to the correct monument, etc.

- c. Where lines on the maps were contested in the court, the court would consider **all** evidence, not merely the newer survey.

- d. Boundary line conflicts between owners are concerns of the owners, not of the state, a county, nor a city.

The only reason such conflicts are considered in the *iterative mapping process* is to provide some assurance that property is assessed to the correct owner. Since a cadastral map cannot affect the bona fide rights of the owner of property, a comprehensive survey of all parcels would **not** be cost-justifiable (and not really practical).

Any comprehensive survey of parcels intended to resolve boundary conflicts or determine “true” and “legal” boundaries (and this is the purpose behind such a scheme) would be so time-consuming that, in reality, the job would never be completed. It would be so costly it would never be approved. If the survey were a “mass survey” intended to be completed in a few years, the resultant product would be little better than the available source data.

15. The cadastral maps must be maintained to the general, graphic, and technical standards outlined by the Department of Revenue. The maps and records must reflect the most recent real property ownerships (as provided by statutory law, and in recognition of the common law). New survey information must be recognized or considered, and the natural and cultural land features must be revised to conform to present conditions and locations.

16. Cadastral Map Records. A tax lot record is to be created for each parcel of real property that exists on each cadastral map. The Department of Revenue recommends the record format. However, counties can create their own hard-copy or computerized tax lot record as long as it contains adequate space to record:

a. The official description used to establish parcel boundaries. Where the boundaries have been established by survey, and the true plotted boundary is slightly different than the deed,²⁷ the survey **must** be noted.

b. Deed record number (identifying where recorded in the office of the county clerk or county recorder), or if unrecorded, must be noted.

c. Date deed is recorded in office of county clerk or county recorder, or is filed in the office of the county assessor.

d. Gross acreage of parcel purchased; all subsequent acreages of parcels conveyed from the parent parcel; net acreage; acreage revisions and corrections (noting why the acreage has been changed, and the date changed).

e. Tax lot number, including the parcel number, and special interest number (if any), and the tax code area number.

f. "Parent parcel number," if this number is derived from another tax lot number.

The intent of the tax lot record is to support all work on a map relating to a parcel of land, i.e. a history of the cadastral mapping of each parcel. Although this is an official record, it is an informal record that can be filled out in pen, pencil, by typing or computer. To maintain an affordable system, the standards regarding this record are more concerned with **content** than with **looks** or **bureaucracy**.

Endnotes

1. *Need for a Multipurpose Cadastre*, Washington, D.C., National Academy Press (1980).

2. See: Douglas & Greenway's 1042 *English Historical Documents-1042 to 1189*; N.Y., N.Y., Oxford University Press.

3. The Domesday Survey was very unpopular in England because it included a very complete inventory of every personal resource.

4. *Strothers v. Lucas*, 12 Pet. 410, 428, note 9 L. Ed. 1137. See also: *Black's Law Dictionary*.

5. *Personal property* can be grouped into corporeal personal property (tangible, movable things) and incorporeal personal property (such as stocks, bonds, patents and copyrights).

6. Property can also be classified as *tangible* and *intangible*. Tangible property is that capable of being perceived by sense of touch. Intangible is not capable of being touched, such as a water right, easement, etc.

7. *Disintegration of Oregon's Property Tax System*, Oregon Department of Revenue, p 25, March 1987.

8. *Id.* "Income tax was legislated as a property tax relief measure."

9. Commissioner, State Tax Commission.

10. *A&T Bulletin*, No. 6; Oct. 31, 1947.

11. *Disintegration of Oregon's Property Tax System*, *supra*.

12. *A&T Bulletin* No. 8, August 1949.

13. *Id.*, March 1951, Section 5.

14. N.V. Hurst, manager, Tax Commission Mapping Section. Speech before the 1961 Assessors Conference.

15. Earl J. Elliott, project manager, Dept. U.R. Map Unit, 1956 to 1974; notes on evolution of the cadastral map system.

16. A note of interest. In the Department of Revenue's March 1987 *Disintegration of Oregon's Property Tax System* (for presentation to the 1987 Legislative Assembly), inadequate maintenance of some of the *standard* map systems of certain counties was identified as an important factor contributing to the recent deterioration of the property tax system. The same

problem was discovered before the 1951 reappraisal move.

17. ORS 306.125(1).

18. ORS 306.125(2).

19. Director, Property Tax Division, Maine Bureau of Taxation. This was reprinted from the New Brunswick Municipal Monthly of May 1954.

20. At this writing (August 1987), Multnomah County has signed an agreement with the Department of Revenue to map that county. Marion County is engaged in a cooperative effort with the City of Salem to bring its maps to state standards.

21. Baker County maps are now 25 years old. That county has signed an agreement with the department for computer-based state-of-the-art maps.

22. 1" = 100' scale was selected as the base because early Tax Commission maps of urban areas were drawn at that scale, and it was considered adequate for assessment and appraisal purposes. The 1" = 100' maps could have been of 1/4 section; however, the resultant map size was considered to be awkward for field work.

23. Pencil was inadequate because it was necessary to use hard lead that would hold its shape when applied to the abrasive linen; the hard lead did not produce prints as good as soft lead (that smeared easily). The hard lead usually required so much pressure that the tracings were difficult to revise.
24. Webster's New Collegiate Dictionary defines *iterative* as: "Involving repetition . . . being a computational procedure in which replication of a cycle of operations produces results which approximate the desired result more and more closely." (Syn. *reiterative*.) Use of the term here, adopted from "Procedures and Standards for a Multi-purpose Cadastre," National Research Council, National Academy Press, Washington, D.C. (1983), p. 57.
25. For example, an area of a map may contain several deeds that have been based on incorrect surveys. The deed problem could be complicated by ambiguities and questions regarding intent. Some new surveys may have been executed to resolve problems on some parcels, but they may also create other problems. When all of this data is analyzed and considered as a whole, and other data such as subdivision plats, engineering surveys, route surveys, etc., are included in the process, the resultant maps will be better than the source document.
26. *Thompson*, §3041, p 558, footnote 62 for citations. (1962 replace.)
27. "The office of a deed description is not to identify or locate the land, but to afford the **means** of identification." The courts have consistently held that it is the intent and the land survey's purpose to locate the actual boundaries. See: *Gubser v. Town*, 273 P.2d 430.

Such successes are the norm when the cartographer is well versed in surveying, deed interpretation, photogrammetry and real property law.

Graphics is a language with its own vocabulary, syntax, idioms, conventional marks, symbolic characters, referents and abbreviations. The agreement as to the application of that language to a specific graphic endeavor is called the 'Graphic Standards.'

CHAPTER 2

GRAPHIC STANDARDS AND MAP SPECIFICATIONS

Introduction

Although seldom thought of as a language form, graphics is a unique language whose central function is to express (or communicate) thought. It is a real language with its own vocabulary, syntax, idioms, conventional marks, symbolic representations, characters, and abbreviations.

The graphic community can be generally divided into two major categories: technical graphics and graphic arts. The difference between the two categories is the allowable freedom to manipulate the graphic vocabulary.

In “technical graphics,” accurate communication of technical data is required. Therefore, it is essential that the standard graphic vocabulary be used. On the other hand, most graphic arts require only the *general communication* of general information. In this category, the graphic artist has the freedom to manipulate or totally ignore the conventional graphic vocabulary. In fact, graphic art is often created to generate thought rather than communicate thought.

The subject of this manual is *technical graphics*. The graphic professions classified as “technical” are:

1. Mechanical drafting.
2. Engineering drafting.
3. Architectural drafting.
4. Marine architectural drafting.
5. Design drafting.
6. Statistical drafting.
7. Electronic drafting.
8. General drafting.
9. Cartographic drafting.
10. Medical cartography.
11. Cadastral cartography.
12. Thematic cartography.
13. Hydrographic cartography.
14. Aeronautical cartography.
15. Space cartography.
16. Geological cartography.
17. Nautical cartography.
18. Photogrammetry, etc.

The list provides a clue to the complexity of the graphic language. In fact, the language is so complex that each graphic specialty requires a general agreement on how to apply the graphic language for that specialty. This agreement is known as the *graphic standards*. The graphic standards provide the syntax, abbreviations and idiom of the language of each graphic specialty.

Without question, experienced personnel realize the importance of graphic standards. However, less ex-

perienced personnel may not be convinced of the importance of standards. Some in the technical graphic community reject these standards; they feel that cartographers and draftsmen, like artists, must be free to set their own standards and vary their personal graphic styles. Although fashionable, this attitude shows a total misunderstanding of the central function of technical graphics:

“... to accurately communicate technical information.”

It is difficult to focus attention on graphic standards without leaving the impression that they were designed to suppress innovation. It is true that some applications of standards suppress creative thought. However, the standardization of a language serves to make communication of new ideas easier. Such is the case with graphic standards.

The technical complexity of cartography demands close adherence to cartographic graphic standards. These standards have been developed *to meet the needs of map users and to simplify the compilation task of the cartographer*. Of the two, the first is most important:

“...to meet the needs of the map-user community.”

How big is the map-user community? Consider the wide use of nautical charts. Nautical chart users are not only nationwide, but worldwide. If we examine the purpose of the nautical chart, the importance of graphic standards is evident. Pity the professional cartographer who carelessly decides to vary the graphic standards on a nautical chart. Such decision could be costly, disastrous, or even fatal to the chart user.

Recently, the demand for maps of all kinds has increased rapidly. Never before has this country been so map-conscious. As the demand increases, map awareness increases, as does the demand for greater accuracy and map standardization. The demand of map users will be felt at every level of government and in every branch of cartography. Cadastral cartography will be no exception.

Cadastral Graphic Standards

The central function of the cadastral map is to communicate information. That statement may appear to conflict with the primary purpose of the cadastral map—that is:

“...for the discovery, identification and inventory of real property.”

However, it would be pointless to discover, identify and inventory property if this information were not communicated to someone.

There must be awareness that the public does not finance cadastral mapping to benefit cartographers. The maps are for map users, who include not only the assessor and appraiser but the taxpayer as well.

The cadastral cartographer must be aware of the scope and size of the cadastral map-user community. Taxpayers, government agencies and private agencies are just beginning to recognize the utility and value of the cadastral map. No longer is the use of maps confined to just “a few locals.” Now the users of each county cadastral system extend beyond county boundaries and, in fact, beyond state boundaries. Many users have management problems that are no longer confined to county boundaries. It is common for some agencies and taxpayers to purchase maps from several counties.

It is easy to see why map users are displeased with *out-of-step* map systems that fail to have even internal standards and uniformity. It is not surprising that much dismay over nonstandard systems comes from within county government—road departments, county commissioners, appraisers, planning commissions, surveyors, and even county cartographers.

Although a high priority is placed on serving map users, there are limits to how far a county can go in trying to please them. Remember rule number one—the cadastral map is primarily for the purpose of assessment; it must never fail to serve that purpose. To be sure this rule is followed, the cadastral map system must be maintained in accordance with the specifications and standards defined in this chapter.

The standards and specifications were developed through the combined efforts of county assessors, state and county appraisers and cartographers. Each standard was developed to solve a particular problem or meet a specific need. Technological advancements may require changes in some standards. Basic standards are retained until new standards are developed and accepted by all counties with standard map systems.

Finally, maps prepared early in the reappraisal-mapping program will be considered standard if properly maintained, even though not revised to meet subsequent minor changes in standards. However, it is recommended that new maps meet specifications and standards defined in this manual. If this is done, the map system will eventually meet current standards. More important, this policy will help extend the life of the map system.

Map Specifications

The cadastral map must display as accurately as possible the true geometric spatial relationship of each land parcel as established and monumented on the ground and defined by:

1. Cadastral surveys executed by registered Oregon land surveyors or registered engineers.
2. Recorded plats of subdivisions, condominiums, minor or major partitions, or official Forest Service summer homesites.
3. Official U.S., state county and city surveys (executed in accordance with state survey laws).
4. Documents sufficient to effect a transfer of any interest in land (recording not mandatory).
5. Aerial surveys.

Geometric Control

The overall geometry of basic cadastral map control must be established by the analytical bridging of all official surveys (No. 1 through No. 3 as defined above) in and surrounding the area being mapped. The resulting triangulation net must be plotted on the base control map. This will constitute the primary control and will control all secondary surveys, deeds and photogrammetry.

Mathematical Base

The mathematical base of the cadastral map system is the Oregon Coordinate System.

Geographic Base

The geographic base of the cadastral map system is the survey of the Public Lands of the U.S. (the Rectangular Survey System). This is the base of the map boundary; map number and tax lot number systems.

Standard Meridian

Unless otherwise noted, all lines on cadastral maps (except coordinate ticks) are oriented to and based on the geodetic meridian.

Basic Land Unit

The land parcel (or parcel) is the basic land unit of the cadastral map system.

Standard Linear System of Measure

The system of measure is the English system (feet, yards, etc.) unless otherwise noted.

To help identify the lines described in deeds by chains, rods, and other miscellaneous survey measures, the map lines should be labeled with the unit described in the deed. They should then be converted to English measure, and shown on the map as an equation.

Standard Map Areas and Boundaries

The area of each cadastral map will, depending on scale, coincide with the various subdivisions of the U. S. Rectangular System; that is, the township, section, $\frac{1}{4}$ section, and $\frac{1}{4} \frac{1}{4}$ section.

Subsequently, the boundaries of each cadastral map must conform, in general, the lines of the subdivision of the Rectangular Survey System; that is, township lines, section lines, $\frac{1}{4}$ section lines, and $\frac{1}{4} \frac{1}{4}$ section lines (or $1/16$ lines). Exceptions: the following are used as map boundaries when in close proximity to the lines of the U.S. Rectangular Survey:

1. Roads, streets, alleys, highways
2. Railroads or railroad spurs.
3. Subdivision boundaries.
4. Property lines.
5. Bodies of water.
6. County, city and state boundaries.

Map Scales

There are two categories of map scales in the standard cadastral map system: (1) standard map scales, and (2) special map scales. (See Chapter 3 for the relationship of map scales to the standard tax lot number.

1. Standard Map Scales

Four standard map scales are employed in the cadastral map system: (1) $1''=2000'$, (2) $1''=400'$, (3) $1''=200'$, and (4) $1''=100'$.

The map scale to be used is determined by (a) the area of the U.S. Rectangular Survey that is being mapped, (b) quantity of detail to be shown, (c) land use, (d) number of real property parcels being mapped, and (e) the probability of future urban or suburban growth. The following shows the relationship of the map scales to the U.S. Rectangular Surveys.

Map Scale	Rectangular Survey Area
$1''=2000'$	one township
$1''=400'$	one section
$1''=200'$	one $\frac{1}{4}$ section
$1''=100'$	one $\frac{1}{4} \frac{1}{4}$ section

Map scales, as generally related to land use, are as follows:

Map Scale	Land Use
$1''=2000'$	Timber, ranch, desert
$1''=400'$	Rural, suburban, some subdivisions
$1''=200'$	Rural, suburban, industrial, some subdivision
$1''=100'$	Urban, suburban, subdivisions, industrial

The system of map scales is not confined to land use. For example, $1''=100'$ scale is usually used for subdivision properties and urban metes and bound tracts. However, many subdivisions of large farm tracts may be shown on $1''=200'$ scale, and possibly $1''=400'$ scale. The quantity of detail to be included on the map would be the controlling factor.

Note: Do not assume that time can be saved by plotting new urban subdivisions on existing $1''=400'$ scale and $1''=200'$ scale maps. Time studies and experience have demonstrated that accuracy; clarity, important information, and map utility are sacrificed when a proper scale map is not constructed. In most cases, it takes less time to prepare a new map at a proper scale than it does to try to squeeze the new subdivision on a smaller scale map.

2. Special Map Scales

Special maps are used to show certain detail that cannot be displayed on the standard scale maps. Special map scales are (1) $1''=800'$ for mining claim maps, and (2) $1''=20'$ to $1''=50'$ for condominium detail.

Condominium boundaries must be shown on the standard cadastral map. Condominium detail can be shown on the cadastral map. However, must condominiums have sufficient detail to warrant a special map?

The basic floor plan of the condominium is shown on the special map. Architectural treatment, such as double lines for partitions, wall outlets, etc. that appear on the developer's floor plan should not be included.

Note: Special maps are prepared for reference purpose only. These must not be used as substitutes for standard cadastral maps.

Map Sizes

All cadastral maps and special maps are 18 by 20 inches. The standard practice is to orient the right-hand 18-inch side to the geodetic meridian.

Graphic Standards

Map Heading and Title

The title of the map is shown in the map heading. The following are examples of map titles for each map scale.

Map Scale	Map Title
$1''=2000'$	T.28S. R.10W. W.M.
$1''=800'$	Mining Claim Detail T.15S R.40E.W.M.

1"=400'	Section 35 T.11S. R.5W. W.M.
1"=200'	SE ¼ Sec. 6 T.3S R.2W. W.M.
1"=100'	SE¼ SE¼ Sec 7 T.12S.
	R.3W. W.M.
1"=50'	Supplemental Map
	SE¼ SE¼ Sec 1 T.1S.
	R.1E. W.M.
1"20'	Supplemental Map
	SE¼ SE¼ Sec 2 T.1S.
	R.1E. W.M.

If a 1"=400' scale map is used as a detail sheet for a township map (e.g., for T.28S. R.10W. W.M.) the map heading will be: DETAIL MAP OF T.28S. R.10W. W.M.

Note: Detail maps are useful for showing the detail of isolated small parcels where a larger scale map might be impractical. However, detail maps should never be used as substitutes for cadastral maps in areas where proper scale cadastral maps are needed.

Rule: Never use a detail map where a cadastral map can do the job better.

The Map Number

The standard cadastral map number is based on the U.S. Rectangular Survey System (township, range, section, ¼ section and ¼ ¼ section). The number depends on the standard map scale employed. The following are four examples of map numbers and their relationship to the map scales.

Map Scale	Tshp.	Rge.	Sec.	¼	¼
1"=2000'	11	5			
1"=400'	11	5	36		
1"=200'	11	5	36	A	
1"=100'	11	5	36	A	B

The letter "A" designates the NE1/4 of the section. The letter "B" designates the NW1/4 of the NE1/4 of the section.

Special maps are not assigned their own numbers. They are assigned the number of the parent map and subtitled "DETAIL MAP," "MINING CLAIM DETAIL," or "SUPPLEMENTAL MAP" under the map number.

B (NW1/4)	A (NE1/4)
C (SW1/4)	D (SE1/4)

Figure 2-1

BB	BA	AB	AA
BC	BD	AC	AD
CB	CA	DB	DA
CC	CD	DC	DD

Figure 2-2.

Figures 2-1 and 2-2 show how letters are used to designate the section subdivisions (1/4 sections and ¼ ¼ sections). Figure 2-1 illustrates a whole section subdivided into ¼ sections (often referred to as "quarter sections" or "one-sixties"). Figure 2-2 illustrates a whole section subdivided into ¼ ¼ sections (also referred to as "quarter-quarter sections," "forties," and sometimes "sixteenth sections").

More information on the subdivision of townships and sections is in Volume 2, Chapter 2. Graphic examples of the miscellaneous subdivisions of ¼ and ¼ ¼ sections are in the appendix.

Some counties substitute the letters with numbers. 1 This is done to accommodate certain computer requirements. The method is not recommended, but it is accepted as standard. Figures 2-3 and 2-4 show how numbers are used in the map number to designate ¼ sections and ¼ ¼ sections.

Figure 2-3 is a whole section divided in ¼ sections, and Figure 2-4 is a whole section divided into ¼ ¼ sections.

2 (NW1/4)	1 (NE1/4)
3 (SW1/4)	4 (SE1/4)

Figure 2-3

22	21	12	11
23	24	13	14
32	31	42	41
33	34	43	44

Figure 2-4

A number of sections in Oregon are considerably larger than the standard approximate one-mile-square section. Most are divided into more than 16 ¼ ¼ sections. In fact, the largest has 16 ¼ ¼ sections and 60 ¼ ¼ section subdivisions. The solutions to lettering these sections will depend on the capacity of the computer system used by the county. It is difficult to set a specific standard that can be applied in every case.

Fortunately, most "super" sections are located in desert-ranch lands or timber lands where 1"=100' scale maps may not be required (and subsequently the lettering will present no problem). However, some large sections will eventually be mapped at either 1"=200' scale or 1"=100' scale. Most of these sections can be treated as illustrated in Figure 2-5.

In Figure 2-5, the basic section (enclosed with the heavy line) is still lettered as a one-mile-square section.

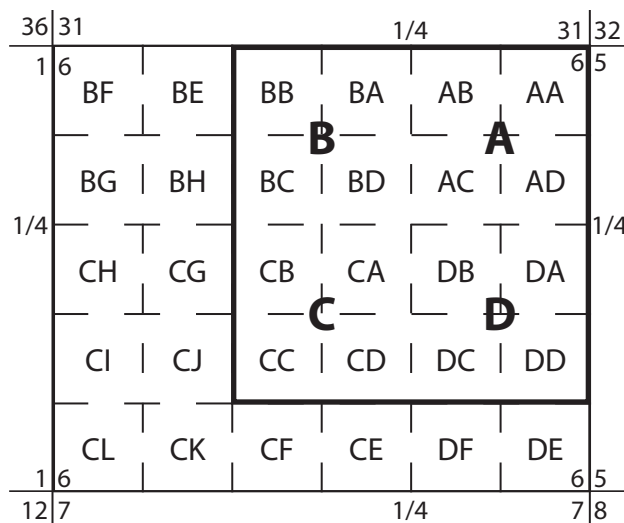


Figure 2-5

The Willamette Meridian divides seven Oregon counties, and 11 counties are divided by the base line (map in the appendix). In these counties, it is essential to identify the east or west township (i.e., to distinguish T.15S. R.1E. from T.15S. R.1W.) or the north or south township (i.e., to distinguish T.1S. R.2W. from T.1N.R.2W.) in the map number. This is done by adding the letter "E" to the range number, to designate east ranges; "W" to the range number to designate the west ranges; "N" to the township numbers to designate the north townships; and "S" to the township number to designate the south townships.

In most counties, it has been the practice to identify either the east or west townships, but not both, in the map number. In Douglas County, for example, the map numbers for T.26S. R.6E. is 66 6E, but the map number for T.26S. R.6W. is just 26 6, without using the letter "W" to identify western townships.

In Lane County, the original computer system software would not accommodate letters in the map number, so "5" has been substituted for the letter "E" in eastern townships. T.15S. R.1W., for example, has the map number 15. The "15" representing the range number will not be confused with Range 15 because Lane County extends only to Range 9 East.

However, the use of the number "5" in place of "E" on these maps creates a nonstandard tax lot number. With the present computer systems, substitutions are not required. As a statewide computer database is created, the township and range numbers will show up as duplicates.

Half townships, three-quarter townships, half ranges and three-quarter ranges, surveyed and designated as such in the Survey of the U.S. Public Lands, are to be cartographically treated as follows:

Townships

V	South half-township
X	South Three-quarter township
Y	North half township
Z	North three-quarter township

Ranges

V	East half range
X	East three-quarter range
Y	West half range
Z	West three-quarter range

For example, if the map title is T.29½S. R./32¾E. W.M., the map number appearing in the upper and lower right-hand corners of the map would be 29V 32X.

Note: The order was selected to avoid the use of the letter "Z" as much as possible. "Z" is often confused with the number "2". To our knowledge, there appear to be no north or west three-quarter townships or ranges.

Map Positioning

The drawing of the cadastral map must be positioned on the tracing as shown in Figure 2-6.

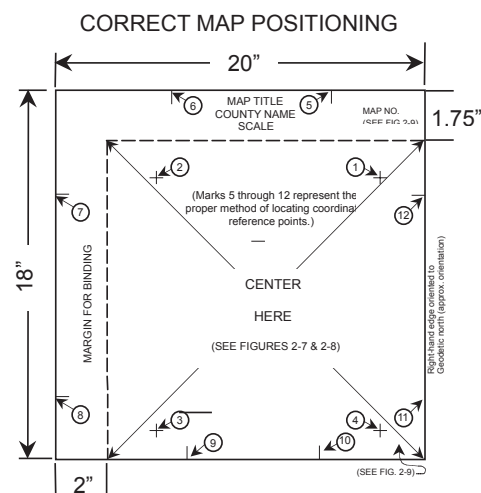


Figure 2-6

In Figure 2-6, the points labeled 1, 2, 3, and 4 represent the approximate location of the township corners, section corners, ¼ section corners, or ¼ ¼ section corners. This is to illustrate the importance of centering the maximum standard map area in the right-hand 18 inches of the bottom 16.25 inches of the 18-by-20 inch map sheet. If this rule was ignored and the "drawing" centered on the map sheet, the bookbinding could cover important information on the left-hand side of the drawing. Moreover, when bound, the drawing would appear off-center.

If the “drawing” were located on the sheet so that any of the points 1 through 4 lay off the sheet, it could create future mapping problems. Consider the following case:

1. The first 1”=100’ scale map in section 6 was of the SE¼ SW¼. The map was incorrectly positioned as illustrated in Figure 2-7 (map No. 1).
2. Subsequently, maps No. 2 through No. 8 were made, and based on the incorrect position of the first map (Figure 2-7).
3. Meanwhile, the SE¼ SW¼ of section 7 was also mapped and incorrectly positioned as shown in Figure 2-7 (map No. 9).
4. And, maps No. 10 through No. 16 were later added over a two-year period.

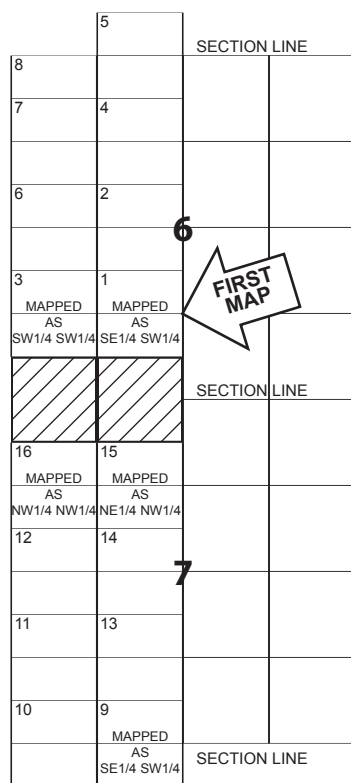


Figure 2-7

5. Surprisingly enough, the area shaded in Figure 2-7 had not small ownership until a year after map No. 16 was created. It is also surprising that the cartographer could not see the obvious problem he was generating by careless selection of map boundaries and incorrect positioning of his map on the map sheet.
6. When the owner of the shaded area subdivided his property, there was not enough room on maps 6CC, 6 CD, 7 BA or 7 BB to accommodate the new subdivisions. Furthermore, the lots were too small for both the 1”=200’ scale or 1”=400’ scale maps.
7. To correct the problem, all 16 maps had to be re-mapped.

By using standard map positioning procedures, problems like this can be avoided.

Figures 2-8A and 2-8B show the correct and incorrect way to position a drawing on the map sheet. In Figure 2-8A, additional parcels can be added in the future to complete the ¼ ¼ section. In Figure 2-8B, however, some of the parcels in the ¼ ¼ section will have to be added to another map-if possible.

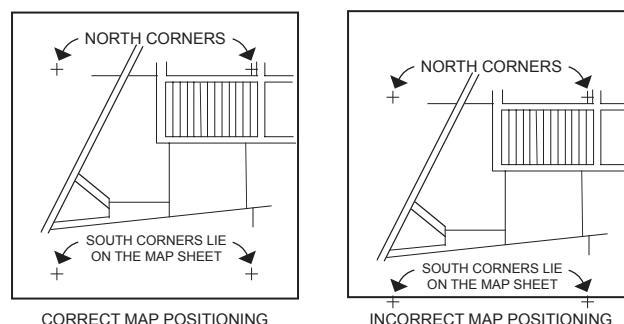


Fig. 2-8A

Figure 2-8

Fig. 2-8B

The map number and subtitle should be positioned as show in Figure 2-9.

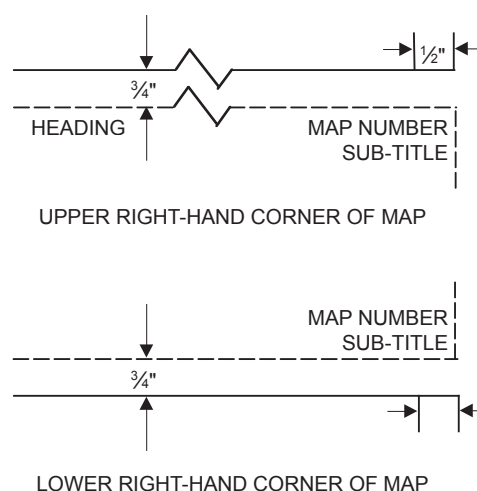


Figure 2-9

Map Lines

There are only four line weights in the standard cadastral map system. They are:

Weight	Comparable To
.25-mm	Leroy #000
.35-mm	Leroy #00
.70-mm	Leroy #2
1.40-mm	Leroy #5

The .25-mm line is the standard line weight used to letter a cadastral map.

The .35-mm line is the line used most in tracing. It is called the standard line. The standard line is used as shown in 91) through (37) in Figure 2-10.

Though not required, many counties use pattern symbols to designate water areas (as shown in Figure 2-10 (23), (25), and (27). The pattern help to identify complex water boundaries or other map lines. To simplify the drafting/tracing process, pressure-sensitive, transparent pattern sheets are used to represent the water areas. The pattern is burnished to the reverse side (backside) of the tracing.

Although it adds a professional touch, the water pattern material and application process is expensive. If the tracing receive considerable handling, the pressure-sensitive material may peel off.

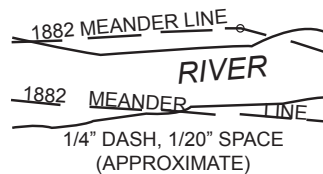
Cartographic Map Symbols

Figure 2-10

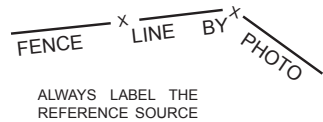
Note: Symbols produced on computer-plotter may vary slightly from those of hand-traced maps.

Standard Line	
—Boundaries—	
1. Ownership	
2. Parcel	
3. Right of way	
4. Easement	
5. Railroad (1"=2,000' scale)	MANUAL PLOTTER
6. Intermittent streams that also represent ownership boundaries (surveyed and unsurveyed)	
7. Perennial streams that represent ownership boundaries (of width too small to be displayed on the cadastral map)	
8. Perennial streams that represent ownership boundaries. Right and left banks always solid, regardless of where ownership extends	
9. Pond, reservoir, or lake, navigable or non-navigable. Always solid regardless of ownership	
10. Intermittent or dry lake, pond, or reservoir. (If the lake, pond, or reservoir is owned separately from surrounding upland, lines would be solid.)	
Standard Line	
—Supplementary Lines—	
11. Coordinate marks	X = 2,051, 322.91 (LABEL WITH X OR Y VALUE)
12. Right-of-way centerlines	
13. Traverse (non-ownership)	
14. Used for line of improvement, old shore line conflicting survey line (always label)	
15. Standard nonparcel or nonownership supplemental line (usually a line of a survey; nonparcel 1/16 line or 1/4 section line, etc.)	
16. Section line, not coinciding with a parcel or ownership line	
17. Intermittent streams—not parcel or ownership boundary	

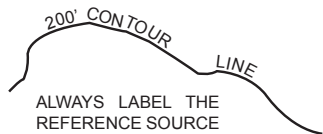
18. Meander lines not coinciding with parcel lines, ownership lines, mean high tide, or mean high water



19. Fence line (when boundary conflict demands notation of the line). Used only when not the ownership or property boundary



20. Contour line used only when deed or survey calls for contour line as a boundary or reference line



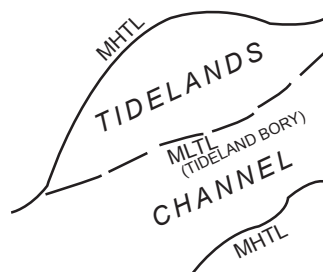
21. Rimrock, bluff, etc., when called for, in deed or survey, as boundary line of ownership



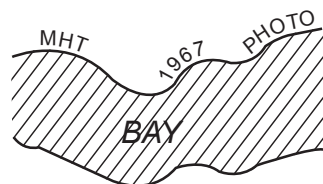
Standard Line

—Riparian Boundaries—

22. Tideland boundary between mean high tide (boundary between uplands and submersible lands) and mean low tide (boundary between submersible lands and submerged lands)



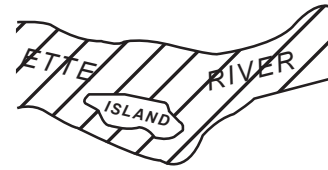
23. Estuaries. Mean high tide (mean high water). Always shown as solid line. (Water pattern used in this example.)



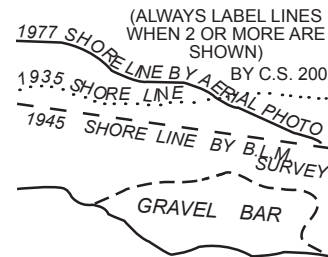
24. Boundary of navigable bodies of water. Mean high water. Line always solid



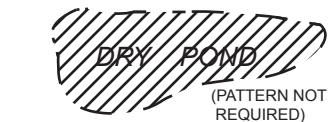
25. Boundary of non-navigable body of water. Mean high water. Line always solid, even though ownership and parcel boundary extends into or across water)



26. Navigable or non-navigable stream showing both fore-shore flat (sand bar, gravel bar, rock outcropping below MHW) and old shore lines
Note: Water patterns are optional.



27. Intermittent or dry pond, lake, or reservoir (using pattern)



28. Elevated aqueduct



29. Aqueduct tunnel (always label tunnel)

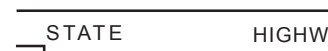


See appendix for information on "Ocean Shore Profile," "General Estuary Profile," and "Tidal and Sea Level Elevations and Definitions." Also see Volume 5.

Standard Line

—Right-of-Way Boundaries—

30. Highway



31. County road



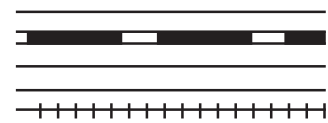
32. Street, alley, public-usage road traditionally accepted as a public road



33. Sample county road on 1" = 2,000' scale map. Drawn at 100', but actual width is 80'



34. Railroad (except 1" = 2,000' scale)

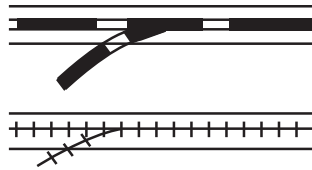


Or plotter generated

Note: RR symbol is to follow survey travers rather than mathematical center of right of way.

35. Railroad right of way and spur (except 1" = 2,000' scale)

Plotter generated

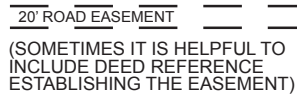


Note: All right of way lines are drawn as dedicated, deeded, or surveyed width from each other except on 1" = 2,000' scale maps.

Standard Line

—Easements—

36. Road (where neither line is parcel or ownership boundary)



37. Transmission line easement (major, such as BPA) (Figure 2-11)



Note: If either exterior line of an easement or center line of an easement coincides with an ownership or parcel boundary, then that line must be solid.

Easements. Easements are nonpossessory interest. The right-of-way lines of easements are not ownership boundaries and should be drawn as shown in Figure 2-10 (36) and (37). Often, however, one of the three lines of an easement (the right-of-way lines or centerline) will coincide with an ownership or parcel boundary. In this case, that line of the easement will be solid as shown in Figure 2-10 (1) or (2). *Perpetual easements* are easements and must receive the same cartographic treatment as all other easements. The fact they are perpetual does not make them possessory interests.

Small utility easements, such as sewer line, telephone line and water line easements, etc., should not be

included on maps. In most cases, these easements have no effect on the value of real property. Because there are so many small utility easements, their inclusion on cadastral maps would be detrimental to the mapping program. In the rare cases where easements do affect the value of land, it is advisable to show, or at least note, the easement on the map.

Major utility easements, such as for transmission lines like that shown in Figure 2-11, have little effect on the value of real property. However, they must be included on the map because of their importance (1) to the analytical bridging process in map control, (2) as a reference survey source to cultural lines and points (fence lines, property corners, road/traverse intersections, traverse intersections with bodies of water, etc.), and (3) as useful landmarks to the map user.

The fact is, transmission line easements offer excellent survey control—especially those executed by the Bonneville Power Administration. The up-to-date location of this information on cadastral maps is as important to the map maintenance program as any other control information.

Most railroad tracks run across land owned in fee by the railroad companies. However, a few miles of railroad track operate across easements. The correct method of showing railroad easements is illustrated in Figure 2-12.

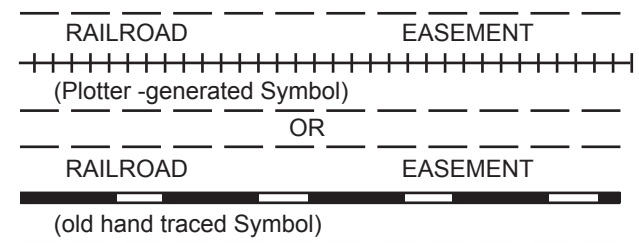


Figure 2-12

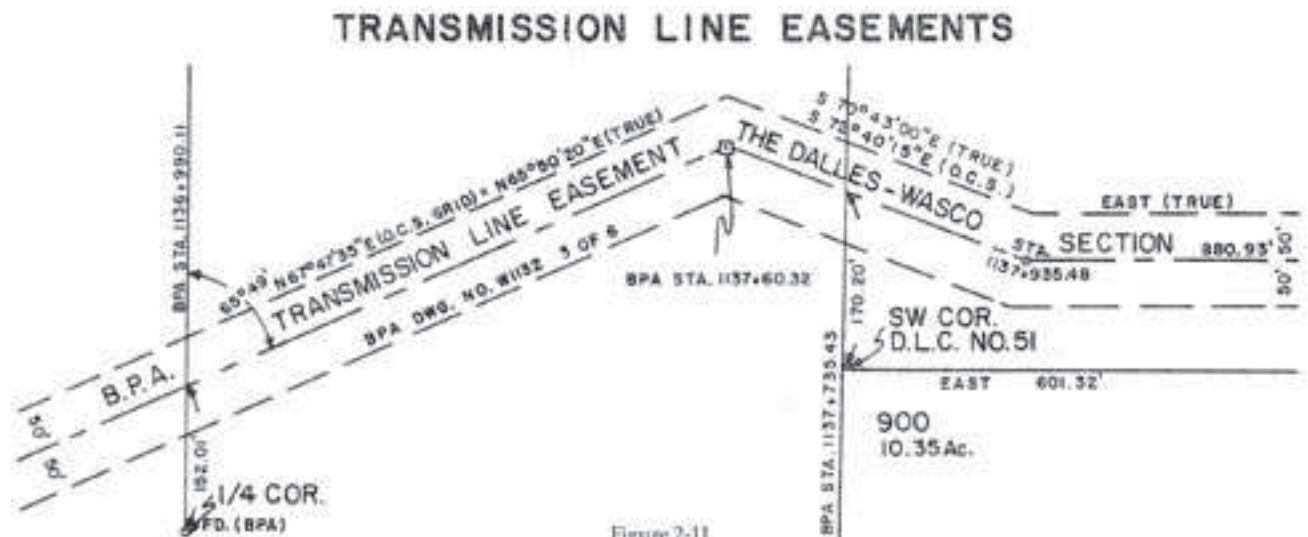


Figure 2-11

Notes: On 1"=2,000' maps, the above centerline symbols and wording are used, but without the R/W lines.

Regardless of the railroad symbol used, the adopted symbol should be used as consistently as possible. Never use both symbols on one map.

The .70-mm solid line is the *map boundary line*. It has no other purpose than that of designating the boundaries of large scale maps being indexed on parent *index maps*.

The map boundary line is always a solid line.

The 1.4-mm dashed line, as shown in Figure 2-13, is used to designate the vegetation line that forms the boundary between the ocean shore and the uplands bordering the ocean shore. The ocean shore is described in the statutes as follows:

ORS 390.605(2) "Ocean shore" means the land lying between extreme low tide of the Pacific Ocean and the line of vegetation as established and described by ORS 390.770.

The vegetation line ² to be drawn on the cadastral maps is accurately described (by x-y coordinates) in ORS 390.770. The line generally runs on the 16-foot (above sea level) contour line. (Ref. U.S.C. & G.S. sea level datum of 1929, Pacific N.W. suppl. adjust. of 1974.) *Do not use the line of vegetation visible on aerial photos, or a vegetation line noted on private surveys unless they agree with the ORS 390.770 line.*

Governmental lands (state, county, etc.) lying west of the vegetation line are exceptions to the provisions of ORS 307.450. The vegetation line is shown as a dashed line when it runs through these lands (Figure 2-13 A).

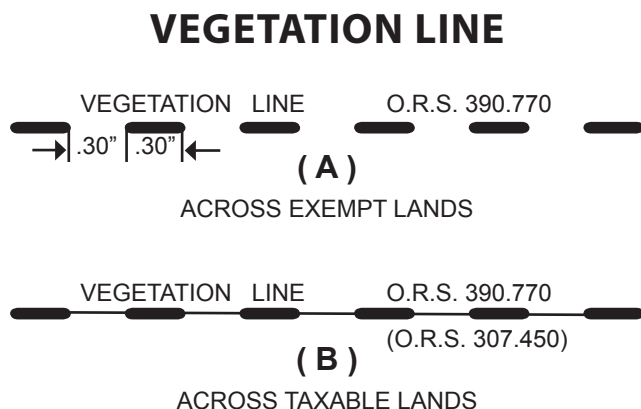


Figure 2-13

When the vegetation line bisects private land, the tax status of the land seaward of the line is changed.

"ORS 307.450 Certain beach lands. After December 31, 1969, the land, but not the improvements to the land

within the area described by ORS 390.770, is exempt from taxation."

If a parcel of land extends across the vegetation line, the seaward part is exempt from taxation. The land that is upland from the vegetation line is taxable. The land must be divided into two parcels, and a *solid line designation* must be used to divide the parcels (Figure 2-13 B).

Zoning district boundary line. The 1.4-mm (.035") line is used to designate the boundaries of local zoning district boundaries. The line is not required on standard cadastral maps. However, if a county feels the zone line is needed, the following line designation should be used.

ZONING DISTRICT BOUNDARY

Figure 2-14

Zoning district lines are often changed. It is advisable to use a pattern tape on the back side of the tracing instead of an inked line. This will allow the line to be easily revised without a lot of time-consuming and messy erasures of an inked line. The above pattern is K * E PPT 16 BK G 61 6555 (on a pressure-sensitive tape). Any similar pattern by another manufacturer will suffice. However, be sure the tape is *transparent*.

Most zone lines will run along ownership or parcel boundaries. The existence of the zone line will not change the status or the designation of any other line. The zone line should be centered on the ownership or parcel boundary line and labeled "zoning district boundary."

Miscellaneous line designations and symbols. Figure 2-15 shows the standard designation for subdivision lines, code lines, triangulation station, U.S. bench mark, and coordinate control points.

Pattern tapes. The code line should be designated by a blue, *transparent*, pressure-sensitive tape applied to the back side of the tracing.

In some projects, each taxing district boundary was designated by a different pattern. This may appear useful and necessary, but is costly and seldom understood. The taxing district boundary is a *code area boundary* and it is only necessary to show the dividing lines between code areas. Only *one pattern* is necessary.

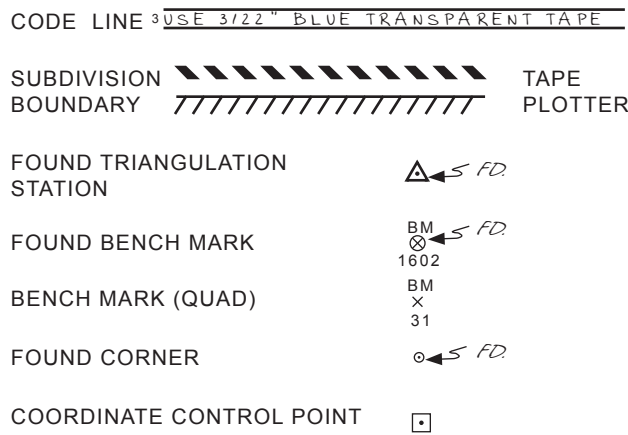


Figure 2-15

The subdivision line origin is similar to that of code lines. The hatch line designation was done in free-hand. This was costly, time-consuming, and didn't always look professional. To expedite tracing, a "zip" sheet (with fine hatch lines) was cut into fine strips and burnished onto the reverse side of the tracing. This process was slightly faster, a little neater, but not too permanent. After some use, the zip adhesive dried and fell off the tracings.

A heavier-patterned, transparent, pressure-sensitive tape was adopted as the standard subdivision boundary symbol. The symbol shown in Figure 2-15 was made with Chartpak 6238 T transparent pressure-sensitive tape. This process is now standard.

Map Arrows

Map arrows are used to clarify points of measurement or points of call. They are also used to show the direction of flow of a stream, or to direct map information to the line, point or space the information relates to.

It is important to make arrows neat and in accordance with conventional drafting graphic standards (Figure 2-16).

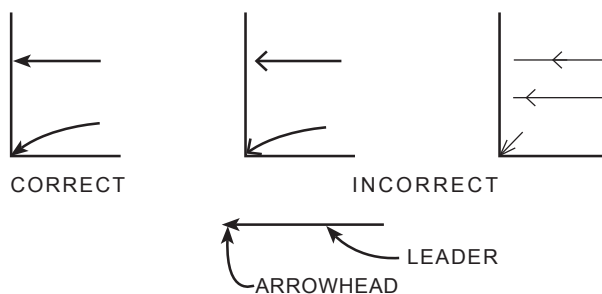


Figure 2-16

All arrowheads should be the same. However, various combinations of leaders can be used to clarify points of measurement when more than one measurement is shown on a line (Figure 2-17).

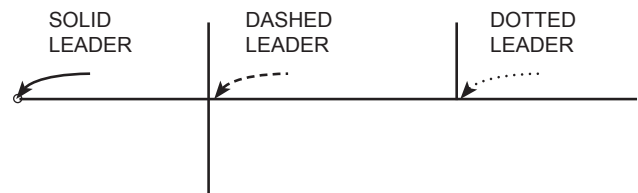


Figure 2-17

Whenever a line (regardless of line designation) intersects another line between two points of measurement, arrows **MUST BE USED** to clarify those points (Figure 2-18).

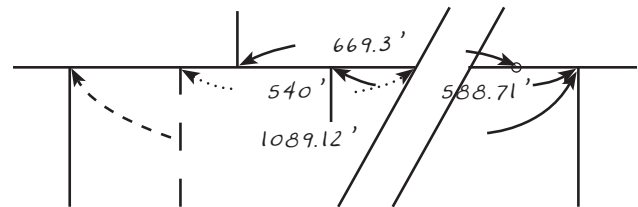


Figure 2-18

Figure 2-19 illustrates the proper method for designating the direction of flow of a stream. The arrow used in large streams should be larger than the arrows used to identify points of measurement.

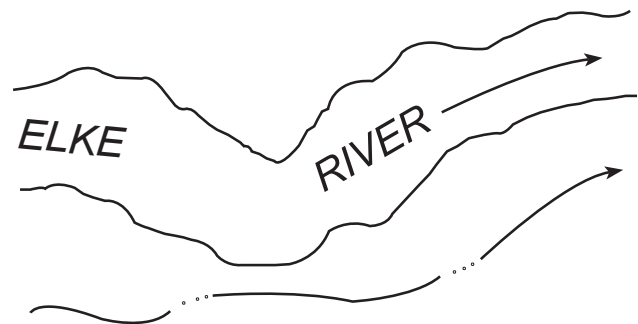


Figure 2-19

The direction of a stream may seem unimportant. However, many deeds run to the *right banks* or *left banks* of rivers. Without knowing the direction of flow, it is impossible to identify which bank is the left and which is the right bank of the stream. Note: Determination is made while facing downstream.

Knowledge of the direction of flow is essential when considering riparian right (problems of avulsion, erosion, reliction, etc.).

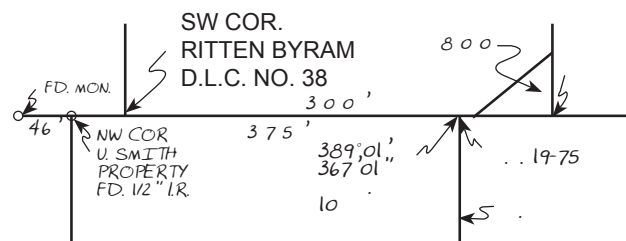


Figure 2-20

PROPER USE OF CIRCLES

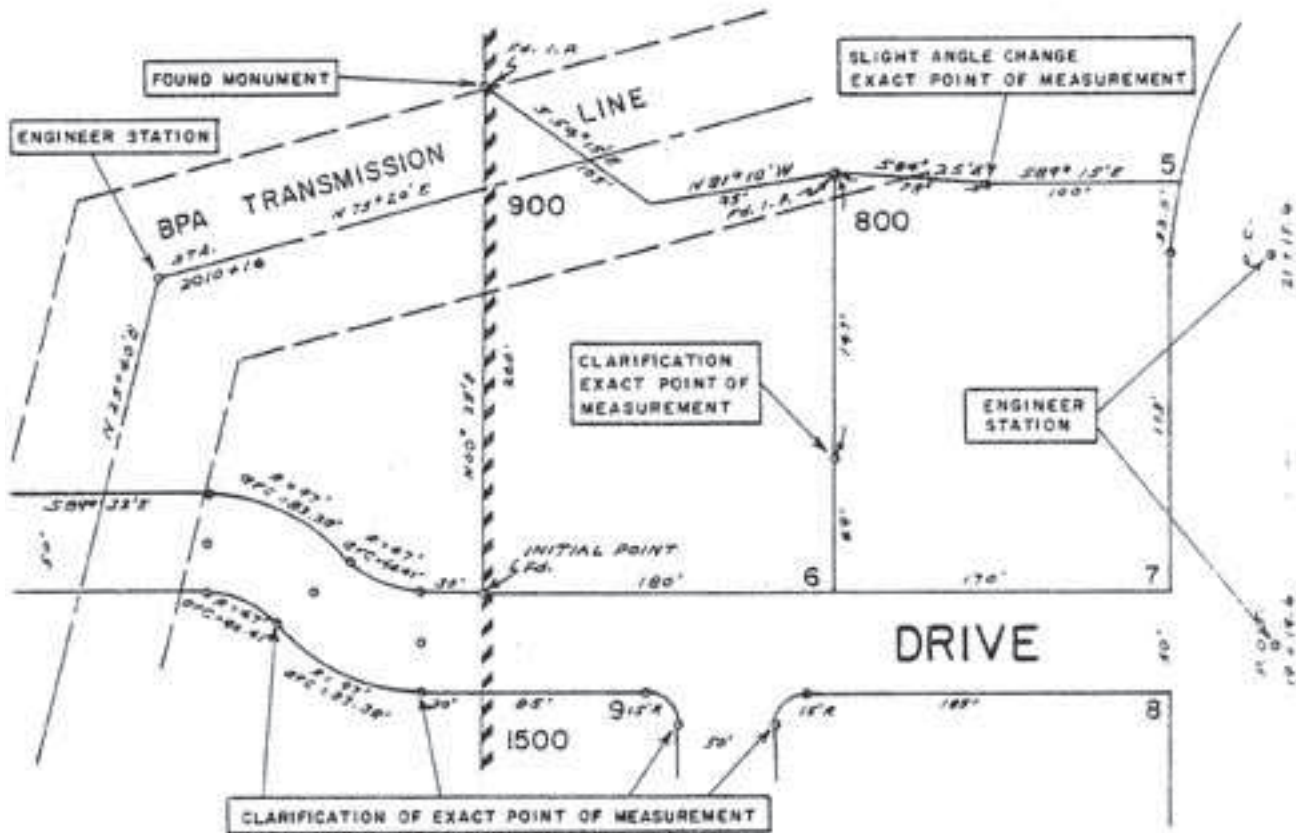


Figure 2-21

Figure 2-20 shows how map information is directed to points, space and lines on a map. Perfectly straight arrow leaders can often be confused with parcel lines, survey lines, etc. So it is recommended that the arrow leader for designating map information location be curved (Figure 2-20).

Circles

Circles are used on the map to clarify and identify points of measurement, found corners, initial points, meander corners and engineer stations.

The circles should be about $\frac{1}{20}$ inch in diameter, with a dot (or point) in the center to designate the exact point of measurement. The circles on manually maintained maps should not be bisected by lines. Circles on computer-generated maps may be bisected by lines.

Figure 2-21 demonstrates the proper use of circles.

U.S. Rectangular Survey Lines and Information

Section corners are required on $1''=400'$, $1''=200'$ and $1''=100'$ scale maps and should be spaced as illustrated in Figure 2-22. The section lines of adjoining maps must be extended from the section corner on the bearing of the adjoining maps.

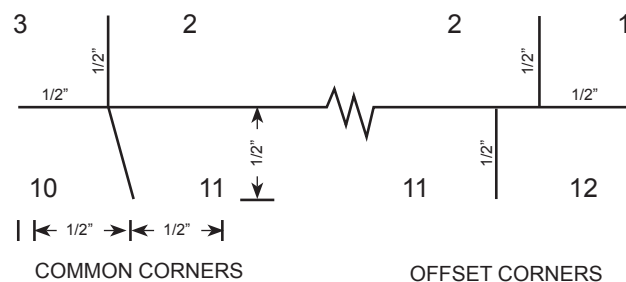


Figure 2-22

Found section corners must be identified by circles. If they are coordinate map control corners, they must

be identified by the standard coordinate control point symbol (Figure 2-23).

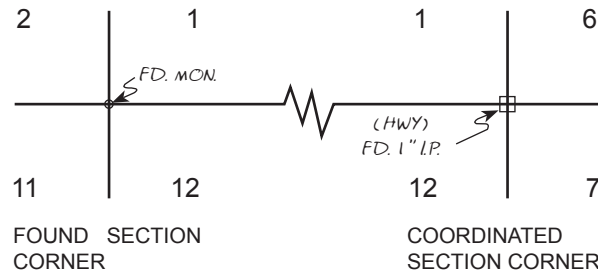


Figure 2-23

Section corners of unsurveyed public lands (usually in national forests) are shown by nonintersecting lines, as in Figure 2-24. This only indicates the approximate location of the section corner *had it been actually surveyed*.

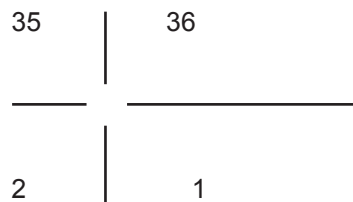


Figure 2-24

Quarter corners and centers of sections are labeled only on 1"=400' scale maps when they could be mistaken for another corner, or when offset $\frac{1}{4}$ corners exist (Figure 2-25).



Figure 2-25

Centers of sections and $\frac{1}{4}$ corners must always be labeled on 1"=200' and 1"=100' scale maps.

$\frac{1}{16}$ section corners must be shown and labeled on 1"=100' scale maps. However, $\frac{1}{16}$ lines should not be shown running through recorded subdivisions unless the line coincides with property boundaries within the subdivision.

$\frac{1}{16}$ section corners need only be labeled when specific identification is desired on all maps scaled differently than 1"=100', or where the $\frac{1}{16}$ corner might be confused with another corner.

$\frac{1}{4}$ and $\frac{1}{16}$ lines are shown on 1"=2000' scale maps only when the lines are parcel boundaries, government lot lines, or when the lines are shown to clarify

tracts conveyed by separate deeds that are a part of one parcel.

Meander corners must be shown and labeled "M.C." All meander corners must be indicated by circles (Figure 2-26).

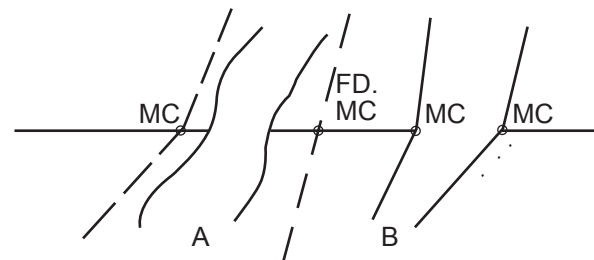


Figure 2-26

When meander lines do not coincide with mean high water, as in Figure 2-26(A), they are dashed unless specifically designated (in no uncertain terms) in the deed as the limit of ownership. In Figure 2-26(B) the meander line and mean high water line coincide.

Omit the word "government" on all government lots on tracings.

Section lines running inside public rights of way or railroad rights of way must be dashed.

Whenever possible, all of the following survey data should be included on cadastral maps.

- Government lot numbers (except on 1"=100').
- Government lot acres (except 1"=100').
- Public land survey dimensions, bearings and ties (includes D.L.C.s).
- Surveyed meander lines, dimensions, bearings and ties.
- Standard parallels.
- Section corner numbers (except 1"=2000').
- Section numbers on 1"=2000' (except in indexed areas where map number if shown instead of the section number).

All internal and external donation land claim corners (D.L.C. corners) must be labeled. Figure 2-27 will aid in labeling the corners.

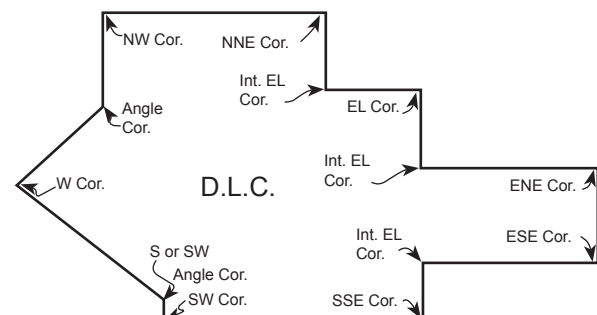


Figure 2-27

N 89° 45' W 10.01 Chs. = 2640.66'	
NW COR P.W. NICHOLAS DLC No 45	NE COR DLC No 45



All donation land claim dimensions, bearings and ties must be shown (Figure 2-29).

Always label D.L.C. lines when none of the D.L.C. corners lie on the map (Figure 2-30).



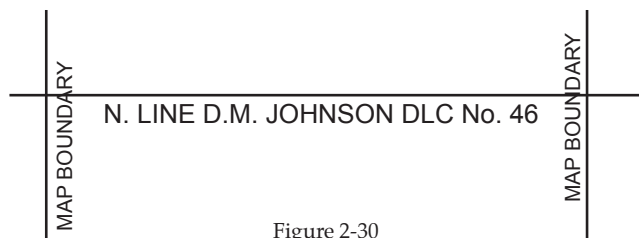


Figure 2-30

A listing of D.L.C.s may be added to cadastral maps. The list should be placed to the left of the map number in the upper right hand corner of the map. The D.L.C. list is optional (Figure 2-31).

DLCs	MAP NUMBER
D. McLENDON DLC NO. 37	
D. BAKER DLC NO. 38	
A.K. HASH DLC NO. 43	
D. ALDRICH DLC NO. 44	

Figure 2-31

If the point of call of a deed or survey is the center of a road or street, the points of call should be shown by ticks (Figure 2-34).

If a street right of way has been purchased by deed, the deed reference number should be shown in the right of way (Figure 2-34).

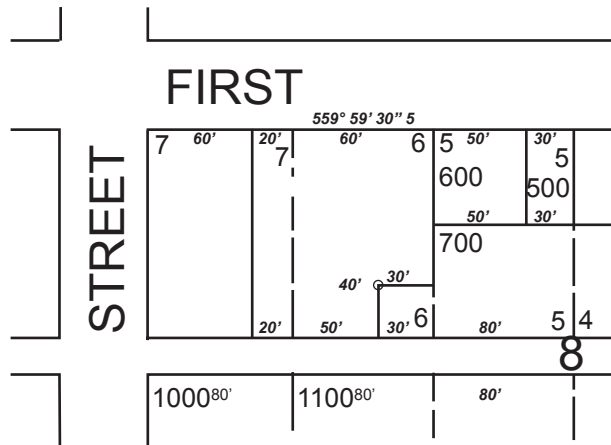


Figure 2-32

If an existing street right of way is not being used for public purposes, it must be separated from streets that are being used by the public and tax-lotted with the adjacent owner or owners.

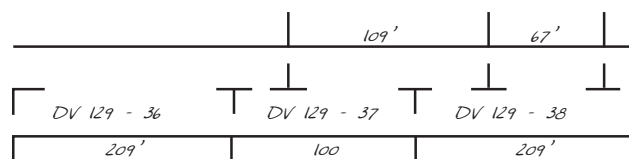


Figure 2-34

The word "VACATED" and the ordinance number must be shown in officially vacated streets and alleys (No. 4 of Figure 2-33).

Private roads must always be separated from public roads, labeled "PRIVATE ROAD," and assigned a tax lot number.

Subdivision Data

The following subdivision data should be shown on cadastral maps:

- Subdivision name.
- Subdivision boundaries (Fig. 2-15).
- Block numbers or letters.
- Lot numbers.
- Streets, alleys, public walkways, bicycle paths (dashed if easement only).
- Subdivision dimensions.
- Bearings.
- Initial points.
- Vacated parts of a subdivision should be shown if still referred to in deeds. However, the vacated area should be labeled "vacated." The subdivision boundary zip moved to indicate the remaining portion of the subdivision.

If lot lines are split by property lines, as in lots 6 and 7 of Figure 2-32, the lot numbers must be shown in the opposite corners of the segregated lots.

If a subdivision lot is split both vertically and horizontally, as in lot 5 of Figure 2-32, the lot number must be shown in each corner that has been separated by the parcel lines.

Lot and block corners lying in a highway right of way, such as lots 5, 6, 7 and 8 of block 9 in Figure 2-33, must be shown as ticks (unless the lot has been officially vacated). No. 2 of Figure 2-33 shows how the numbers of lots located in a highway are to be shown.

If a subdivision boundary forms the boundary of a map, that line should be labeled (subdivision name) on the adjacent map (No. 3 on Figure 2-33).

Information on Public Rights of Way

When space allows, the following right-of-way survey data should be shown on cadastral maps:

- Engineer stations. At least one on each map.
- Bearings (grid or true).
- Bearing equations.
- Station equations.

Railroad Right-of-Way Data

The following railroad data should be shown on cadastral maps (when space allows).

- Engineer stations and equations. At least one.
- Bearings.
- Ties to major monuments or corners.
- Railroad name.
- Centerline and curve data.
- Right-of-way lines and widths.
- Spurs.
- Improvements on station grounds and rights of way.
- Railroad company right-of-way drawing number.

Figure 2-33 illustrates the correct way of showing railroad right-of-way information.

Map Information on Transmission Line Easements

The following transmission line easement data should be shown on cadastral maps (when space allows).

- Engineer stations. At least one per map.
- Ties to corners and parcels.
- Deflection angles.
- Name of transmission line.
- Station-to-station name.
- Substations.
- Drawing number.
- Traverse or easement center line.
- Easement right-of-way lines and widths.
- Bearings and dimensions.
- Equations.

Figure 2-11 illustrates the correct method for graphic display of transmission line information.

Bodies of Water Information

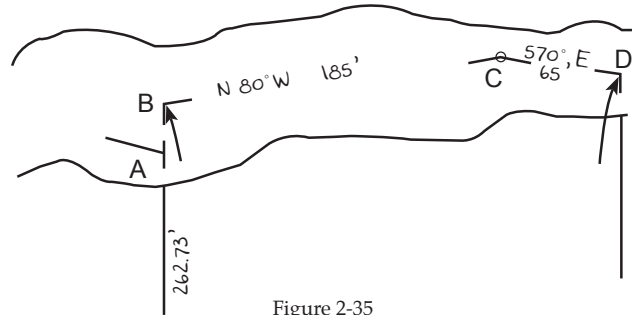
The following information must be shown on cadastral maps:

- Name of body of water (if known).
- Direction of flow (use arrow).
- Surveyed meanders lines and meander corners (of the U.S. Rectangular Survey).
- Meander line survey data (dimensions, bearings, ties, witness corners, etc.).
- Surveyed meander lines of other surveys (other than the Rectangular Survey).
- Tidelands.
- Mean high-water line, mean high-tide line, ordinary high water (on ocean shore-if known), mean low-water line, mean low tide, mean low water (when these lines can be identified).
- Vegetation line and statutes (Figure 2-13 and appendix).
- Ocean shore.
- 5.7-foot contour on ocean shore (when identifiable).

“Tidelands” should be labeled as shown in Figure 2-10.

The treatment of riparian boundaries is a critical element of the cadastral map. It is advisable to read Volume 2, Chapter 2 on the U.S. Rectangular Survey, and Volume 5 on Riparian Rights. It is essential that both areas are completely understood by the cartographer before plotting riparian boundaries.

The points of call of deeds and surveys must be shown as illustrated in Figure 2-35. Points of call to points anywhere between the boundaries of a body of water should be identified by ticks (points A, B, C and D in Figure 2-35).



Deed and Survey Information

The following deed and survey information must be shown on cadastral maps (when space allows).

- Dimensions and bearings.
- Ties to monuments, corners, highway engineer stations, etc.
- Survey numbers (drawing numbers, or file numbers).
- Points of call when not evident on the map (e.g., NE corner of DV 162-38).
- Right-of-way survey data (engineer stations, curve information, widths, traverse dimensions and bearings, etc.).
- Easements (except small utility easements). g. Ties to points lying off the map.

Map Boundaries

When a road, highway, street, railroad, alley, D.L.C. line, stream or subdivision is the boundary of a map, it must be also shown on the adjacent map.

On index maps, the boundary line dimensions and bearings should be shown.

Index Maps

Index maps must show only the following data:

- Public thoroughfares.
- Map boundaries.
- D.L.C. lines and corners.

- d. Transmission line easements.
- e. Major landmarks such as: airports, parks, mountain peaks, etc.
- f. Bodies of water.
- g. Railroad rights of way and spurs, centerlines.
- h. Map numbers.

Tax lotted parcels must not be shown in index areas. The practice of showing tax-lotted parcels on more than one map is a major cause of double assessment.

Measurements

When actual distances of parcel lines are not given in deeds or surveys, and cannot be computed from existing data, a scaled distance must be shown in brackets ().

When more than one distance is given between two points of measurement and the distances conflict, the correct distance must be shown in brackets. The rule also applies to conflicting bearings. Conflicting bearings should be shown as an equation, i.e., (S.89°30'E by deed)=(S.89°37'30"E by survey).

Cancelled Parcel Numbers

Cancelled parcel numbers must be listed on the tracing under a heading titled "CANCELLED NUMBERS." The list should appear on the right margin of the map.

Once cancelled, a tax lot number (which includes the parcel number) should never be used on any other parcel of land. Reusing tax lot numbers can lead to many legal complications and assessment problems. To avoid confusion, the best practice is to use a new tax lot number.

Tracing

All tracing must be done in black tracing ink on Mylarbased film.

Line work and lettering done manually must be neat, readable, and in accordance with the standards spelled out in this chapter. The line work and lettering done on a computer mapping system should conform as close as possible with the Leroy lettering.

Tracing revisions must be done with the same care as original tracings.

Lettering on Tracings

All lettering on cadastral maps (tracings) must conform to the "Standard Letter Guide."

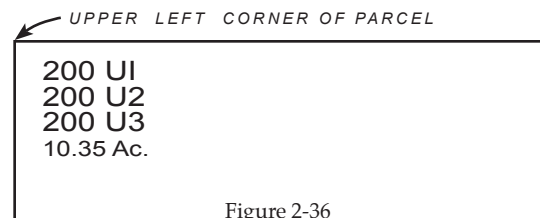


Figure 2-36

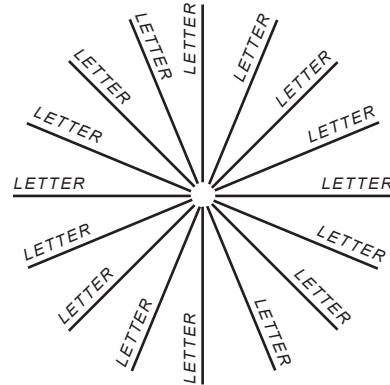


Figure 2-37

Freehand lettering must be neat, readable, and consistent in style, i.e. do not mix slant and vertical freehand lettering.

Long freehand notes should be lettered outside the map boundary.

Parcel numbers must be located in the upper left-hand corner of each parcel. If the parcel is divided by a county road, street, railroad or stream, the parcel number should be shown on all divided parts of the parcel. If a parcel is large, with complicated boundaries, the parcel number should be shown in enough places on the map to clearly define the boundaries of the parcel.

Parcel acreages are not usually applied to subdivision land. However, occasionally it is necessary to show acreages of farm tracts or irregular-shaped lots.

Parcel acreages are shown only once for each parcel. The acreage should be lettered below the parcel number in the upper left-hand corner of the parcel.

Special interest numbers are lettered below the parcel acreage; on subdivisions, below the parcel number.

Undivided-interests are lettered in the upper left-hand corner of the parcel (Figure 2-36).

Code numbers should be lettered in the approximate center of the code area on the map.

Zoning district numbers (if shown) are placed in the upper right-hand corner of each zone on each map. The zone numbers are underlined.

Subdivision names should be lettered across the subdivision on approximately a 60-degree angle.

Block or tract numbers are lettered in the center of each block or tract.

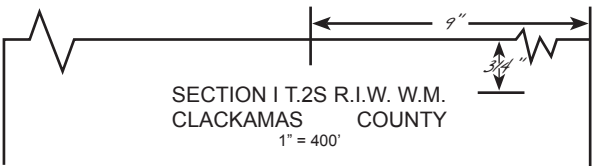


Figure 2-38

Lot numbers should be lettered adjacent to streets (Figures 2-32 and 2-33).

Lettering must be read from the bottom and right-hand side of the map. The guide in Figure 2-37 will assist in lettering.

The map heading must be centered as shown in Figure 2-38. (See location on map sheet in Figure 2-6.)

All maps are referenced on adjoining maps.

References to adjoining maps are lettered outside of the map boundary, centered between boundary corners, and spaced 3/4 to 1 inch from the boundary. They must be lettered as follows:

SEE MAP 11 5 35 AA

Index map references must be lettered in the center of the indexed area as follows:

SEE MAP
13 6 8 BB

Government lot numbers and acreages must be lettered as follows:

LOT 4 41.07

County survey numbers must be lettered in the center of the survey area of each map. The map survey notation, in freehand, should be labeled as follows:

SEE C.S. 1127

If the county survey number is unknown, note the survey by using the name of the party having the survey made, and the date of the survey as follows:

SEE SURVEY FOR C. JOHNSON, Jan. 14, 1949

Mineral monuments should be labeled “MM” and the number of the monument as follows:

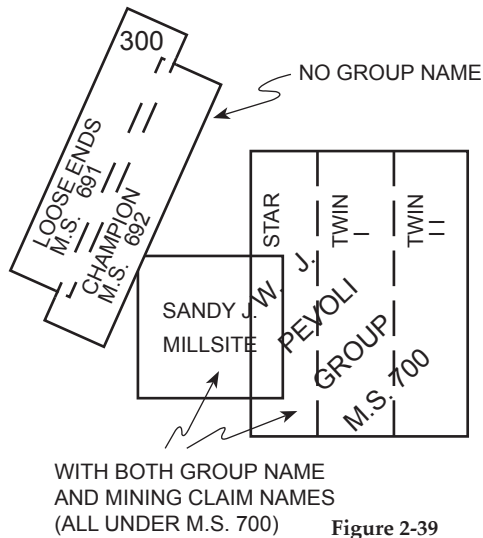
MM NO. 1

The names of mining claim groups, of individual mining claims, and the mineral survey number should be as illustrated in Figure 2-39.

In addition to the foregoing mining claim information, dimensions and bearings of all mining claim boundaries and survey ties must be included on the map. This is essential because of the complexity of mining claim surveys.

PEN SIZES			
Mechanical Lettering Guide			
TEMPLATE*	PEN SIZE *	TEMPLATE*	PEN SIZE *
60	000	240	3
80	000	350	4
100	00	500	5
120	0		
140	1		
175	2		
200	2		
* “Leroy” or similar			

Patented Mining Claims



Summary

The lettering guide (pages 2-19 through 2-22) is also a summation of required map data.

Lumped together in one chapter, the map information requirements appear to be an excellent example of information overkill. In traditional cartographic practices, too much information makes a map less attractive.

Appearances, in this case, are misleading. First, a cadastral map is not designed to be artistic; it is a tool, a record source, and a technical worksheet. It is designed to show land base data and the technical support for that data. The information required in this chapter is the technical support.

Second, no single map in the statewide system would contain all of the information elements shown on the lettering guide. It is rare, for example, to find a 1"=100' scale map with a state highway, railroad and transmission line easement. Likewise, it is rare to find a 1"=400' scale map with the quantity of subdivision information that would appear on a V=100' scale map. In fact, when compared to all of the standard cadastral maps in the state, only a small percentage of the maps have the vegetation line, meander lines, reservoirs, tidelands, index map boundaries, standard parallels, mining claims, undivided interests, or the ocean.

Third, there is a considerable investment in obtaining the information necessary to construct or maintain a cadastral map. It can be as much as 50 percent of the cost of a map. Often, once the information record is stored, it cannot be retrieved. It is wise to at least record the more important information on the map while it is readily available.

Tracings are now being made by computerized plotters incapable of producing -fine lettering under 1/20 inch. This limitation and the need to conserve space on storage tapes requires certain data be omitted from tracings, e.g. some stationing, widths, etc. If needed, this information can always be added by hand.

Endnotes

1. As of January 1988, the counties are Lane and Columbia.
2. The vegetation line is often referred to as the *beach zone line*. However, "vegetation" line is the statutory name.
3. Also called a "taxing district boundary line," "taxing district line," or "code area boundary."

Standard Letter Guide

The following is the guide for lettering cadastral maps. The guide is also a list of information that should be shown on cadastral maps. The guide is based on Leroy lettering sizes; however, any similar lettering systems may be used. The letter "C" after the Leroy size means the lettering shall be in caps; CS indicates slanted capital letters. Use 1"=100' Scale letter sizes for 1"=20' and 1"=50' scale maps. Letter size and style will vary slightly on maps produced by computer plotters. All lettering labeled freehand will be a similar size on the computer.

	Information	Letter Type	1"=100' Scale	1"=200' Scale	1"=400' Scale	1"=800' Scale	1"=2000' Scale
MAP HEADING	1. Map title	Leroy	200C	200C	200C	200C	200C
	2. County name	Leroy	200C	200C	200C	200C	200C
	3. Map Scale	Leroy	100	100	100	100	100
MAP IDENTIFICATION	4. Map Number	Leroy	200C	200C	200C	200C	200C
	5. Subtitle (under map number)	Leroy	200C	200C	200C	200C	200C
	6. City Name (incorporated only)	Leroy	200C	200C	200C	200C	200C
	7. D.L.C. listing (optional)	Leroy	120C	120C	120C	120C	120C
U.S. PUBLIC LANDSURVEY DATA DONATION LAND CLAIM DATA	8. Section corner numbers	Leroy	100	100	100	100	100
	9. Quarter ($\frac{1}{4}$) corner	Leroy	100C	100C	100C	100C	100C
	10. Sixteenth ($\frac{1}{16}$) corners	Freehand					
	11. Center of section	Leroy	100C	100C	100C	100C	100C
	12. Meander corners (M.C.)	Leroy	100C	100C	100C	100C	100C
	13. Standard parallels	Leroy	100C	100C	100C	100C	100C
	14. Section numbers (1"=2000')	Leroy					200
	15. Government lot numbers	Leroy	100	100	100	100	100
	16. "Lot" (for "government lot")	Leroy	100C	100C	100C	100C	100C
	17. Government lot acreage	Leroy	100	100	100	100	100
	18. D.L.C. corners (name and number)	Leroy	100C	100C	100C	100C	100C
	19. D.L. C. lines (name and number)	Leroy	100C	100C	100C	100C	100C
	20. Bearing and dimensions	Freehand					
MAP REFERENCES	21. Triangulation stations	Leroy	80C	80C	80C	80C	80C
	22. Side map references (of adjacent maps)	Leroy	100C	100C	100C	100C	100C
	23. Index map references (in body of index area)	Leroy		200C	200C		
	1"=200' indexed on 1"=2000'	Leroy					140C
	1"=400' indexed on 1"=2000'	Leroy					200C

	Information	Letter Type	1"=100' Scale	1"=200' Scale	1"=400' Scale	1"=800' Scale	1"=2000' Scale
MAP REFERENCES	24. See "Detail map"	Leroy			100C		60C
	25. See "Mining claim detail map)	Leroy					140C
	26. See "Supplementary map"						
	27. See "Insert"	Leroy			Suitable		
SURVEY AND DEED INFORMATION	28. Dimensions and bearings	Freehand					
	29. Engineering stations	Freehand					
	30. Oregon coordinates and O.C.S.		100C	100C	100C	100C	100C
	31. Supplemental information	Freehand					
	32. Special notes	Freehand					
	33. Gap, overlap	Freehand					
	34. References to beginning points located off the map	Freehand					
	35. Reference drawing numbers		80C	80C	80C	80C	80C
	36. Deed references numbers	Freehand					
	37. County survey numbers	Freehand					
PARCEL INFORMATION	38. Parcel numbers	Leroy	100	100	100		100
	39. Parcel acreage	80	80	80	80		80
	40. Improvement only (A1, A2, etc.)	Leroy	100	100	100		100
	41. Mineral rights only (M1, M2, etc.)	Leroy	100	100	100		100
	42. Undivided interests	Leroy	100	100	100		100
	43. "Assessed by Department of Revenue"	Leroy	100C	100C	100C		100C
BODIES OF WATER	44. Creek, river, ditch names	Watertext	200CS	200CS	200CS	(suitable)	200CS
	45. Names of lakes, ponds, reservoirs	Watertext	200CS	200CS	200CS	(suitable)	200CS
	46. Marshes	Watertext	200CS	200CS	200CS	(suitable)	200CS
	47. Ocean, bays, sloughs	Watertext	200CS	200CS	200CS	200CS	200CS
	48. Meander line survey data	Freehand					
	49. Vegetation line	Leroy	100C	100C	100C		
	49A. Tidelines	Leroy	200CS	200CS	200CS		100CS

	Information	Letter Type	1"=100' Scale	1"=200' Scale	1"=400' Scale	1"=800' Scale	1"=2000' Scale
RAILROAD AND HIGHWAY INFORMATION	50. Railroad Names	Leroy	200CS		Suitable		
	51. Highway names and numbers	Leroy	200C		Suitable		
	52. County road names and numbers	Leroy	200C		Suitable		
	53. B.L.M. and N.F.D. road names	Leroy	200C		Suitable		
	54. Street names or numbers (old names in brackets) Vacated streets, use smaller Leroy	Leroy	200C		Suitable		
	55. Easements	Freehand					
	56. Vacation ordinance numbers	Leroy		Suitable to Size			
	57. "Not constructed"	Leroy		Suitable to Size			
	58. "Vacation" (in parenthesis)	Leroy		Suitable to Size			
	59. Right-of-way survey data (includes stationing, curve data, widths, dimensions and bearings)	Freehand					
	60. Drawing number	Freehand					
TRANSMISSION LINE EASEMENTS	61. Transmission line name	Leroy	100C	100C	To	60C	(Suitable)
	62. Section Name	Leroy	200C	200C	To	60C	(Suitable)
	63. Survey data	Freehand					
	64. Drawing number	Freehand					
SPECIAL NUMBERS	65. Code number (in center of code)	Leroy	500	or smaller if necessary			
	66. Zone number (underlined)	Leroy	240CS	in upper r-hand corner of zone			
SUBDIVISION INFORMATION	67. Subdivision names (Wrico or Leroy shadow)					Suitable	
	68. Condominium names (Wrico or Leroy shadow)	Leroy		240C	Or	Suitable	
	69. Block numbers	Leroy	200	200	140		
	70. Lot numbers	Leroy	100	100	100		
	71. Reference on adjacent maps	Freehand					
	72. Dimensions and bearings	Freehand					
	73. "Park"	Leroy	100	100	100		
	74. Initial Points	Freehand					
	75. Names of unrecorded plats (dotted Leroy)	Dotted		240C	Or	Suitable	
	76. Lot and block numbers of vacated subdivisions (show only when necessary)	Leroy	200 100	For all blocks (or suitable) For all lots			

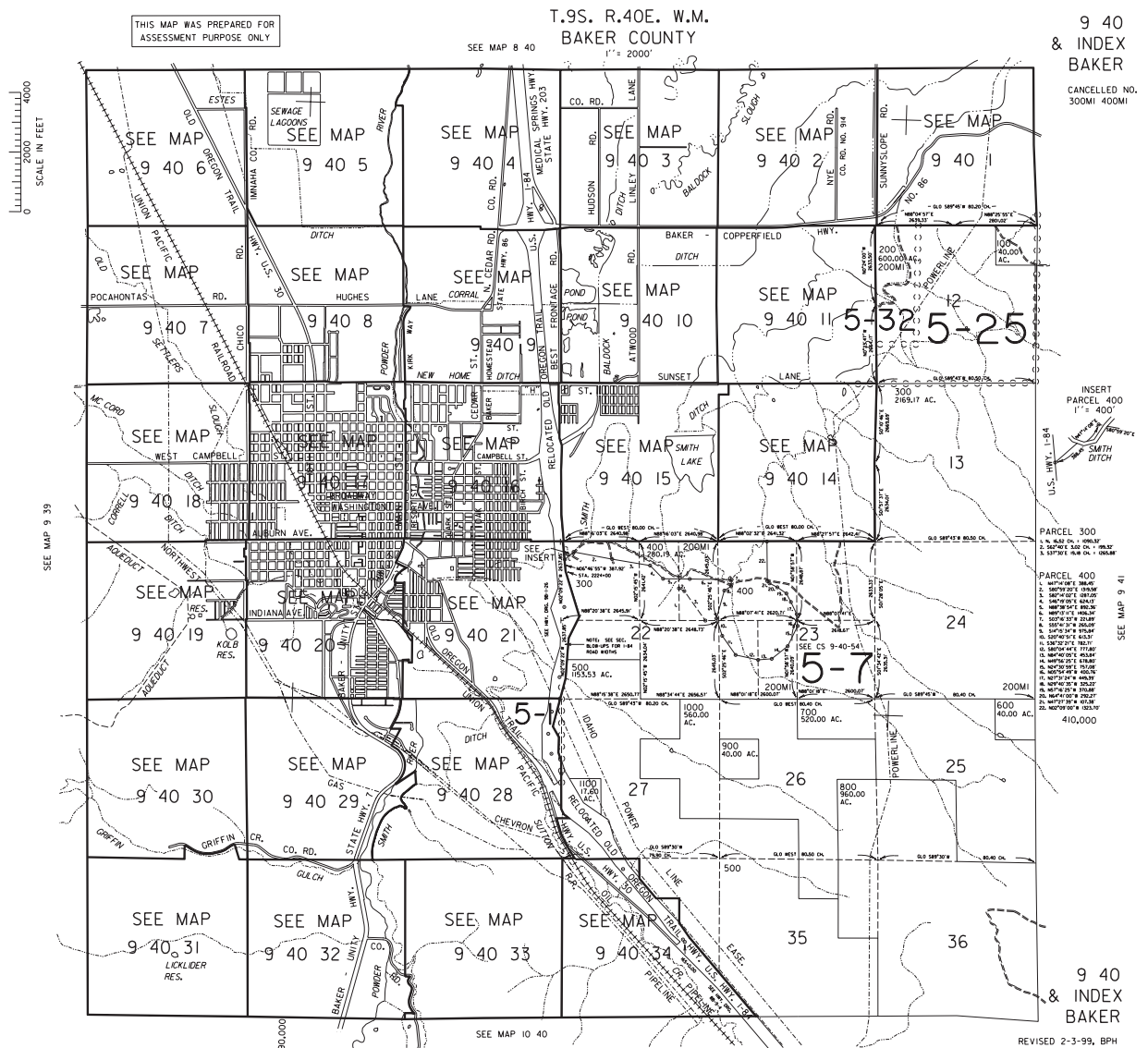
Information		Letter Type	1"=100' Scale	1"=200' Scale	1"=400' Scale	1"=800' Scale	1"=2000' Scale
POLITICAL OR SPECIAL BOUNDARIES	77. Adjacent state or county names	(Shadow Leroy)	240C	240C	240C	240C	240C
	78. "County line"	Leroy	100C	100C	100C	100C	100C
	79. "City limits line"	Leroy	80C	80C	80C		80C
	80. Special boundaries (Indian reservations, wildlife reserves, etc.)	Leroy	80C	80C	80C	80C	80C
MINING CLAIM INFORMATION	81. Mining claim name	Leroy	100C	100C	80C	80C	60C
	82. Mineral survey number (M.S.) No, ____	Leroy	100C	100C	80C	80C	60C
	83. Mining claim survey data	Freehand					
	84. Mineral monument (M.M.)	Leroy	100C	100C	100C	80C	60C
	85. Mining group name	Leroy		Suitable	to	size	

Standard Letter Guide

Special Maps

Information	Letter Type	1"=100' scale to 1"=400' scale	1"=800'
1. Parcel numbers (supplementary maps only)	Leroy	See Standard Letter Guide	80
2. Tax lot numbers	Leroy	See Standard Letter Guide	80
3. Parcel or tax lot number acreage	Leroy	See Standard Letter Guide	60C
4. Bodies of water	Leroy	See Standard Letter Guide	80C
5. Highways, roads, streets	Leroy	See Standard Letter Guide	80C
6. Section corner numbers	Leroy	See Standard Letter Guide	80
7. Mining claim names and numbers	Leroy	See Standard Letter Guide	80C
8. Government lot numbers	Leroy	See Standard Letter Guide	80C
9. Dimensions and Bearings	Freehand		
10. Special notes	Freehand		

Sample of a 1" = 2000' scale and "and index" map consisting of tax-lotted areas and indexed areas. Note that major landmarks, such as the airport in sections 19 and 30 have been included.



Sample of a 1" = 400' scale index map. Note that the only information shown are streets, highways, logging roads, and bodies of water.

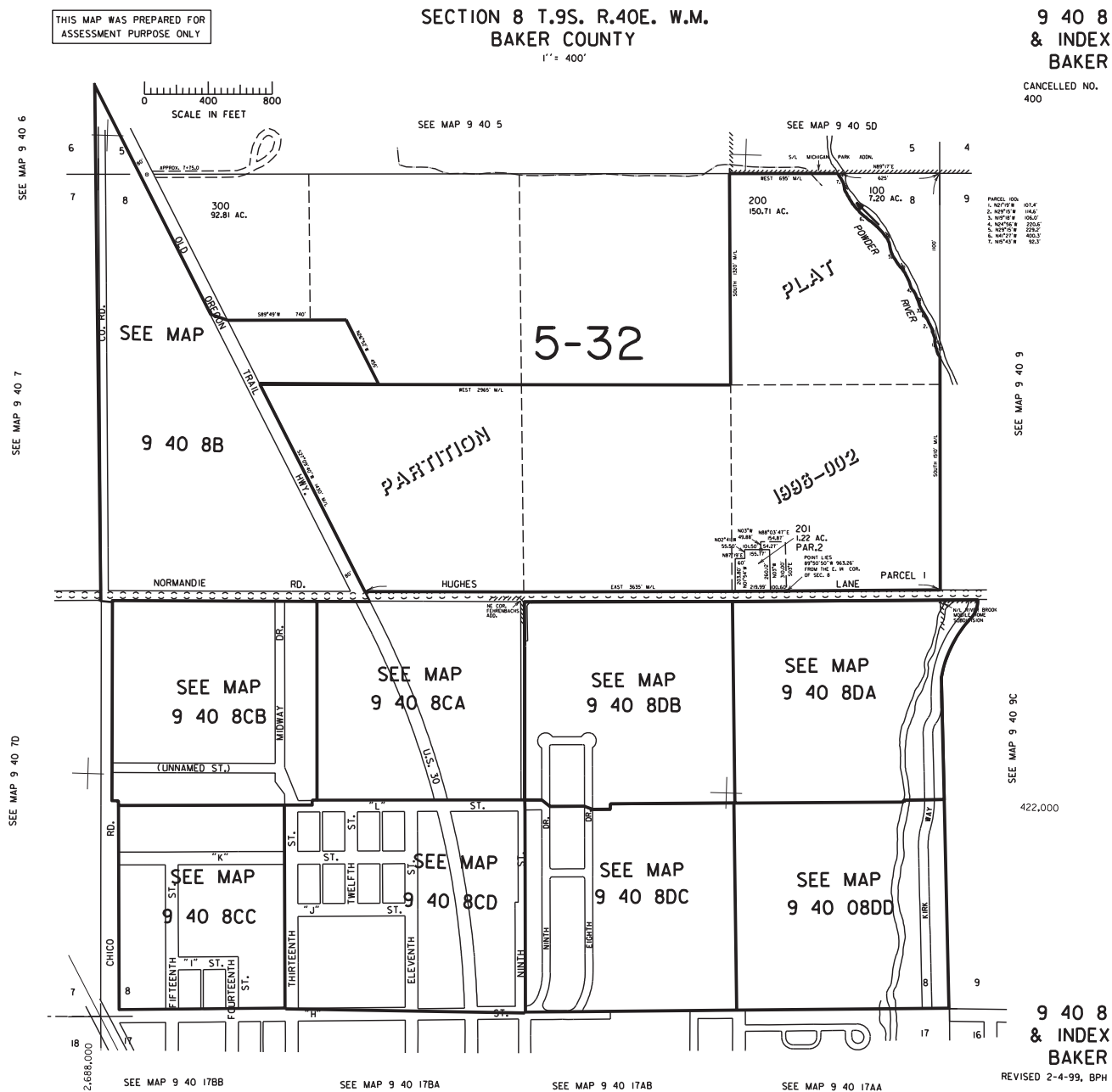


Figure 2-41

2-29

2-30

Sample of a 100" = 400' scale "and index" map showing combination of large tax-lotted areas and indexed areas.

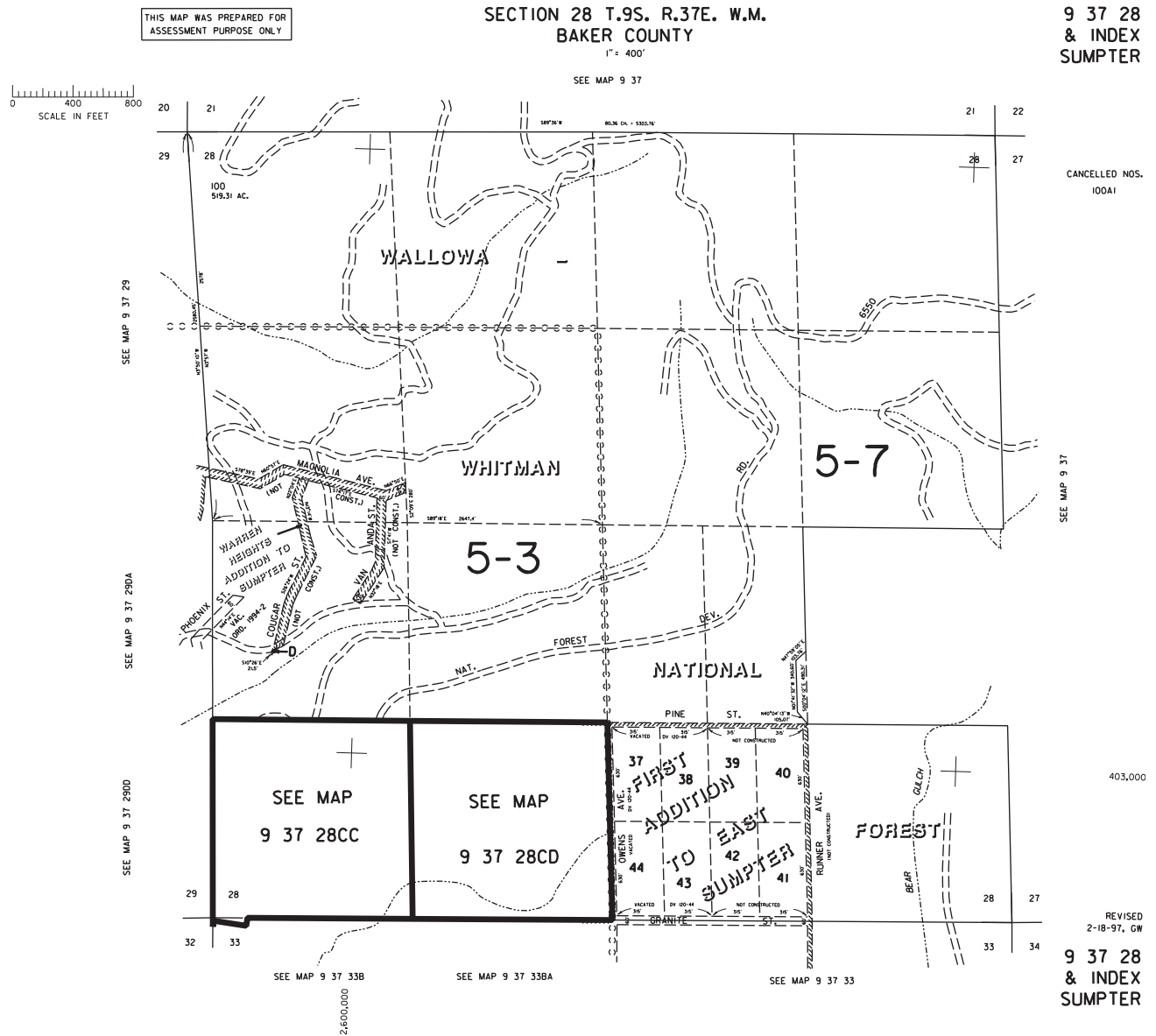


Figure 2-44

Sample of a 1" = 400' indexing a supplemental map of a condominium (see Figure 2-46).

THIS MAP WAS PREPARED FOR
ASSESSMENT PURPOSE ONLY

SE1/4 SW1/4 SEC. 6 T.13S. R.13W. W.M.
CURRY COUNTY

1" = 100'

41 13 6CD
BROOKINGS

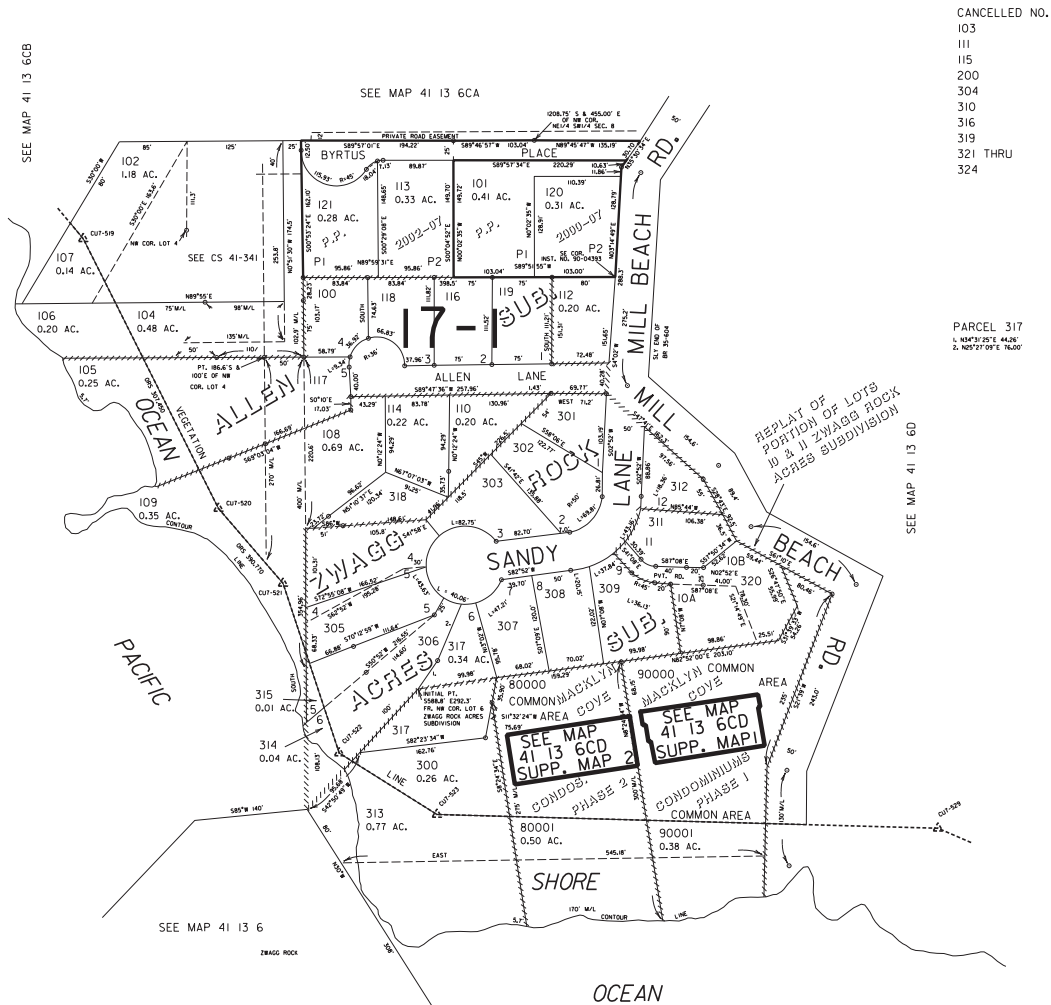
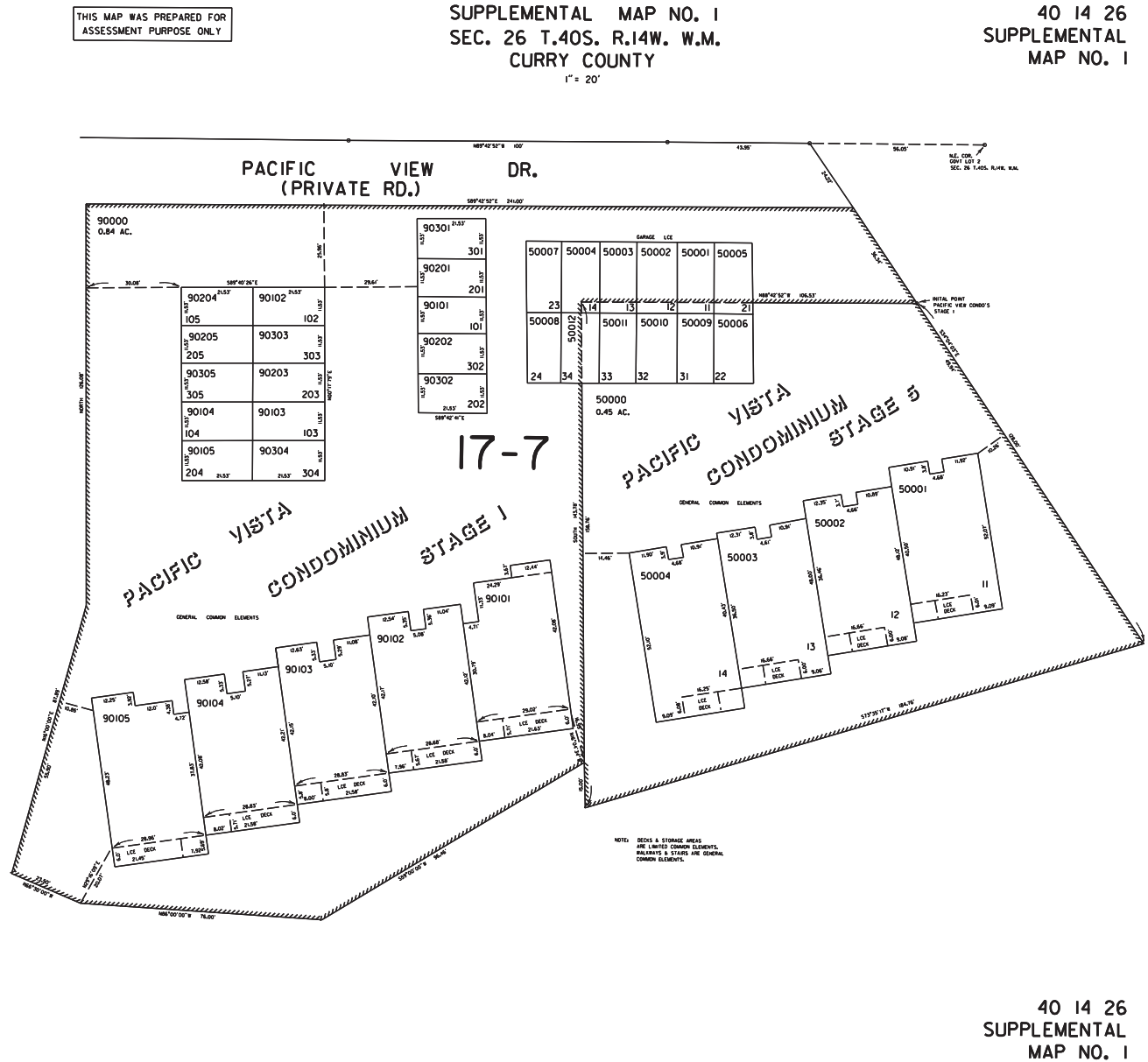


Figure 2-45

41 13 6CD
BROOKINGS
Revised
5/7/02, DBJ

Sample of a supplemental map of a condominium. Any new condominium may be added to this map to show condominium detail. The boundary is treated as a subdivision boundary.



REVISED 5-4-94

Figure 2-46

Sample of a 1" = 400' scale map of part of a section. The omitted area is presently shown on a 1" = 2000' scale map in order to avoid splitting a large ownership. If partitions or subdivisions develop in the SW ¼, they will be cancelled on the 1" = 200' scale map and brought forward to this map.

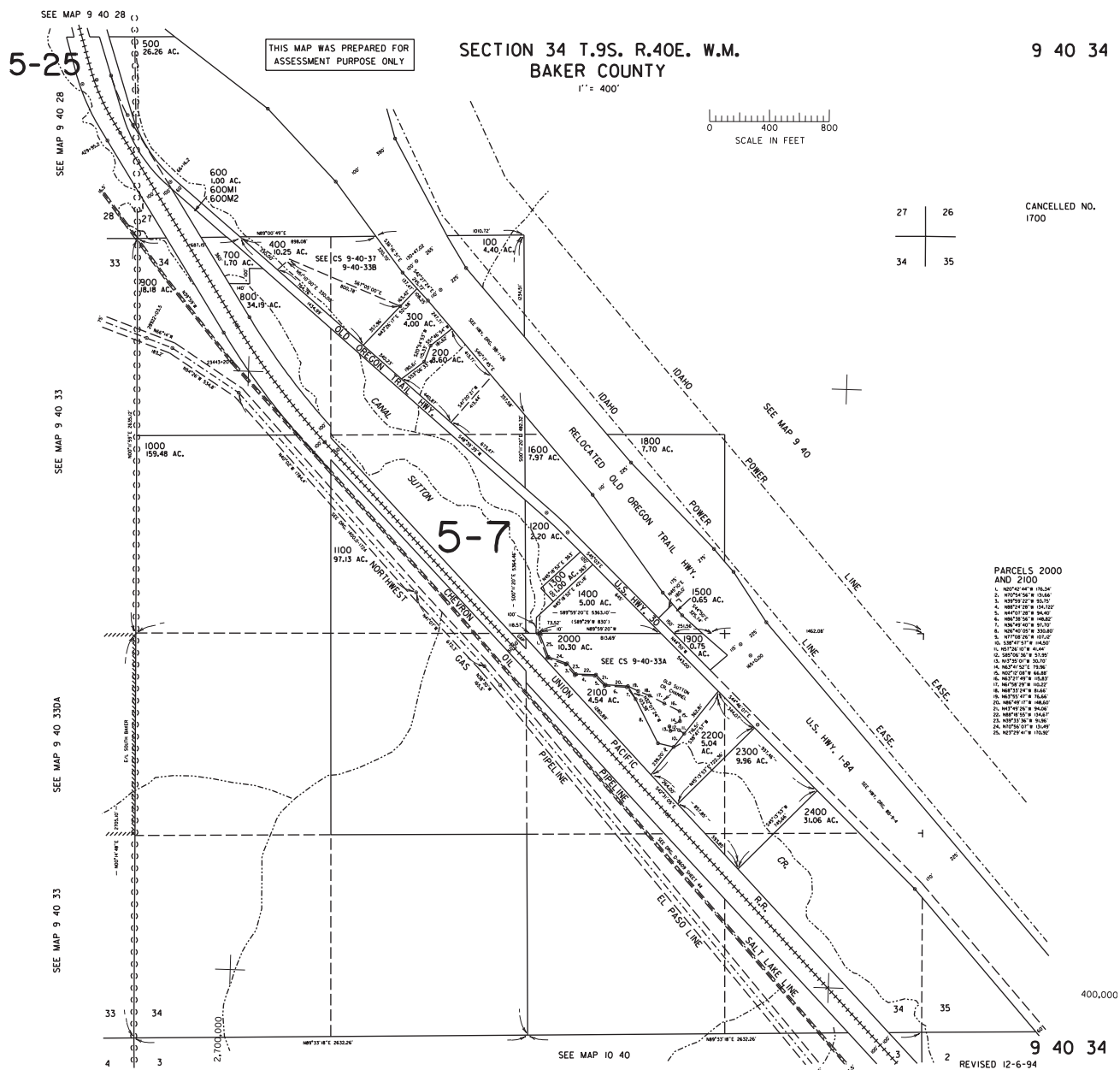


Figure 2-47

Sample of a 1" = 2000' map split by a county line. The map shows mining claims tax-lotted on this map. The detail of the claims is shown on a detail map in Figure 2-49.

THIS MAP WAS PREPARED FOR
ASSESSMENT PURPOSE ONLY

T.10S. R.35E. W.M.
BAKER COUNTY
1" = 2000'

10 35
& INDEX
GREENHORN

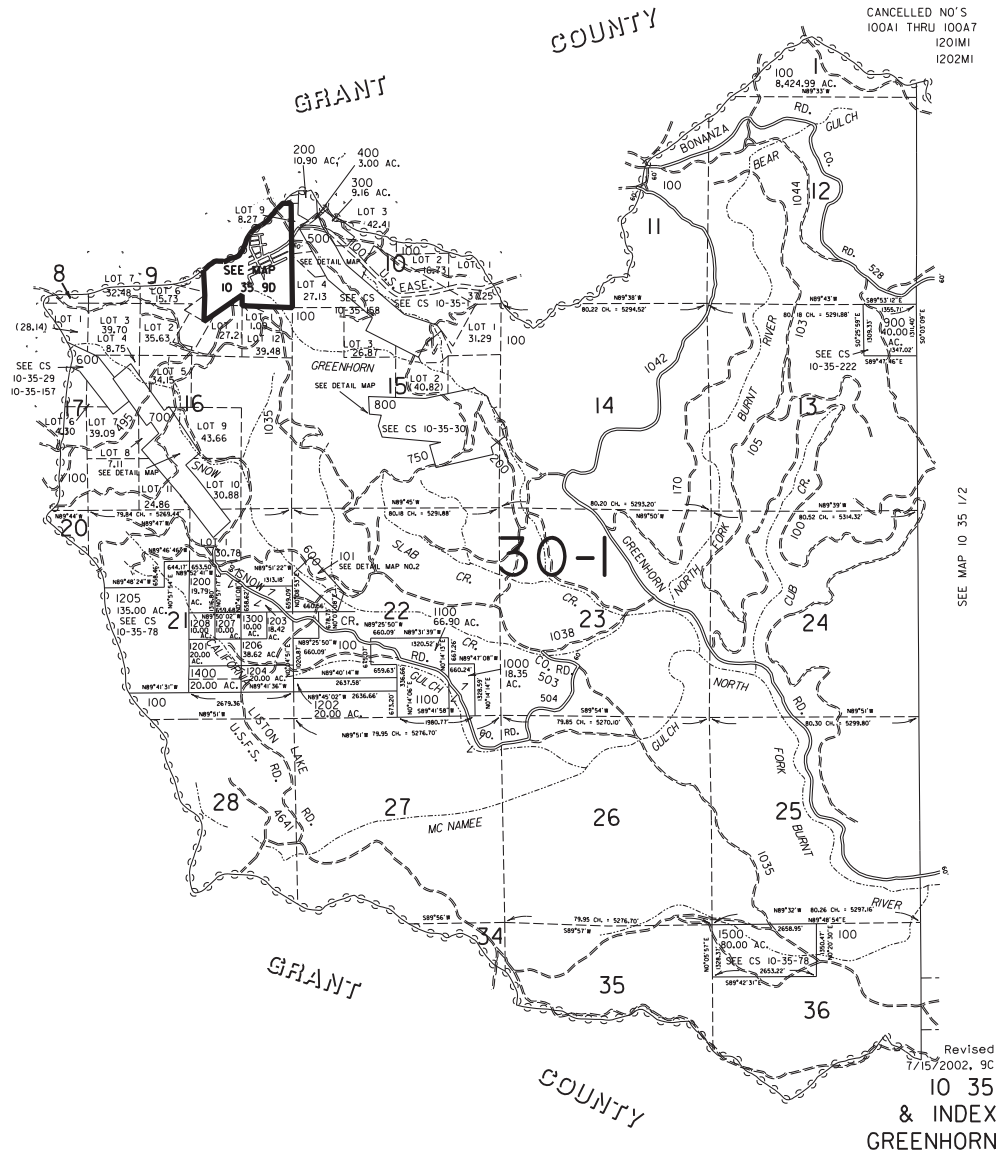
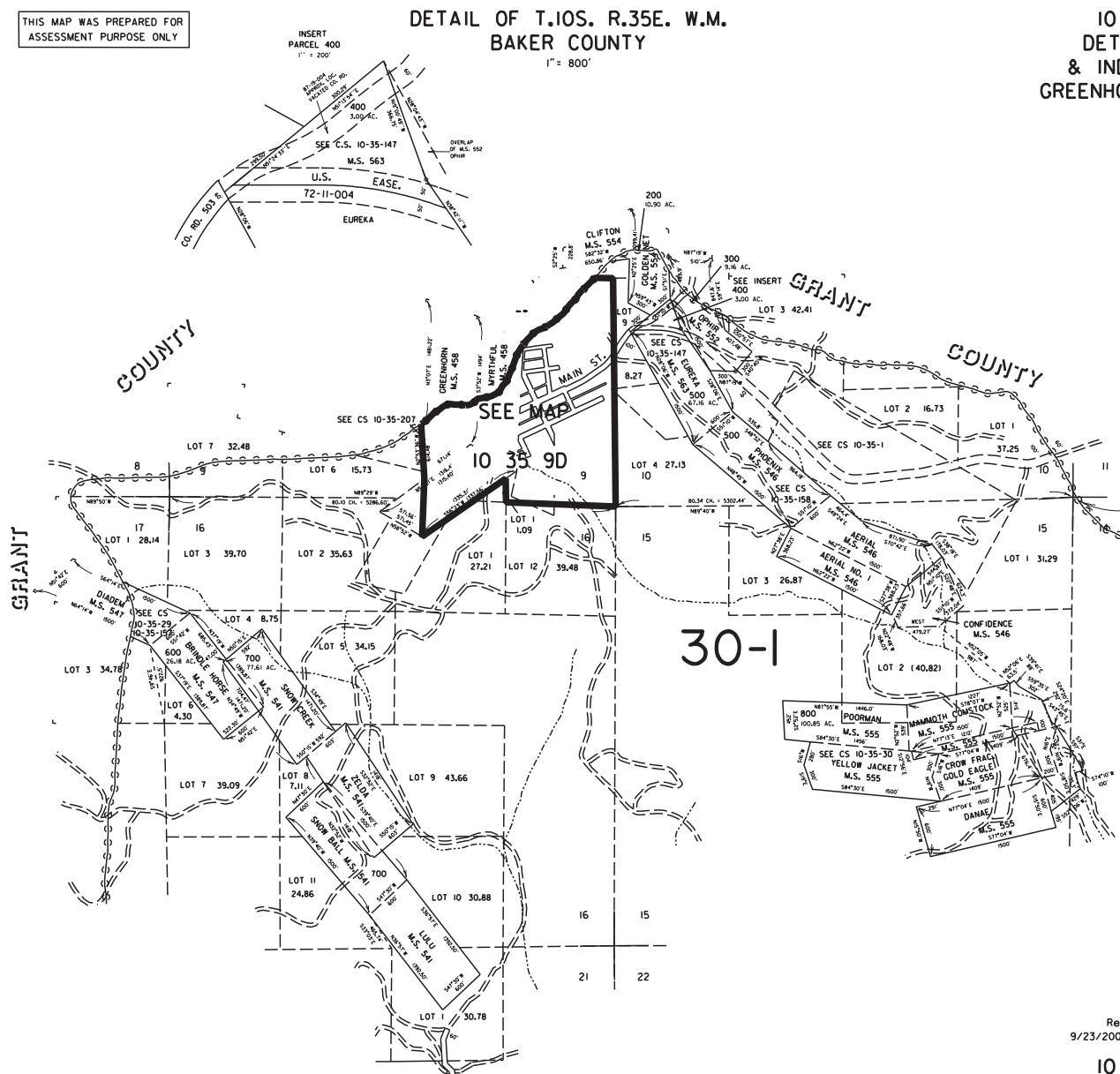


Figure 2-48

THIS MAP WAS PREPARED FOR
ASSESSMENT PURPOSE ONLY

IO 35
DETAIL
& INDEX
GREENHORN



Revised
9/23/2002, 9C

IO 35
DETAIL
& INDEX
GREENHORN

Figure 2-49

2-37

SE1/4 SW1/4 SEC.16 T.9S. R.40E. W.M.
BAKER COUNTY
1" = 100'

THIS MAP WAS PREPARED FOR
ASSESSMENT PURPOSE ONLY

0 100 200
SCALE IN FEET

BROADWAY ST.
1/16 COR.

BROADWAY (CENTRE) ST.

CLARK'S BLOCK

ST. 5-1 WASHINGTON

SEE MAP 9 40 16CC

EAST CLARK AND ADDITION

COURT (HARRISON) (BAILEY ST.) AVE.

VALLEY (WILLCOT) AVE.

AUBURN

ASH

ST. CHESTNUT

SEE MAP 9 40 16CD

SEE MAP 9 40 21BA

9 40 16CD
BAKER CITY

CANCELLED NO.
600
3000
5400
5501
5800
13700
14200

SEE MAP 9 40 16DC

Revised 8/7/00, CS

9 40 16CD
BAKER CITY

2-38

9 47



2-39

Sample of a 1" = 2000' map showing water areas in pattern.

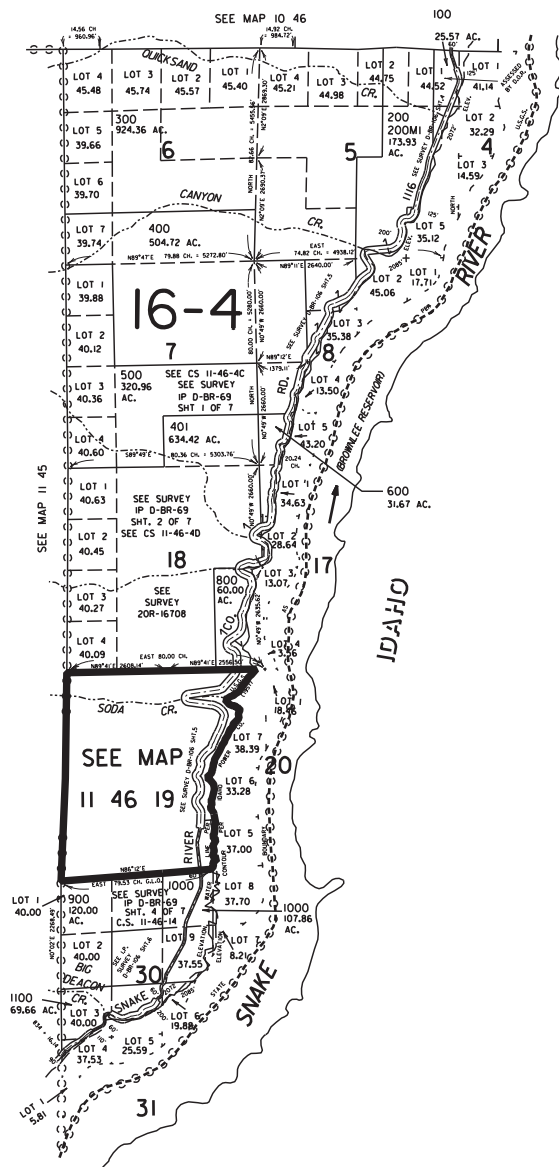
THIS MAP WAS PREPARED FOR
ASSESSMENT PURPOSE ONLY

T.11 S. R.46 E. W.M.
BAKER COUNTY

1" = 2000'

11 46
& INDEX

CANCELLED NO.
100A1
700



REVISED 10-28-97, CS

11 46
& INDEX

Figure 2-53

THIS MAP WAS PREPARED FOR
ASSESSMENT PURPOSE ONLY

13 36
DETAIL MAP



Below is an example of a detail map.

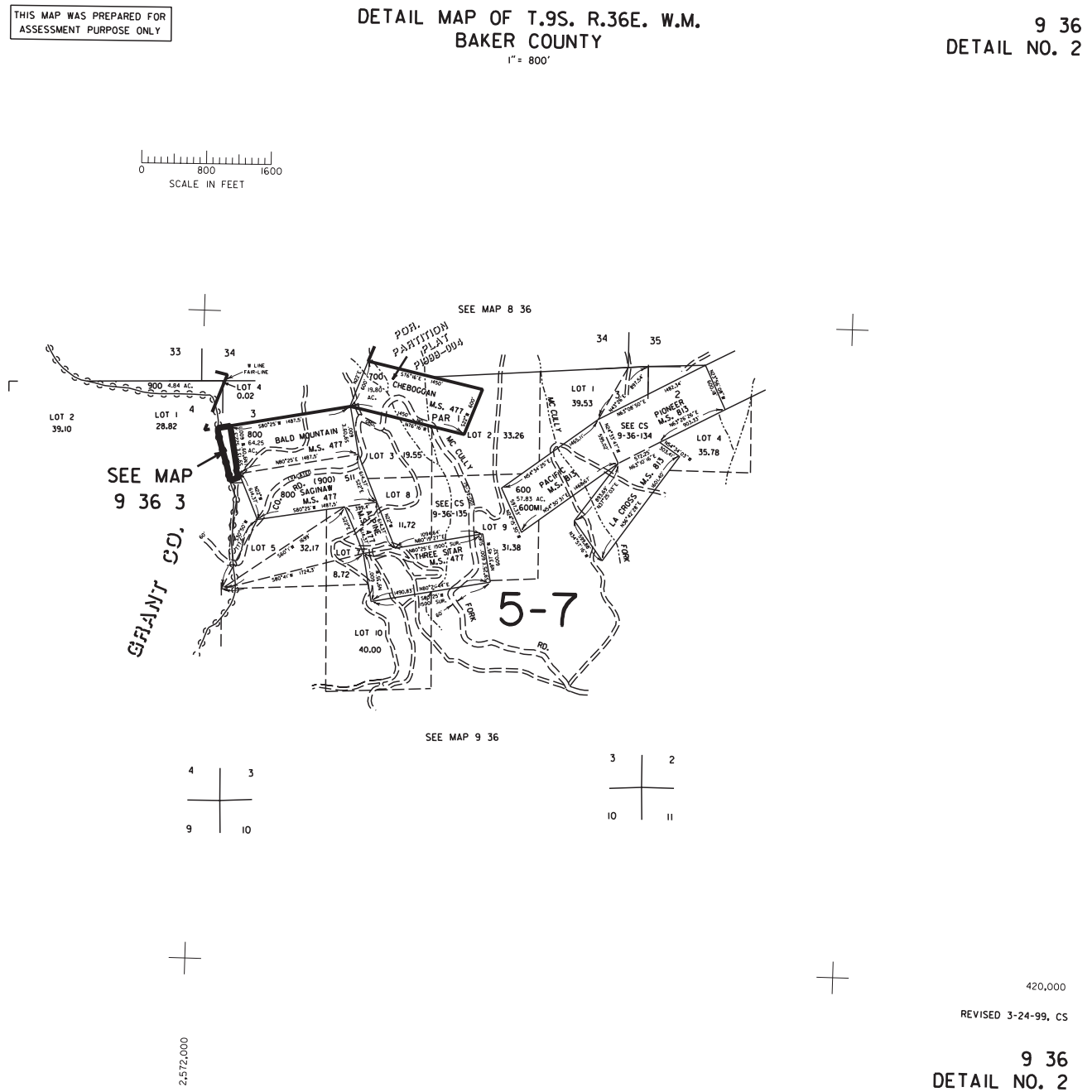


Figure 2-55

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The efficient performance of assessment tasks necessitates a parcel identifier that provides a link between the geographic location of a parcel of land, the assessment records, the legal description of the parcel, and the cadastral map.

*It should be a people number;
simple, easy to identify,
permanent, easy to maintain,
and flexible enough to adapt
to new laws, new requirements
and the computer.*

CHAPTER

THE STANDARD TAX LOT NUMBER

Based on conclusions of the North American Conference on "Modernization of Land Data Systems." (MOLDS) 1975

Introduction

To systematically identify land parcels, *a numeric, alphabetic or alphanumeric system is used. It is a code that refers to the parcels in lieu of their full legal descriptions.*

One example of a land parcel identifier system is the street address system. Other systems include the sequential serial number system, the state plane coordinate-based system, the geodetic coordinate-based system, the DIME (Dual Independent Map Encoder) system, the map based system, the government survey-based system and the government survey / map-based system.

Some of the parcel identifier systems are used for assessment administration; Others are used in the administration of federal programs such as the DIME system used by the U.S. Bureau of Census. Some of the systems are in concept only – but designed for possible use at the national level. Some parcel identifier systems are people-oriented (for manual operations); Other systems are strictly for computer operations, or manual and computer operations.

The present trend is to promote the very advanced parcel identifier. It can be designed to (1) relate to every element affecting land, (2) eliminate all other identifiers of numbering systems, (3) be national or international in scope, and (4) solve all of the problems associated with the legal cadastre (see Chapter 1).

Most of these goals are commendable. However a complex computer-oriented parcel identifier is inefficient for most manual operations. In assessment administration, most of the important work is done by people – not computers. The parcel identifier used in manual assessment operations must be easy for people to identify, understand and use. This requires the identifier to have an element (easily recognized by those who work with land-based records) that provides a link between the identifier, the cadastral map, and the geographic location of each parcel of land, and the official records of the assessment cadastre. In Oregon, that element is the government survey-based numbering system: the U.S. Rectangular Survey System.

Of all the cadastral numbering systems none is as familiar as the *section, township and range* numbering system of the U.S. Rectangular Survey. It is used, or referred to by assessment officers, surveyors, title examiners, attorneys, cartographers, appraisers, county recorders, land developers, realtors, the courts, engineers, and taxpayers (in Oregon). These people are also the primary users of the cadastral map.

The cadastral map number is directly related to the U.S. survey number. This relationship supports the government survey/map-based standard tax lot number recommended by the Department of Revenue. Cadastral records are filed in tax lot number order.

The tax lot number is not an elite identifier from a National viewpoint,¹ it is computer compatible and is used in most Oregon computerized assessment operations. It can also co-exist with special identifiers designed for the computer. In Lane County, for example, a computer-generated account number exists side by side with the tax lot number in the computer. The computer account number is a simple, sequential, numerical and designed to speed data entry and retrieval. It has no recognizable geographical element making it unsatisfactory for most manual operations. The computer-generated account number appears only as a notation on the records.

In addition to the identifier number, Lane County has a unique feature called the *self-check digit*. It is used by the computer to check the validity of the entire number. (see the glossary.) This eliminates the possibility of repeating an identifying number.

The parcel identifier described in this chapter, Components of the Standard Tax Lot Number, serves to communicate important information about the assessment cadastre, i.e.:

1. Identify the cadastral map containing the land parcel.
2. Identify the scale of the cadastral map. This provides a general idea about the size of the parcel, whether it is urban or rural, and the accuracy in which the parcel has been mapped.
3. Identify the parcel number on the cadastral map.
4. Show whether the account is an improvement only or mineral right (both being assessed separately from the land).
5. Identify the account as an undivided interest in land (requested as a separate billing from the remaining undivided interests).
6. Identify the account as being the common area of a condominium or unit of a condominium.
7. Identify the geographic location of the parcel in the county.

The tax lot number is a permanent number. The statute providing for use of the number is ORS 308.240(1) which reads (in part):²

“Real property may be described...by designation of tax lot number referring to a record kept by the assessor of descriptions of real properties of the county...”

"93,600 Description of real property for purposes of recordation. Unless otherwise prescribed by law, real property shall be described for recordation by giving the subdivision according to the United States survey when coincident with the boundaries thereof, or by lots, blocks and addition names, or by giving the boundaries thereof by metes and bounds, or by reference to the book and page of any public record of the county where the description may be found or in such other manner as to cause the description to be capable of being made certain. However, the description by tax lot number shall not be adequate. Initial letters, abbreviations, figures, fractions and exponents, to designate the township, range, section or part of a section, or the number of any lot or block or part thereof, or any distance, course, bearing or direction, may be employed in any such description of real property."

Components of the Standard Tax Lot Number

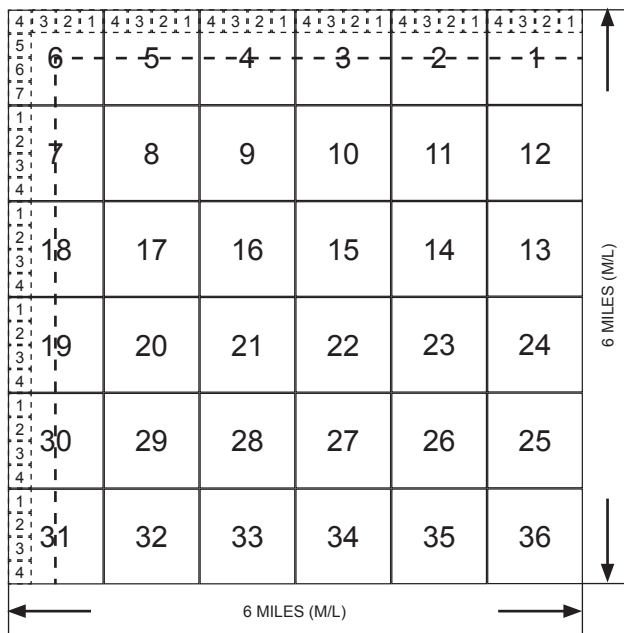
[illegible]

and (2) the tax lot number using the *unit ownership number*. Every tax lot number has a *map number* and a *parcel or unit ownership number*. A third element of the tax lot number, the *special interest number*, is only used when a special interest in real property requires separate billing.³

Standard Map Number

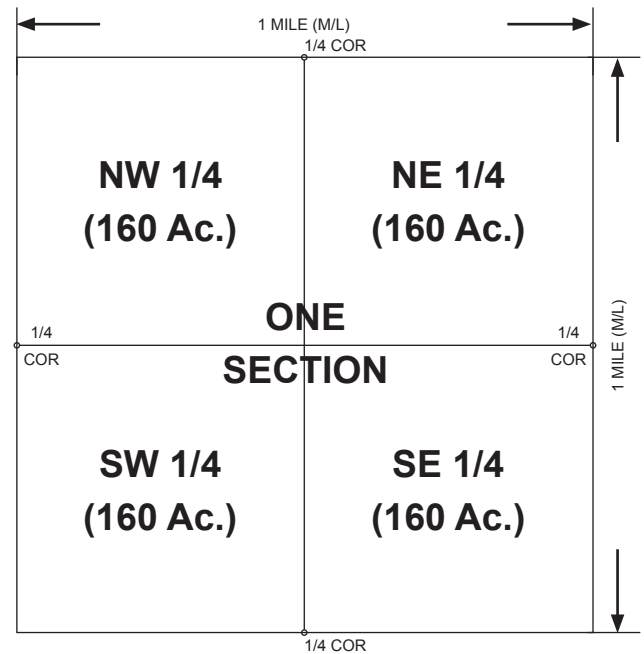
The U.S. Rectangular Survey System is composed of a Cartesian coordinate – type network of six-mile square townships that are divided into thirty-six, one-mile square sections.⁴ Each section is divided into four $\frac{1}{4}$ sections and each $\frac{1}{4}$ section is divided into four $\frac{1}{4}$ $\frac{1}{4}$ sections.⁵ The progression from the township and range network to the $\frac{1}{4}$ $\frac{1}{4}$ section subdivision network is illustrated in Figures 3-1 through 3-6.

3-4



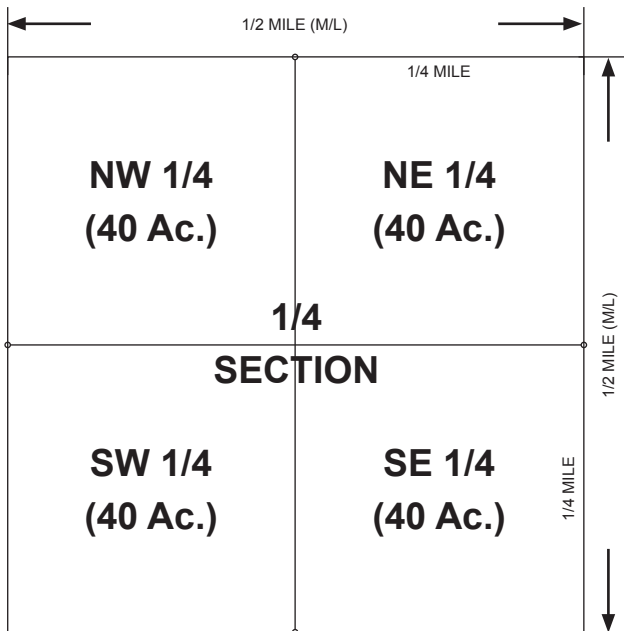
ONE TOWNSHIP
(subdivided into sections)

Figure 3-3



ONE SECTION
(showing 1/4 section subdivisions)

Figure 3-4



ONE-QUARTER (1/4) SECTION
(showing 1/4 1/4 section subdivisions)

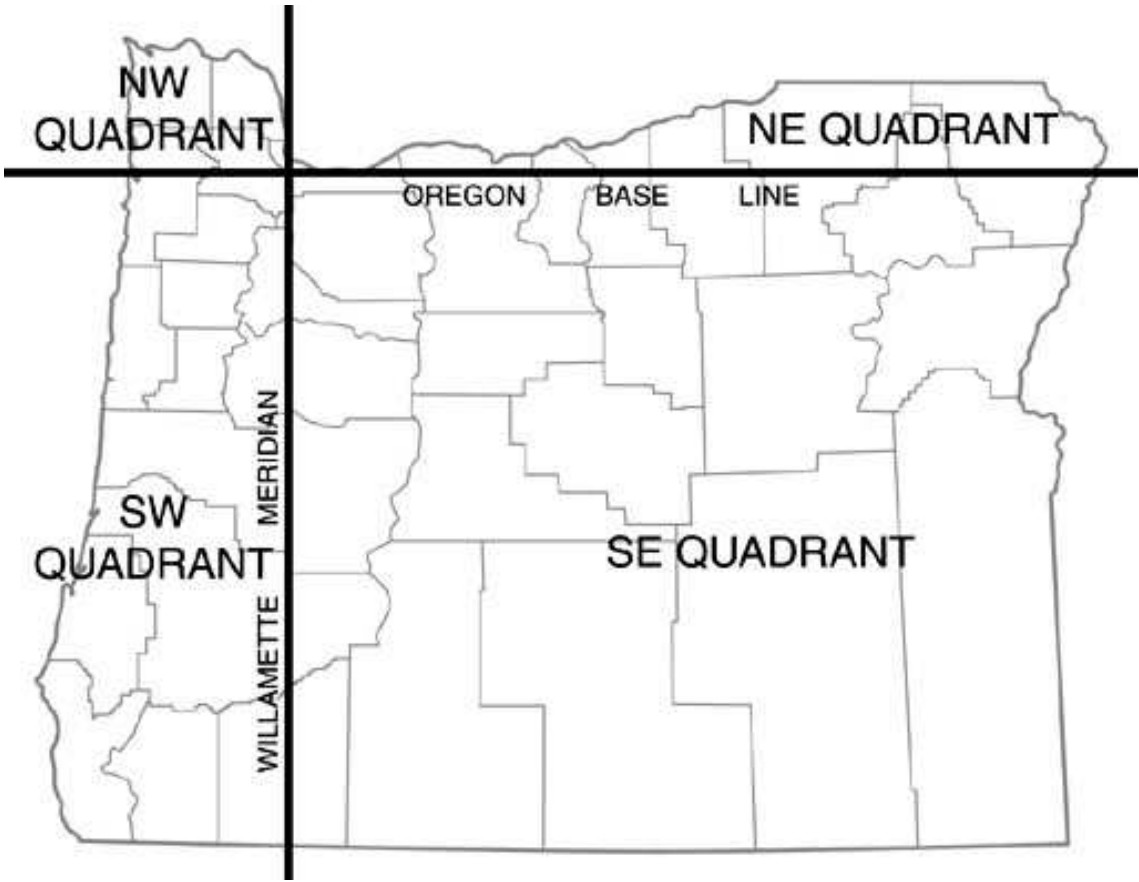
Figure 3-5



SUBDIVISIONS OF A SECTION
(showing 1/4 and 1/4 1/4 section subdivisions)

Figure 3-6

FOUR QUADRANTS OF THE U.S. RECTANGULAR SURVEY SYSTEM



SEE THE APPENDIX FOR ADDITIONAL RECTANGULAR SURVEY INFORMATION

Figure 3-7

The quadrant of a township can be determined from the township /range number, i.e.:

T.2N. R.19E. W.M.	NE Quadrant
T.3N. R.6W. W.M.	NW Quadrant
T.15S. R.1W. W.M.	SW Quadrant
T.37S. R.37E. W.M.	SE Quadrant

In other words, the “S” (for South) and “E” (for East) of T.37S R.37E. W.M. denotes a township in the SE quadrant. T.37S. R.37E. W.M. is read as: *Township thirty-seven South, Range thirty-seven East of the Willamette Meridian.*

The “37 south” means *south of the Oregon Base Line.* However, the base line is never noted in the township number (as the Willamette Meridian is noted by the abbreviation “W.M.”), nor is it read into the number. It is always understood that “north” means north of the base line and “south” means south of the base line.

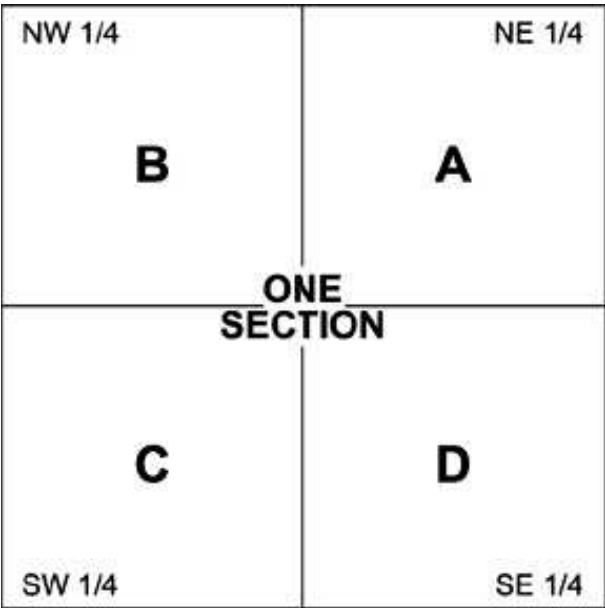
The transformation of the township, range and section number to a map number is simple. For example, the map number of a 1”=400’ scale map of Section 10 of T.3S. R.16E. would be:

3	16	10
TOWNSHIP	RANGE	SECTION

To arrive at the number the letters T, S, R and E are dropped.

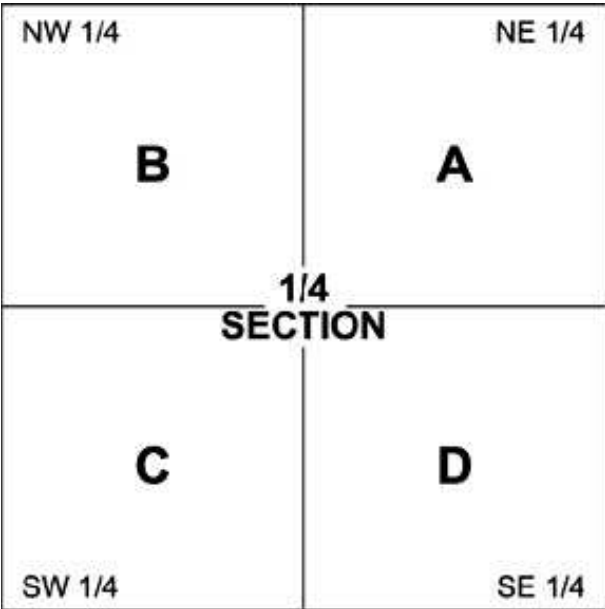
The map number designation of section and quarter-section subdivisions is nearly as simple. First, the section is divided into four quadrants, and each quadrant is assigned a letter (Figure 3-8). Second, each one-quarter section is divided into four quadrants. Each quadrant is assigned the same letter as the corresponding quadrants of the section (Figure 3-9).

For a 1”=200’ scale map, the letters A, B, C or D are used to designate the ¼ section covered by the map. For example, the 1”=200’ scale map of the SW¼ of Section 35 of T.2S. R.9W. W.M. would be map number:



LETTER DESIGNATIONS OF THE FOUR QUARTERS OF A SECTION.

Figure 3-8



LETTER DESIGNATIONS OF THE FOUR QUARTERS OF A 1/4 SECTION.

Figure 3-9

2	9	35	C
TOWNSHIP	RANGE	SECTION	1/4 SECTION

To designate 1/4 1/4 sections (1"=100' maps), the 1/4 section letter and the 1/4 section letter are combined to form a dual identifier. The 1/4 1/4 section subdivisions of a section are lettered as shown in Figure 3-10.

A 1"=100' scale map of the SE 1/4 of the NE 1/4 (SE 1/4 NE 1/4 or SENE) of Section 35 of T.2S. R.9W. W.M. would be map number:

2	9	35	AD
TOWNSHIP	RANGE	SECTION	1/4 SECTION 1/4 1/4 SECTION
BB	BA	AB	AA
BC	BD	AC	AD
CB	CA	DB	DA
CC	CD	DC	DD

LETTER DESIGNATIONS OF 1/4 SECTIONS (CIRCLED) AND 1/4 1/4 SECTIONS OF A SECTION.

Figure 3-10

Note that the map number starts with the largest subdivision of the Rectangular Survey, the township, and ends with the smallest subdivision of the survey plan, the 1/4 1/4 section.

Relationship of Standard Map Scale to the Standard Map Number

Four standard map scales are used in the cadastral map system. Their relationship to the rectangular survey is as follows:

MAP SCALE	RECTANGULAR SURVEY AREA
1" = 2000'	One Township
1" = 400'	One Section
1" = 200'	One 1/4 Section
1" = 100'	One 1/4 1/4 Section

The map scale to be used is determined by (a) the area of the U.S. Rectangular Survey (as labeled above), (b) quantity of detail to be included on the map, (c) land use, (d) number of real property parcels being mapped, and (e) the probability of future urban or suburban growth. The map scales, as generally related to land use, are as follows:

MAP SCALE	LAND USE
1" = 2000'	Timber (or Forest) Ranch lands Desert
1" = 400'	Rural (small timber tracts)
1" = 200'	Suburban Farm lots (or tracts) Industrial
1" = 100'	Urban Suburban Recreation lands

The relationship of the standard map scales to the standard map number is:

Map Scale	Map Number				
	Tshp	Rge	Sec	¼	¼
1" = 2000'	11	5			
1" = 400'	11	5	35		
1" = 200'	11	5	35	C	
1" = 100'	11	5	35	C	A

Special Map Numbering Instructions

Oregon has many irregular townships and ranges. These are designated half townships, three-quarter townships, half ranges and three quarter ranges by the U.S. Rectangular Survey. The following paragraph contains a general explanation on how these irregular townships and ranges were created.

8	5	4	3	2	1	8	5	4	3	2	1
7	3	2	10	11	12	7	3	2	10	11	12
13	17	16	15	14	13	13	17	16	15	14	13
19	20	21	22	23	24	19	20	21	22	23	24
20	23	22	27	28	29	20	23	22	27	28	29
21	22	23	24	25	26	21	22	23	24	25	26
T.X.N. R.A.E.						T.X.N. R.B.E.					

WHAT THE ORIGINAL SURVEYORS THOUGHT THEY ESTABLISHED.

Figure 3-11

Irregular units are fractional areas inadvertently excluded from the township and range designation at the time of the original survey. For example, when townships A and B (Figure 3-11) were surveyed they were supposed to be contiguous. However, when the townships immediately to the south (of A & B) were surveyed, it was discovered that the SE corner of Section 36 of T.X.N. R.A.E. was two miles from the SW corner of Section 31 of T.X.N. R.B.E. A retracement survey revealed that none of the section corners on the township line were common except the north corner common to Sections 1 and 6. Patents had been issued; monuments set in place; and the surveys recorded. It was therefore necessary to give the omitted area a half-township number; in this case T.X.N. R.A. ½ E. (See Figure 3-12.)

8	5	4	3	2	1	8	5	4	3	2	1
7	3	2	10	11	12	7	3	2	10	11	12
13	17	16	15	14	13	13	17	16	15	14	13
19	20	21	22	23	24	19	20	21	22	23	24
20	23	22	27	28	29	20	23	22	27	28	29
21	22	23	24	25	26	21	22	23	24	25	26
T.X.N. R.A.E.						T.X.N. R.A. 1/2 E.					
						T.X.N. R.B.E.					

WHAT THE ORIGINAL SURVEYORS ACTUALLY ESTABLISHED
LOCATION OF HALF-TOWNSHIP

Figure 3-12

The irregular townships and ranges create no special mapping problems. It does, however, create a problem in taxlotting. The fraction (½) is cumbersome to deal with in computers. Also, problems occur in filing and retrieving data because it is so often confused with the parent township.

The irregular townships and ranges are to be mapped separately from abutting townships as if they were full townships. This is necessary because some half-townships are nearly as big as a regular thirty-six section township.

The map number should reflect the true number, if possible. As an example, T.10N. R.16 ½ W. W.M. would be numbered and labeled:

10 16 ½

In the map title the number would appear:

T.10N. R.16 ½ W. W.M.

If the computer system being used will not accept the numerical values of one-half (1/2) or three-quarters (3/4), the following alpha characters are used:

Townships

- S ½ townships = V
- S ¾ townships = X
- N ½ townships = Y
- N ¾ townships = Z

Example: T.32 ½ S. R.33E. W.M. map number would read:

32V 33

Ranges

East ½ range = V

East ¾ range = X

West ½ range = Y

West ¾ range = Z

Example: T.32S. R.33 ¾ E. W.M. map number would read:

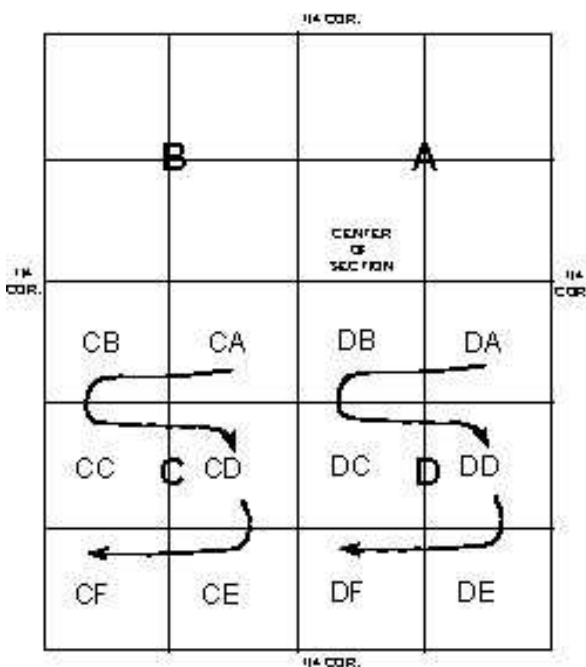
32 33X

The tax-lotting of these irregular maps will follow the same format as other standard maps. (see "Components of the Standard Tax Lot Number," page 3-2

Many sections in Oregon are larger than the regular 16 ¼ ¼ section. One section, for example, has 16 ¼ sections and 60 ¼ ¼ sections. When this is the case, the regular A, B, C and D lettering plan will need to be extended to include other letters.

There are too many variations of the oversized section to establish one specific map numbering rule. However, the map numbering should retain a sequence compatible to the standard numbering plan.

Consider the elongated section of Figure 3-13. When assigning the ¼ ¼ section letter designations, the lettering plan for ¼ sections was retained. The letter designations for the SW ¼ and SE ¼ maps followed the pattern of the standard plan and the letters were extended to "F."



WHAT THE ORIGINAL SURVEYORS ACTUALLY ESTABLISHED
LOCATION OF HALF-TOWNSHIP

Figure 3-12

Even though it is evident that one area of a section will never be mapped at a larger scale, the flow of the standard numbering system should be retained. For example, all of the elongated section 6 (Figure 3-14) was going to be mapped at 1"=100' scale, except for the area in a lake. It was obvious that the area in the lake would never require mapping; therefore, the numbering plan could be as shown in Figure 3-15.

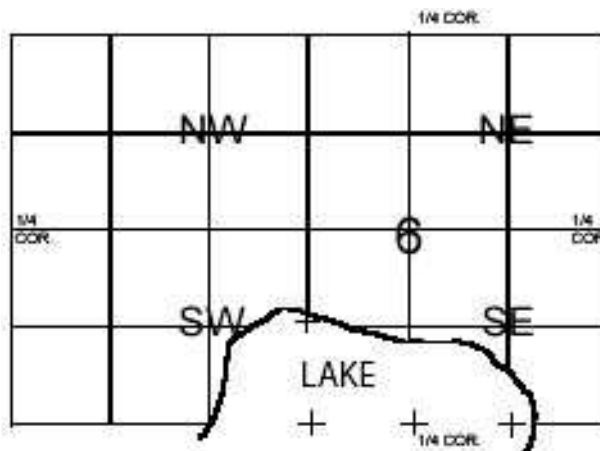
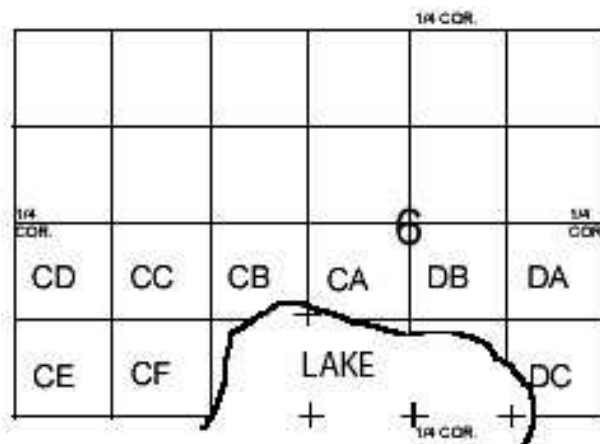


Figure 3-14



INCORRECT MAP NUMBER PLANNING

Figure 3-15

What is wrong with the numbering in Figure 3-15? Not everyone who encounters the tax lot number (and subsequently the map number) has a map. Without a map, a person familiar with the regular map numbering pattern would assume that CC was the traditional SW ¼ SW ¼ location; that CD was the SE ¼ SW ¼; and that DC was the SE ¼ SE ¼.

The extended lettering of the elongated section is confusing enough. By maintaining a pattern (whenever possible) map-users and tax lot number-users will be able to decipher the numbering plan without a map. In this case, the plan illustrated in Figure 3-16 would be the correct pattern for numbering.

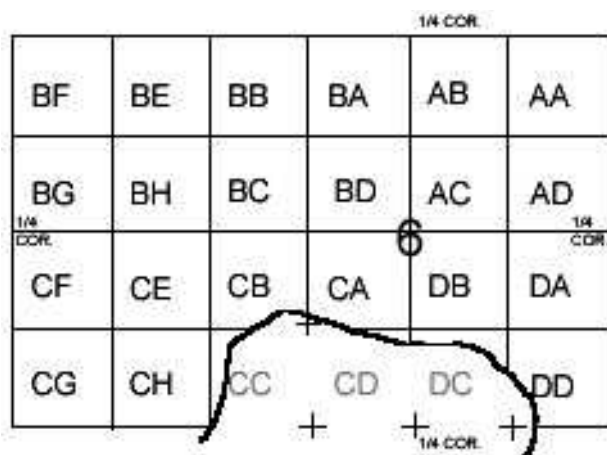


Figure 3-16

Counties bisected by the Oregon Base Line, or the Willamette Meridian, must add an E, W, N or S to the map number to be able to differentiate west from east townships or north from south townships. (See Figure 3-17.)

In Lane County the number "5" is used with the range number to denote east ranges. The map number for T. 17 S. R. 1 E. W.M. is:

17	1	5
TOWNSHIP	RANGE	SECTION

Those familiar with the geography of Lane county will not confuse the fifteen with "Range fifteen" because the township and range numbering in Lane County extends only to Range 9 East and Range 13 West. When the numbering system was installed, the county's computer system would not combine alpha and numeric characters. Situations such as this should be corrected as soon as new technology will allow it. Lane and Columbia counties use numbers instead of letters to designate 1/4 and 1/4 1/4 section subdivisions. The number substitutions are:

A=1	B=2	C=3	D=4
AA=11	BA=21	CA=31	DA=41
AB=12	BB=22	CB=32	DB=42
AC=13	BC=23	CC=33	DC=43
AD=14	BD=24	CD=34	DD=44

Figures 3-18 and 3-19 show the numbering plan for 1/4 and 1/4 1/4 section subdivisions.

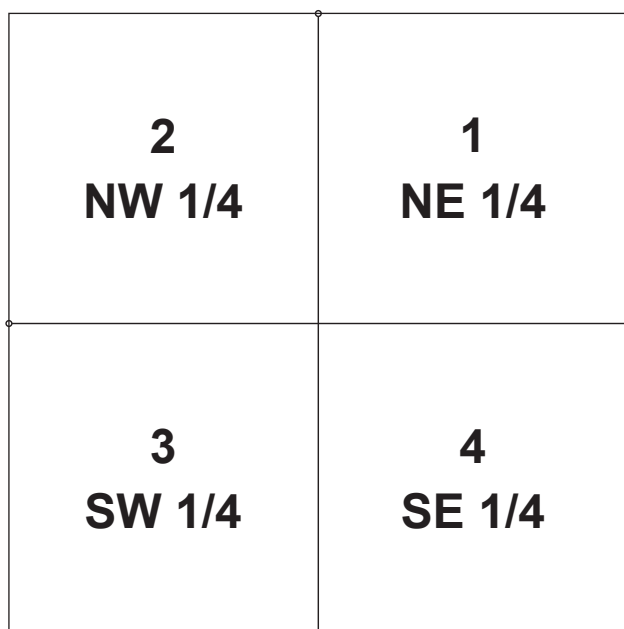
The number substitution for 1/4 and 1/4 1/4 section identification should not be used unless there is no other option in a computer system.

Example of Map Numbers in Counties Using the Standard Tax Lot Number*

COUNTY	NORTHEAST QUADRANT	NORTHWEST QUADRANT	SOUTHWEST QUADRANT	SOUTHEAST QUADRANT
Baker	9 40 15 BA			
Benton			14 8 1 DD	
Clackamas			3 1W 25 BB	1 CE 32 BD
Clatsop		6 10 16 DA		
Columbia		8 3 19 42		
Coos			23 7 12 CB	
Crook				15 16 1 AA
Curry			36 15 25 BD	
Deschutes				14 13 16 CC
Douglas			26 6 22 DA	22 4E 10 AB
Gilliam	3N 21 21 CC			45 21 10 DC
Grant				13 31 26 BD
Hood River	2N 7 12 DA			15 10 31 AB
Jackson			37 2W 32 BA	32 3E 32 AB
Jefferson				10 3 9 AA
Josephine			39 8 4 34	
Klamath				34 7 34 41
Lake				27 17 10 DA
Lane			15 04 32 23	17 15 17 13
Lincoln			12 11 6 DA	
Linn			11 3W 8 AC	13 1E 3 BC
Malheur				19 47 32 CA
Morrow	4N 25 17 AA			45 28 11 AB
Polk			8 5 24 DD	
Sherman	1N 17 9 BA			25 16 26 CA
Tillamook		2N 10 9 BA	1S 9 17 DD	
Umatilla	2N 32 10 DD			55 31 14 BD
Union	1N 39 15 BC			35 38 5 AA
Wallowa	1N 42 14 DA			35 45 20 DC
Wasco	1N 13 9 AB			25 12 15 AC
Washington		2N 3 31 BB	1S 1 24 DC	
Wheeler				8 24 36 DA
Yamhill			5 4 20 CD	

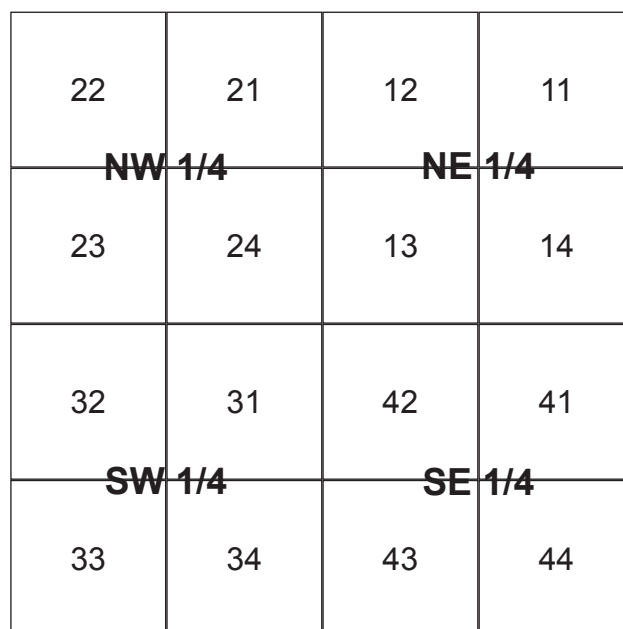
*Bisected by Oregon Base Line **Bisected by Willamette Meridian

Figure 3-17



1/4 SECTION NUMBERING PLAN

Figure 3-18



1/4 1/4 SECTION NUMBERING PLAN

Figure 3-19

Tax Lot Number Employing a Parcel Number

The standard parcel number is called a *two-zero number*. The numbers are in order of hundreds, always beginning with the number 100 and proceeding in the following order: 200, 300, 400, 500, 600 and so on. The two zeros in the parcel number provide the digits for future parcel segregations and omitted parcels. The segregated parcels are assigned subnumbers based on the parent two-zero parcel number.

The combined parcel and map number form the standard tax lot number. For example, the following is a standard tax lot number in Coos County:

COOS COUNTY TAX LOT NUMBER

<u>23 7 12 CB</u>	<u>700</u>
Map Number	Parent
	Parcel
	No.

All townships in Coos County are south of the base line and west of the principal meridian, so the cardinal direction designations (E, W, N or S) are not included in the map number. The tax lot number tells us that parcel 700 is situated in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of sections 12, Township 23 South, Range 7 West. It also tells us that the parcel is mapped on the 1"=100' scale map number 23 7 12 CB.

What Constitutes a Parcel

A *parcel* is a contiguous area of land that can be described in a single description (by a closed traverse, or as one of a number of lots, blocks, sections, or tracts in a subdivision or township), that is separately owned and that can be separately conveyed.

Examples of properties that should be considered a parcel are:⁶

1. Two lots occupied by one building and used as a unit (e.g. a warehouse, motel, mill, apartment, hotel, house, etc.).
2. Two contiguous properties with one improvement (e.g. a parking lot, log pond, loading dock, etc.).
3. Contiguous timberlands, ranch lands, etc.
4. Property of one use (e.g. either residential, commercial, or industrial) even if part is in a subdivision and the contiguous part is in metes and bounds lands.

Examples of properties that should not be considered as parcels are:⁷

1. Contiguous properties that have separate dwellings.
2. Properties divided by city streets:
3. In urban areas, properties divided by a highway, railroad, navigable river or other navigable body of water that totally divides the land of an owner.

4. Two contiguous tracts of land that are not under *identical ownership*. A tract of land conveyed to R.W. Simon should not be combined with one conveyed to Robert W. Simon. The R. W. may be a son, brother, daughter, etc.
5. Mortgaged land and nonmortgaged land.
6. Tax delinquent land and nondelinquent land.
7. Industrial or commercial classed properties with other property classes.

Examples 1 thru 7 apply to *most* units being mapped. However, there are exceptions. Examples: (1) public lands under one use could be considered one parcel when bisected by a street or railroad, (2) lands in one owner and one use or class bisected by an unconstructed street, (3) lumber yards, parking lots, church grounds in the same owner bisected by an alley or railroad.

Code lines, taxing district lines and zoning lines are not considered permanent. Therefore, none of the lines will change the status of a segment of land that qualifies as a parcel.

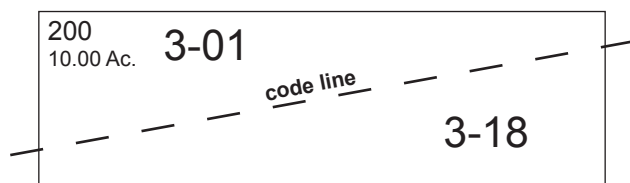


Figure 3-20

In Figure 3-20, parcel 200 is bisected by a code line. The existence of the code line (which is also a taxing district line) will not create two parcels. The parcel must not be divided into two parcels (one for the part in code area 3-01 and one for the part in code area 3-18). The logic behind this policy is simple. Code area, taxing district, and zoning lines change frequently. In Figure 3-20 parcel 200 is divided by the code line. It is safe to say that eventually parcel 200 will be either all in code area 3-01, or all in code area 3-18.

Dividing parcel 200 because of the split code would serve no purpose. It would only increase the number of parcels to maintain. Code splits are created as a tool to assure that each taxing district gets its allotted moneys. Each parcel is still assessed as a whole.⁸

"The tax lot number and code area number creates what is commonly referred to as the account numbers."

Parcel 200 in Figure 3-20 would be only one tax lot number, but each part in each code area would be separate account numbers. If parcel 200 was in map 11 3W 8 AC, it would be tax lot number:

11 3W 8 AC 200

However, on the assessment roll it would be:

11 3W 8 AC 200 3-01

and

11 3W 8AC 200 3-18

When a parcel is split by a code line the assessment cards will carry the notation:

That part lying in code _____

Remainder lying in code _____

This is called a code split.

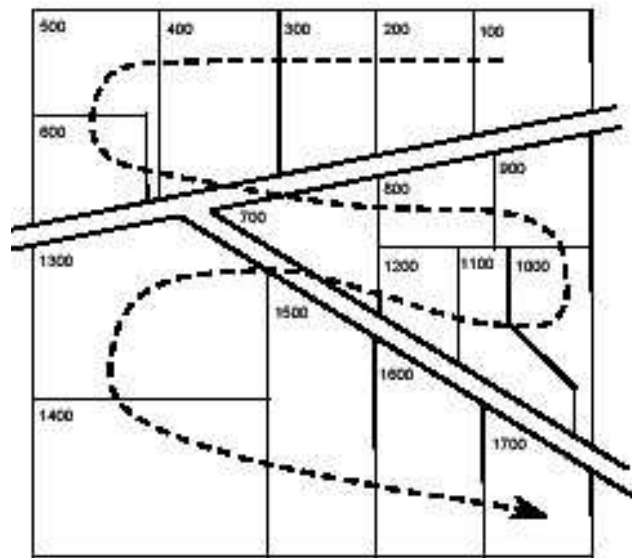
Where a church and a parsonage are on the same land, separate parcel numbers are to be assigned to the church and to the parsonage (providing there is adequate information for segregating the parsonage from the church).

If the parsonage cannot be located by description, assign it an improvement-only number (described later in the chapter).

Assigning Parcel Numbers

Particular care should be taken when assigning parcel numbers on maps. Parcel numbers should be assigned in an easily followed pattern. When there is no smooth flow to parcel numbering, and the numbering jumps from one part of the map to another – with no apparent pattern – parcel numbers are hard to locate.

On 1"=100', 1"=200', and 1"=400' scale maps the parcel number sequence will usually start in the northeast corner of the map and progress in a general counterclockwise direction (Figure 3-21).



DIRECTION OF PARCEL NUMBER FLOW

Figure 3-21

Property patterns vary so much that sometimes it is impossible number in a back-and-forth-horizontal

pattern. The best rule is to let the numbers follow the direction of smoothest flow. In Figure 3-22, for example, it is obvious that the number flow should be in a vertical-alternating pattern. There are two points of view on numbering the subdivision. Some appraisers prefer the numbering to flow down one side of a street, the full length of the map, and back up the other side of the street ignoring blocks and lot numbering as in Figure 3-22.

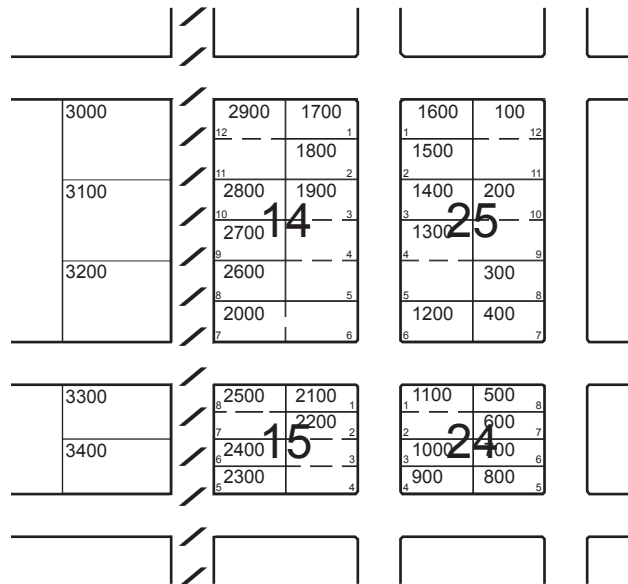


Figure 3-22

Although the pattern of 3-22 is smooth, many assessment officers object to breaking up the records of a block. Moreover, some appraisers prefer to appraise an entire block before moving to the next block. The pattern of Figure 3-22 is acceptable, but most assessors, cartographers, appraisers, and other assessment officials prefer the pattern illustrated in Figure 3-23. This is recommended as the correct procedure:

A block should be completely taxlotted before the next block, or metes and bounds, is taxlotted. It is not essential to follow lot and block sequence; it is more important to have a good number flow pattern.

Remember:

1. Try to start in the NE corner of the map.
2. If possible, complete the numbering of each block before numbering the next block.
3. If you have to jump the number sequence from one part of the map to another, use the shortest distance to determine where your next number will be (1200 to 1300 – Figure 3-21).
4. Do not worry about numbering across subdivision lines from one subdivision to another or from a subdivision to metes and bounds parcels. Property patterns (both subdivision and metes and bounds) were not made to conform to cadastral map boundaries. Subdivision lines are

imaginary lines that become insignificant once a map is numbered and the cadastre is based on the new number system.

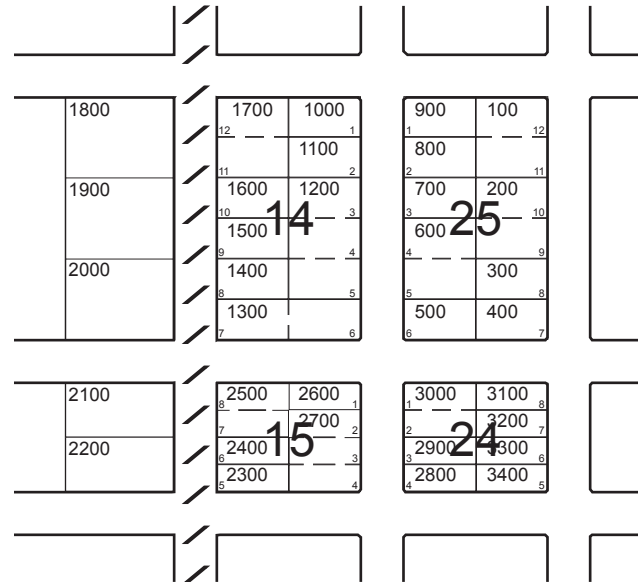


Figure 3-23

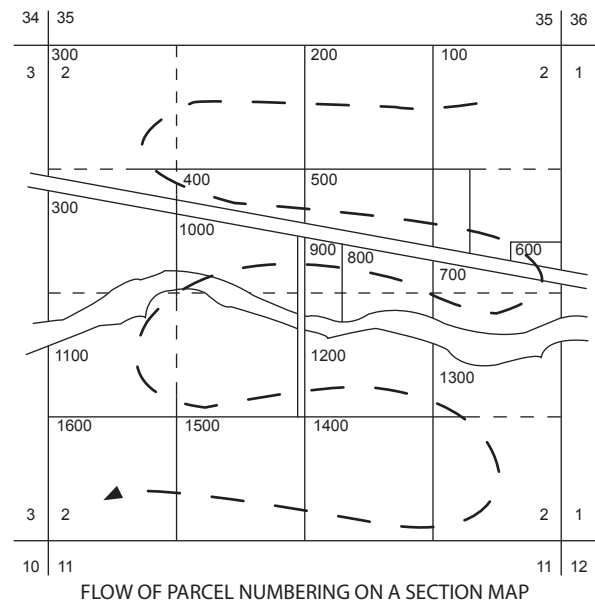


Figure 3-24

Sections should be numbered in the same horizontal alternating pattern as subdivisions and small acreage tracts. (Figure 3-24.)

1"=2000' scale township maps must be numbered (1) in section flow like Figure 3-24, but (2) following the section number sequence in an alternating horizontal pattern. If the township is fractional, or if some of the lower numbered sections are mapped at a larger scale, start the numbering in the section with the lowest number (Figure 3-25).



PARCEL NUMBER FLOW OF A 1"=2000' SCALE MAP

Figure 3-25

Segregation Parcel Number

The two-zero parcel number allows digits for future parcel segregations. Ninety-eight segregations can be made out of each two-zero parent parcel number without changing the number of parcel digits. Segregations out of parcel 700 would be 701, 702, 703, 704 up to 798. Parcel number 799 is always reserved for omitted parcels (described later in this chapter).

Figure 3-26 demonstrates the progression of segregation numbering from parent parcel 700.

In Figure 3-26A, owner A owns all of parent parcel 700. 700 is called the parent parcel because it is the parcel assigned the number 700 in the original tax-lotting of the map; and, it is the base number for all subsequent segregations from this parcel.

In Figure 3-26B, owner A sells a parcel out of the middle of his land. This is a segregation and it is assigned the number 701. The new segregation isolates owner A's southerly one-third of the original parcel.

The isolated parcel of A's property, the southerly one-third, must be assigned a new number. The southerly one-third of the parent parcel, tax lot 700, is now a distinct piece of land with its own value. Using the same parcel number for several isolated parcels of land under the same ownership can lead to foreclosure problems.⁹

An Oregon Department of Justice opinion states:

*"The law does not contemplate assigning the same tax lot number to several noncontiguous pieces of property which have the same owner. To permit such a practice would create many more problems than it would solve."*¹⁰

Some counties try to keep the improvement values with the parent account. If owner A's homesite had been located in the southerly one-third of the original parcel, the numbers for 700 and 702 in Figure 3-26C could have been reversed.

In Figure 3-26D, a second segregation has been made from the original parcel 700, but out of parcel 701. This is assigned the next consecutive segregation number - 703. Also, owner A sold the northerly isolated parcel from his original holdings. This remains parcel 700 (the numbers go with the land - not the owner).

In Figure 3-26E, owner A sells the remainder of his land, 702, to owner C. Owner C also buys a small strip of and from parcel 703. The strip of land could be combined with parcel 702. It is recommended to first assign the next consecutive segregation number to a segregated parcel to be combined, before combining the land into one parcel. Then the segregated parcel number is cancelled and the parcel is combined. In this case, the strip of land is assigned the number 704; then cancelled and combined with parcel 702 (Figure 3-26F). This procedure will reduce research efforts in subsequent years i.e. when trying to determine when, where and how the land became part of parcel 702. The cancelled parcel number 704 should not be used again on this map. The next segregation would be parcel 705.

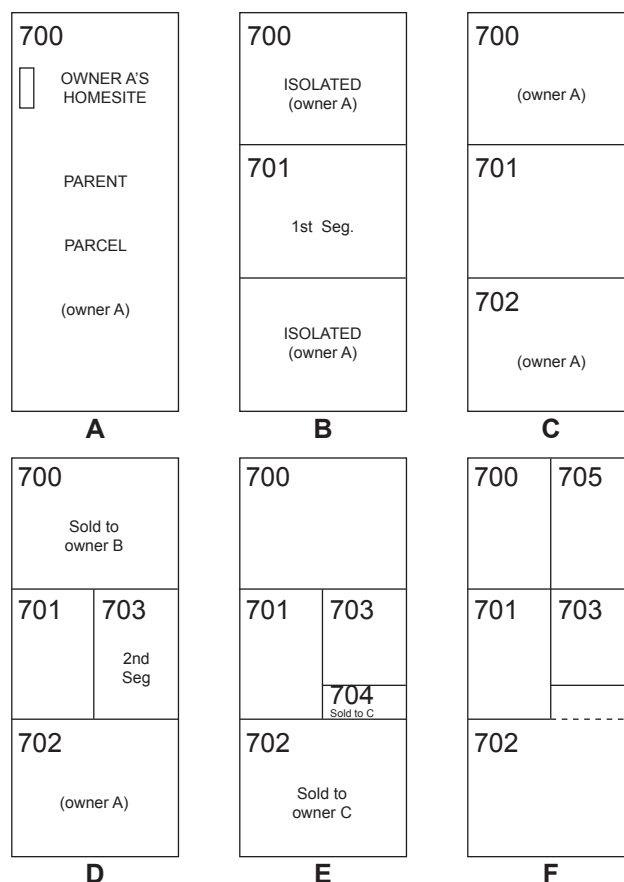


Figure 3-26

Consolidation of Parcels

A parcel of land is defined as a tract of land set off as a single tax account in the assessment cadastre.

To avoid conflict between planners and the assessor's office, the 1985 Legislative Assembly amended the meaning of parcel in ORS 215.010 to include the following wording:

"(2) Does not include a unit of land created solely to establish a separate tax account."

When taxlotting or maintaining a map, some existing parcels under one identical ownership should be consolidated into one new account (or one new parcel unit). This will eliminate unnecessary parcel records. This is permissible and recommended; however, certain precautions must be taken before combining the existing parcels as:

1. Check local planning laws. Some counties use the assessor's parcel numbers as their base. If you combine salable properties, come planners will require a formal partition before allowing the taxpayer to sell one of properties you have combined. This could create an additional financial burden on the taxpayer.
2. If parcels are combined due to a request from the taxpayer, the request should be in writing, signed by the taxpayer. This could protect the assessor from future accusations if the taxpayer runs afoul of the planning rules when the property is again segregated.
3. The name of the owner of each parcel must be identical – to the letter.
4. The owner's interest in each parcel must be identical.
5. The parcels must be contiguous.
6. There must not be any delinquent taxes against any parcel.
7. The property should be of the same classification. Do not consolidate residential with commercial etc.
8. The tax status of both parcels must be identical. Do not consolidate exempt land with taxable land.

Consolidations should not be made when:

1. Parcels are not contiguous.
2. Both parcels have dwellings.
3. When there is a contract or mortgage on one parcel – but not the other.
4. Names of owners are not identical; do not combine, for example:

A.J. Henderson

With

Alvin Henderson or

Alvin J. Henderson

5. One parcel is seaward of the vegetation line and the other is upland of the vegetation line of the Oregon Coast.

Existing parcels should be combined when possible on the assessment cadastre. The combination should first apply to the *next assessment roll* and not to an existing assessment roll (or tax roll). If allowed to affect an existing roll, there could be problems in relation to appeals, orders, payments, foreclosures and title insurance.

Note: Contiguous means *touching* or *abutting*. It has been held by the courts that lands meeting at a common corner, no parts or sides being common, do not constitute contiguous bodies of land.

Most public roads and streets (with exception of state highways) are easements to the public. The public does not own the rights of way in fee (unless deeds prove otherwise). The underlying fee is usually in the abutting owner. Therefore, lands on each side of a county road are contiguous. In rural areas they can be consolidated.

The following are two situations, which, according to the Department of Justice, do not lend themselves to consolidation:¹¹

"(1) Mr. Robert Q. Smith has a piece of property recorded in his name only; and a contiguous piece of property which he owns is recorded in the name of Robert Q. and Mary O. Smith. (2) Robert Q. Smith owns a piece of property which is recorded in his name and is also purchasing a contiguous piece of property on a contract which is recorded

Ninety-Nine Parcel Numbers

New surveys often reveal small strips of land which were not accounted for in the original assigning of

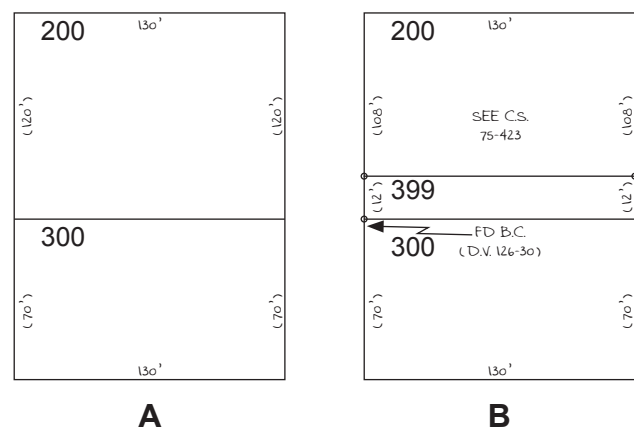


Figure 3-27

parcel numbers. “Ninety-Nine parcel numbers” are reserved for these omitted parcels of land. For example, Figure 3-27A is a drawing of parcels 200 and 300 as originally mapped and taxlotted. Two years later a new survey revealed a 12-foot strip of land that had not been conveyed to the owners of parcels 200 and 300 (Figure 3-27B). The number 399 was assigned to the omitted parcel.

The 399 in this example does not denote any ownership relationship to parcel 300. The number merely indicates the *proximity of the isolated parcel*. The number 299 could have been assigned the omitted parcel instead of 399; either number would provide the proximity of the parcel.

Special Interest Numbers

Most ad valorem tax billings for real property include the land, improvements, mines, timber, trees, water rights, and other rights and privileges appertaining to land.¹²

Sometimes, certain elements of real property are owned separately from the land and other elements. For example, service station buildings and improvements are often owned by parties other than the fee owner of the land. Another example of a separate interest in real property is the mineral rights reserved by the grantor of a parcel of land.

It is common for the owner of a special interest to request a special billing for the ad valorem taxes on his interest. This is provided for in Oregon law.¹³ To accommodate the law, the standard tax lot number includes special interest numbers for *improvements-only and mineral rights only*.

When land is owned by one person it is said to be *owned in severalty*. Often, however, there is more than one person (or party) owning interests to the land. The land is then said to be in *concurrent ownership*. In such cases, the tenants own the land together; sometimes having the same interests in the estate under the same title; or having interests accruing under different titles. In both cases, it is common for one or more tenants to request a separate billing for their share of the taxes. This is permissible under Oregon law.¹⁴ The special interest numbers include a designation for the undivided interests in land.

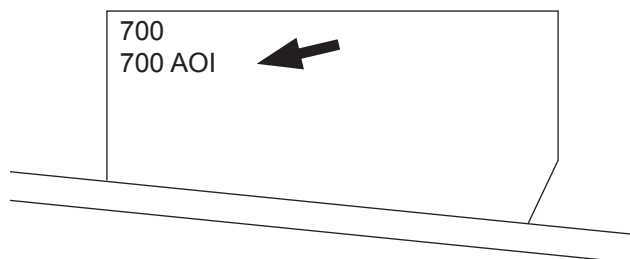


Figure 3-28

Improvement-only

Improvement-only is identified in the tax lot number by the “A” followed by a number:

23	7	12	CB	700	A01
MAP NUMBER				PARCEL NUMBER	IMPROVEMENT ONLY

23 7 12 CB 700 A01 is for improvement number one on parcel 700. If another improvement-only account is requested on parcel 700, it will be 700 A02. Additional improvement-only accounts would be numbered A03, A04 up to A99.

It is not unusual to have several improvement-only accounts on one parcel, e.g. airports, port property, grain elevators. When this is the case, improvement-only numbers could go up to A99. If there were more than 99 improvements, you would then use B01 – B99.¹⁵

Letter the improvement-only number below the parent parcel number on the cadastral map. (Figure 3-28)

Common-carrier railroad rights of way (S.P.R.R., U.P.R.R., etc.) are not assigned parcel numbers. However, many improvements on these rights of ways are owned separately from the land. Nearly all require an improvement-only number.

In order to assign the improvement-only number, there must be a parcel number for the land. This is done by assigning the railroad the next highest parcel number to the highest parcel number on the map. The parent parcel number is not to be shown on the map. The improvement-only number is displayed on the map like the example in Figure 3-29.

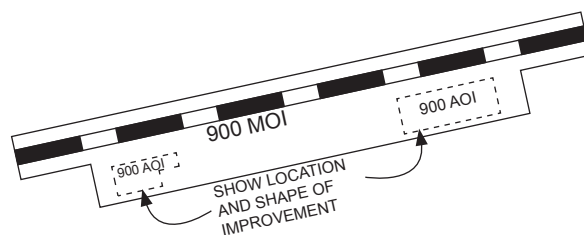


Figure 3-29

A tax lot card¹⁶ is prepared for the parent parcel of the right-of-way. The card should contain the word “Tax-lotted For Improvement Only.”

ORS 478.010 excludes railroad rights of way or improvements from rural fire protection districts unless the owner consents to be included in the district.

A single improvement may have more than one improvement-only number. An example is where each unit in a duplex is owned, in severalty by different people and the land is owned by the same people, but as tenants in common. Improvement-only numbers should be used for separate billings on each unit of the duplex, i.e. A1 and A2. In such cases never divide the land; it will retain the parent account and will remain one billing (if requested the land can be billed separately as an undivided-interest).

Mineral Rights

Mineral rights are identified in the tax lot number by the letter "M" followed by a number:

				Mineral Rights Number	
IN	13	9	AB	1001	M01
MAP NUMBER				PARCEL NUMBER	MINERAL RIGHTS

The number is always used after the letter "M" to identify which mineral right in case there are more than one on a parcel (which is rare). The first mineral right is M01; subsequent mineral rights on the same parcel are M02, M03, M04, etc. to M99.

Mineral rights are defined in ORS 307.01091) as real property, are taxable, and must be assigned tax lot numbers and be entered on the assessment roll.

Property owners may be able to remove dormant mineral accounts by procedures explained in ORS 517.170.

The mineral right number is shown on railroad rights of way as illustrated in Figure 3-24. On regular land parcels, the mineral right number is shown under the parcel number (like the improvement only in Figure 3-28).

Undivided Interests

Undivided-interests are identified in the tax lot number by the letter "U" followed by a number:

				Undivided Interest Number	
5S	31	14	BD	600	U01
MAP NUMBER				PARCEL NUMBER	UNDIVIDED INTEREST

5S 31 14 BD 600 U01 is for undivided interest No. 1 on map 5S 31 14 BD. There will always be at least two undivided interest numbers (e.g. 600 U01, 600 U02) where these interests require separate billing. If there are more than two undivided interests, the numbers U03, U04, U05, up to U48 may be used. When there becomes more than 48 separate undivided interest woner on one parcel of property, the cartographer, assessor and tax collector may set up that parcel according to the instructions in ORS 308.125(2):

"(2) If an undivided interest in property is less than one forty-eighth of the entire interest in the property the interest need not be assessed or taxed to the owner of such undivided interest, and the assessor the tax collector may treat all such undivided interests as one interest which shall be listed as belonging to an unknown owner. Any number of owners of undivided interests which are listed as belonging to an unknown owner because of this subsection, may request the assessor and tax collector that notices concerning the property be sent to a specific person at a specific address. The assessor and tax collector shall honor such requests, but if more that one request is made, only the one signed by the greater number of undivided interest holders shall be honored."

The undivided interest on the cadastral map are lettered in the upper left-hand corner of the parcel. If there are several undivided interests on a parcel, the interests can be shown as illustrated in Figure 3-30.

600U01
through
600U99
27.00 Ac.

Figure 3-30

It is important to note that an undivided interest is just that – undivided. In other words each owner of an undivided interest cannot identify his own severalty; all of the owners occupy promiscuously. If for example, J.P. Cannon owns an undivided half interest in 20 acres of land and R.W. Arkes owns the other undivided half interest, it does not mean that each owns 10 acres. It means that each owns one-half interest in all of the real property. On the assessment roll each account will be on 20 acres, but the taxes will be split.

Note: Separate billings on undivided interest are created only at the request of the taxpayer.

Occasionally an undivided interest will exist on another special interest, such as an improvement-only. The undivided interest cannot be shown in the tax lot number in this case; however, it can be shown on the assessment roll as:

An undivided 1/3 interest in an improvement only.¹⁷

Subsurface Ownerships

The ownership of real property is not only in a horizontal plane and vertical plane above the surface of the land; it can also be in a vertical plane from the earth's surface in a direction toward the center of the earth. In other words, the land can be owned in layers. Subsurface lands will usually be described as:

That portion of the said property (previously described) lying a depth of _____ feet measured vertically from the contour of the surface thereof.

This is not a geothermal right, water right or mineral right – it is an outright ownership of land, including *all rights*.

Subsurface ownerships are identified in the tax lot number by the letter “S” followed by a number (see Figure 3-31A).

If the subsurface lands are being conveyed, they will be assigned regular segregation parcel numbers. The letter and number will be noted on the map as shown in Figure 3-31B.

Numbering for subsurface ownerships can be from S01 through S99.

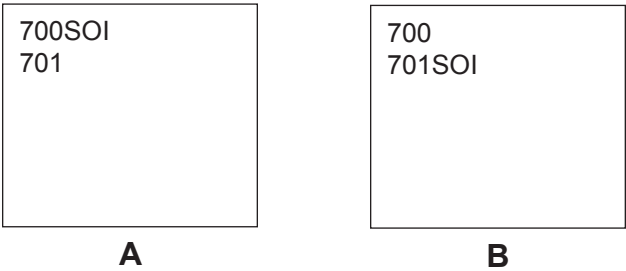
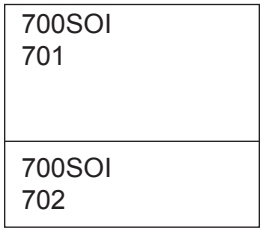


Figure 3-31

If an additional segregation of the surface lands is made, and the parent parcel is still retained for the subsurface land, the parcel would be labeled as shown in Figure 3-32.



Subsurface lands must not be treated as *mineral only* accounts. The ownership is of all land and rights (except those reserved); the “mineral only” would be misleading.

Mapping the Condominium

Often there is inadequate space on the cadastral map to show the detail of the unit ownership. In such cases, the condominium can be shown on a 1”=50’ scale or 1”=20’ scale supplemental map. The condominium outline and some detail can still be shown on the cadastral map. Figures 2-45 and 2-46 show the proper way to map a condominium. Note that Figure 2-45 does not show the unit ownership numbers. That detail is shown on the 1”=20’ scale supplemental map in Figure 2-46.

If the condominium is a high-rise building (or buildings) it would be shown as per the following example:

90001 to 90005	90006 to 90010	90011 to 90015	90016 to 90020
APT. 24			

FIVE STORY BUILDING

Figure 3-33

In Figure 3-33, Apartment 24 is shown in its exact location in the condominium. Each of the rectangular areas represent the size and shape of the units in apartment 24. In this case, the units on all five floors were of identical size and shape. If the units on each floor were different, it would be necessary to include a “general” floor plan with the map. It is not necessary, on the floor plan, to make the plan as detailed as an architectural floor plan. Use only single lines and show only the unit outline. Any further detail will only make the plan confusing. If a detailed floor plan is needed for appraisal, the original copy of the developer’s floor plan can be used.

Unit Ownership Numbers For Condominiums¹⁸

The unit ownership number is designed to accommodate various types of condominium properties: high-rise, subdivision, garden, and court type condominiums.

The unit ownership number is designed so it won’t conflict with the standard parcel number on the map. To make identification easy, a five-digit number is used. The number usually starts with a nine “9”, such as:

27 13 35 AA 90704

This number should not be mistaken for a parcel number because parcel numbers never run above 30000.

It is not uncommon for there to be several condominiums on one map. If this is the case, the first condominium will start with the number 90000; the second condominium will start with the number 80000; the third with 70000, and so on – down to 40000.

Example: 23 12 31 BB 70016

If there are more than six condominiums on a map, it is evident that the scale of the map is too small. A larger scale map will be needed.

Common Areas

All condominiums have what is known as the *general common elements* that are common to all unit owners (with few exceptions). The general common elements are not assessed directly. Instead, a valuation is made of the elements. Then the value is divided and attached to the value of the units in proportion to the interest of the unit owners in the common elements. (Often, the valuation of the common elements is part of the appraisal of the units.)

In addition to the general elements, many condominiums have *limited common elements*. These are elements like moorage slips, aircraft hangers, etc., that are limited to unit owners purchasing the additional rights in these elements.

The rights of unit owners to the general and limited common elements are spelled out in the condominium *declaration*. Specific owner rights to special general common elements and limited common elements can be found in the unit owner's deed.

Some unit ownership declarations provide for the purchase of limited common elements by persons not possessing interests in any unit of the condominium. If it is assumed that the taxes on the limited common elements are to be paid by unit owners only – some owners of limited common elements may be erroneously omitted from the assessment roll.

An important part of the general common elements is the *common area*. This is the land and improvements of the common element that are apart from the unit itself (swimming pool, lawns, recreation rooms, etc.). Even though the common areas are not assessed separately from the units, they must be assigned a tax lot number. That number is composed of the map number and the four-zero base number of the condominium – called the common area number; i.e.:

27 13 35 AA 90000

If several condominiums are situated on one map, the common areas of each are assigned the four-zero base number of the condominium; i.e.:

27 13 35 AA 80000;

27 13 35 AA 70000, etc.

Use 99000, 88000, 77000, etc. for common area numbers when there are more than nine condominiums on a map.

The common areas on the map must be labeled:

COMMON AREA
or
LIMITED COMMON AREA

and the common area number must be included on the map.

If the condominium includes garages owned by individual unit owners, assign each garage space the same number as the unit owned by the owner of the garage.

Planned Community

ORS 94.550 defines a planned community as:

“(9) ‘Planned community’ means any subdivision under ORS 92.010 to 92.190 which results in a pattern of ownership of real property and all the buildings, improvements, and rights located on or belong to the real property, in which:

“(a) There is a homeowners association responsible for the maintenance, operation, insurance, and property taxes related to any common property of the planned community or for the exterior maintenance of any property that is individually owned; and

“(b) Owners of individual lots, by virtue of their ownership automatically are members of the home-owners association and assume liability for membership fees.”

ORS 94.550 continues:

*“(14) ‘Unit’ means a building or portion of a building located **upon a lot** in a planned community and designated for separate occupancy or ownership, **but does not include any building or portion of a building located on common property**” (emphasis added).*

Analysis of the wording of ORS 94.550, specifically subsection 14, shows that the division of property in a planned community is by lot, not by units. The description on the tax lot cards should reflect the lot designation.

ORS 94.550 also defines common property as:

“(2) ‘Common property’ means any real property or interest in real property within a planned community

which is owned or leased by a homeowners association or owned as tenants in common by the lot owners, or designated in the declaration for transfer to the association. 'Common property' does not include any lot designated on the plat or in the declaration of a planned community for ownership by a person other than the homeowners association."

Another important factor is that a condominium can be included within the boundaries of a planned community. ORS 94.570(4): "Nothing in this section prohibits the establishment of a condominium subject to ORS 94.004 to 94.480 and 94.991 within a planned community."

A condominium within a planned community must be specifically identified as a condominium and its boundaries must be identified. Condominium common property should be taxlotted separately from other non-condominium common property (when possible).

Taxation of lots and common property of a planned community is described by ORS 94.728:

"Taxation of lots and common property. (1) Each lot in a planned community constitutes for all purposes a separate parcel of real estate and shall be separately taxed and assessed."

Be careful not to taxlot common improvements on common property as a lot.

"(2) No separate tax or assessment may be levied against any common property which a declarant has reserved no right to develop into additional lots."

"(3) The declarant alone is liable for payment of taxes or assessments on any portion of the common property of a planned community in which the declarant has reserved the right to develop the property into additional lots, until the right terminates or expires, or is exercised, abandoned or relinquished."

"(4) If the right described under subsection (3) of this section terminates or expires or is abandoned or relinquished before July 1 of any year, no tax or assessment shall be imposed against the portion of the common property so affected for the next tax year beginning on July 1."

The common properties are taxlotted separately, but in accordance with ORS 94.728 are not assessed separately (except as provided in subsection 3). They are taxlotted for several reasons: (1) as a means of inventory, (2) ORS 94.665 allows the homeowner's association to sell all or part of the common property. Therefore, should it be conveyed, a tax lot number is already set up for separate assessment, and (3) this will provide a tax lot card to maintain important information and dates about the common property.

The streets and alleys of a "planned community" may be dedicated to the public (by either a common law or statutory dedication), to the lot owners or homeowners association (either as part of the common property or as an easement with the underlying fee remaining in the declarant), or may be a combination of both. Great care must be taken in determining the intent. If the roads are not specifically reserved by the declarant, or specifically reserved to the homeowners association, and such words are used in the road name that imply a public use (e.g. "street," "avenue," "boulevard," "alley," etc.), barring any formal dedication on the plat, the streets must be considered as being "common law dedications" to the public i.e. public highways. This is explained further in Volume 4 of the Oregon Cadastral Map System.

Planned communities should be taxlotted using the standard tax lot number. If there is a condominium located within the boundaries of the planned community it should be taxlotted separately using the standard condominium number.

It is interesting to note that nothing in Oregon law provides for "planned unit developments." When a plat bearing either that name or the initials "P.U.D." has already been approved, it should be treated like a planned community. Assessors should refuse to approve the declarations of any further "planned unit development" until the title is corrected to comply with Oregon law.

Real Property to be Tax-Lotted

All parcels of real property are to be taxlotted except:

- a. Public highway rights of way (see following note)
- b. Public streets and alleys (constructed)
- c. Common-Carrier railroad rights of way
- d. Navigable bodies of water.

Note: If a State highway runs through a drainage district that has a levy, the highway must be assigned a tax lot number. The State is assessed for that part of each highway situated across a drainage district.¹⁹ A state highway running through an irrigation district is also subject to taxation and must be taxlotted.²⁰

Highway quarries, borrow pits, rest areas and parks that are not part of the actual right of way should be tax-lotted.

Dedicated streets and alleys that are not being used as public rights of way must be assigned parcel numbers. These lands are taxable to the abutting owners having the reversionary rights to the right of way.²¹

This rule is based on an expression of the common law rule to the effect that adjoining owners hold title to the middle of a street, alley, or county road (if the adjoining owners or their predecessors in the title contributed equally to the road, as within a subdivision).

A legal opinion²² from the Department of Justice states, in part:

*It is settled past controversy in this State that the abutting owner is also the owner of the soil of the street in front of his lot to the center of the street, subject to the right of the city to improve the same for the purpose of travel.*²³

Also:

“I would also suggest that if the county assessor places undeveloped streets or roadways on the tax roll, that he create a separate account for the area.”

The assessment and taxation of a street, alley or road, or a foreclosure for nonpayment of taxes will not destroy or imperil any public easement.²⁴

When the streets, alleys or county roads are open to the public and are used as public roads, the parcel number should be cancelled.

Unpatented mining claims on governmental lands are not taxable and therefore must not be assigned separate parcel numbers.²⁵

Easements

Easements are never to be assessed separately from the land; even if perpetual in nature, or public easement roads and ways of necessity.

*“An easement is a non-possessory property interest and not a separate estate.”*²⁶

*“Public easement roads, like ways of necessity, are easements and should continue to be assessed to the owner of the land over which the way is located.”*²⁷

Beach Lands Seaward of Vegetation Line

According to ORS 307.450:

“Certain Beach Lands. After December 31, 1969, the land, but not the improvements to the land within the area described by ORS 390.770 is exempt from taxation.”

If a parcel of land owned by a taxpayer extends across the vegetation line, the seaward part has separate tax status from the upland part. So it is essential to divide the land into two parcels and assign each parcel a tax lot number. Governmental lands bisected by the vegetation line can remain as one parcel. (See ORS 478.010; beach lands excluded from RFPDs).

Endnotes

- 1 One primary reason U.S. Rectangular survey/map-based parcel identifiers are unsatisfactory for use on a nationwide basis, is that the national identifier must contain an element common to all states of the Union – The Rectangular survey was never used in the metes and bounds states.
- 2 Although permissible by law, the number should never be used “in lieu of” a description on a deed, contract, or any other instrument of conveyance.
- 3 Permitted under ORS 308.115.
- 4 One township in Klamath County has 37 sections (T.37S. R.8E. W.M.).
- 5 The configuration of township grids, number and size of sections, and the subdivisions of sections are made in reference to the original plan. Actually, few townships are exactly 6 miles square; few sections are actually 1 mile square; and many sections have either more, or less, than sixteen $\frac{1}{4}$ sections.

- 6 In all of the examples, land would have to be in the same ownership and lying on the same map.
- 7 1, 2, 3, 5, 6, and 7 would be in reference to properties under the same ownership.
- 8 Department of Justice opinion (150-303-4-00878) May 24, 1988.
- 9 Guthrie vs. Haun 159 OR 50: “The policy of the law in requiring separate valuations to be placed upon disconnected and distinct parcels or tracts of land for taxation purposes is to protect the rights of the property owner and enable him to redeem any tract or parcel by paying the amount of tax specifically charged thereon.”
- 10 Department of Justice opinion (LS V-405) October 19, 1970.
- 11 Department of Justice (OF 543-V; March 12, 1962.
- 12 See ORS 307.010
- 13 ORS 308.115
- 14 ORS 308.125

- 15 This is typical in recreation areas where improvement-onl special interests are summer homes on leased government lands.
- 16 Description of real property.
- 17 The fraction (1/3) and “improvement only” are used only as examples.
- 18 The statutes refer to condominiums as unit ownerships – not condominiums.
- 19 ORS 547.455(3)
- 20 ORS 545.452(3)
- 21 ORS 307.200
- 22 January 21, 1975 No. 14-109.
- 23 Kurtz v. Southern Pacific Co., 80 Or 213, 217, 156 P2d 794 (1916).
- 24 Gasperd v. LeBaron 107 C.A.2d356 (1951), 237 P2d 278, 281 (1951).
- 25 ORS 307.080.
- 26 State v. The Calif. Ore. Power Co., 225 Or. 604, 609 (1961).

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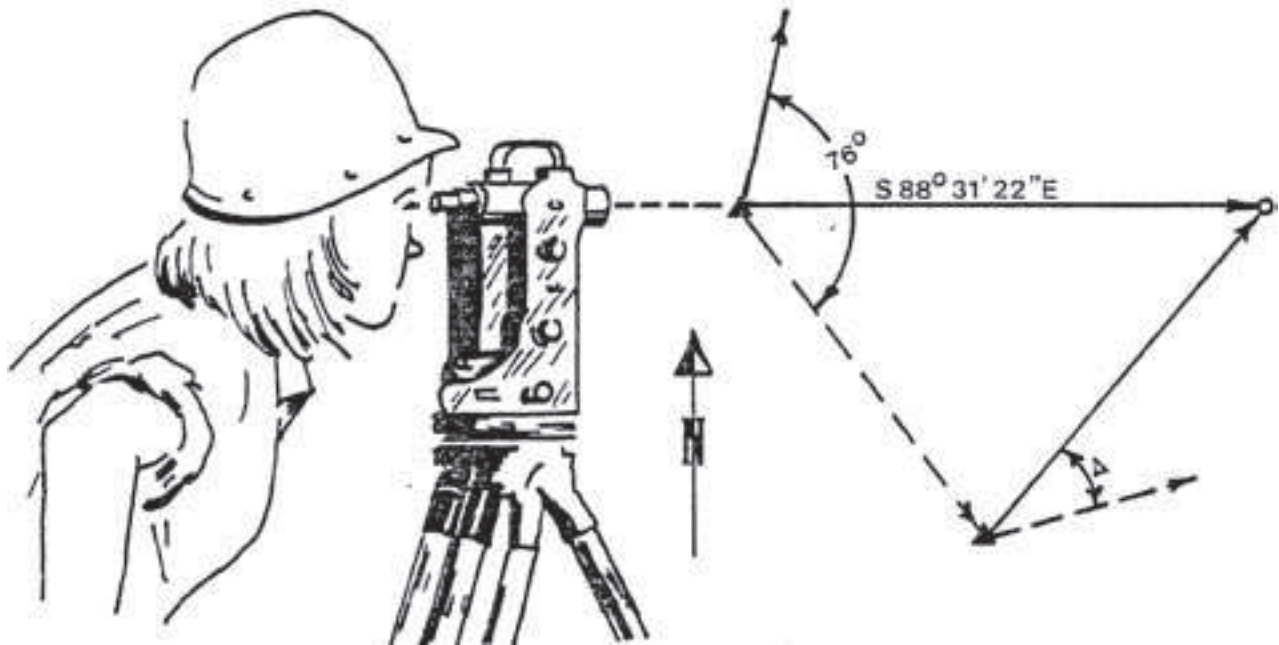
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CHAPTER 4

DIRECTION

DIRECTION

Direction in cadastral cartography is the angular relationship of one line to another line; or one line to a meridian, without reference to the distance between them. One angular measurement of direction is done on a horizontal plane¹ and is called *horizontal direction*.

HORIZONTAL DIRECTION

Horizontal directions are measured in both a clockwise and counterclockwise direction from the zero bases. Horizontal direction is also expressed as a bearing within a quadrant.

Horizontal direction should always be accepted as being a clockwise measurement, unless designated in some manner as being a counterclockwise measurement.

Horizontal direction may be based on four different meridians (1) geodetic (true) north, (2) magnetic north, (3) grid north, and (4) assumed north (direction measured from a line assumed to be, but is not geodetic north).

ANGULAR MEASURE

Angular measure is used for designating the value of horizontal angles. To determine how far an angle has been generated, a unit of measurement is required. At the same time an angle is generated, a corresponding arc is generated. When the line being turned makes one revolution, a circle is generated. Therefore, the circle is divided into divisions known as units of *arc*, that are used to measure angles. In other words, the unit of angular measure is the angle at the center of the circle subtended by one of the small subdivisions of the circumference.

There are several systems of angular measure; each designed for a specific purpose. They are:

1. The *sexagesimal* system. The most commonly used system in cartography, surveying, navigation and mathematics.
2. The *centesimal* system. This is the metric system of angular measure. Unlike other metric units of measure, the centesimal system has not been widely accepted. Even in some countries under the metric system, the sexagesimal system is used more than the centesimal system.
3. The *mil* system. This system is principally used by the military for artillery purposes. However, there are rare cases where the map system has been used on surveys and deeds.

4. The *radian* system. This is a fundamental method of measuring angles. It is used in advanced mathematics and is commonly used in highway spiral formulas.
5. The *point* system. This outdated system was used for navigation in the days of the big sailing ships.
6. The *cardinal and intercardinal* system. The cardinal points are often used in surveying and deeds. Intercardinal points are seldom used in surveys but are often used in deeds.

The Sexagesimal System

In this system the circle is divided into 360 *degrees* of arc. Each degree of arc is divided into 60 equal parts known as *minutes* of arc; and each minute of arc is divided into 60 equal parts known as *seconds* of arc.

Angles in this system are written, for example, as 47°20'33", which is read as "forty-seven degrees, twenty minutes and thirty-three seconds."

In the sexagesimal system north is zero degrees, expressed as 0°. East is ninety degrees (90°); south is one hundred and eighty degrees (180°); west are two hundred and seventy degrees (270°), and a full revolution to north is three hundred and sixty degrees (360°).

The Centesimal System

Also referred to as the metric system of angular measure. In this system each quadrant of a circle is divided into one hundred equal parts called *grads* or *grades*. Each grad is further divided into decimal parts.

Angles in this system are written, for example, as 275°72'89", which reads as "two hundred seventy-five point seven two eight nine grads;" or it may be written as 275°72'89", which reads as "two hundred seventy-five grads, seventy two centesimal minutes, and eighty-nine centesimal seconds."

The Mil System

In the mil system the circle is divided into 6400 equal parts known as mils. The mil (symbolized as m) is divided into decimal parts.

Angles in this system are written, for example, as 1625.39 m , which reads "one thousand six hundred point three nine mils."

The Radian System

This type of system has some advantages over the sexagesimal system for it relates the length of arc generated to the size of the angle. Radian measurement

also simplifies work with trigonometric functions in calculus.

Assume that an angle is generated, as shown in figure 4-1. If we impose the condition that the length of the arc (s), described by the extremity of the line segment generating the angle, must equal the length of the line (r), then we would describe an angle exactly one radian in size; that is, for one radian, $s = r$. The fact that the length of the circumference of a circle is 2π times the radius, tells us that there are 2π radians in a circle; and, there are r radians in 180° . Therefore, 1 radian is equal to 180° divided by π , or $57^\circ 17' 45''$ (approximately 57.3°). Also, $1^\circ = \pi/180$ radians, or 0.017453 radians.

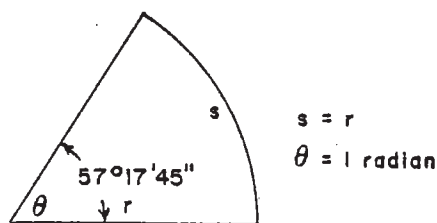


Figure 4-1

The simple relation $s = r\theta$, where s = the length of arc, r = the radius and θ is the size of the angle in radians, is convenient for solving spiral curve problems. Radian conversion tables are included in the appendix.

The Point System

This system is of historical interest only. It is occasionally used in navigation and may still be found on charts and marine compasses.

In the point system, the circle is divided into 32 points; each point equal to 11.75 degrees.

$$32 \text{ pts.} \times 11.75^\circ = 360^\circ$$

It was further divided into fractions of points.

The Cardinal and Intercardinal System

The cardinal and intercardinal system is directly tied to the sexagesimal, and points system.

The cardinal points are known as east, west, north and south, the four main points of the compass.

Intercardinal points are northeast, southeast, southwest, northwest, and are broken down to subintercardinal points such as north-northeast, east-northeast, south-southwest, etc.

The cardinal points have definite meanings. North is exactly 0° north; east is 90° , south is 180° and west is 270° .

Surprisingly enough, the intercardinal points have exact equivalents in degrees (see Table 12), although

few who use the terms realize they are referring to exact points in a circle.

When cardinal and intercardinal points are used in the description in a deed, the exact bearing equivalent should be used unless a specific point of call has been designated in the deed description; or unless a survey shows otherwise. Tables 12 and 13 show compass cardinal and intercardinal equivalents of sexagesimal angular measure and bearing measure.

MERIDIANS

Meridians are north-south lines from which direction is based. As stated earlier in this chapter, meridians can be geodetic (or true), grid, magnetic or assumed.²

Geodetic Meridian

This is the "true" north meridian on a great circle to the north and south geodetic (geographic) poles. Surveys should be considered as being based on a geodetic meridian unless specified in some manner as being grid or magnetic.

Grid Meridian

This is the meridian of a local or state plane coordinate system. In the Oregon Coordinate System the central meridian is the only grid meridian that is also a geodetic meridian (it is longitude $120^\circ 30'$).

Magnetic Meridian

Magnetic meridians are magnetic north. Contrary to popular belief, magnetic meridians are not on a great circle running to what is commonly known as the magnetic north pole. This is because the magnetic meridians are compass meridians, and the earth's magnetic influence on magnetic compasses at any point is always changing. At one point on the earth's surface, the needle of a magnetic compass may point to one certain position as being magnetic north, yet at a point only a few miles away the needle of the magnetic compass may put magnetic north in an entirely different position.

The horizontal angle between the magnetic meridian and the true meridian, at a point, is called magnetic declination.

Magnetic Declination

The meridian indicated by the needle of a magnetic compass seldom coincides with geodetic north. As explained above, this difference between magnetic

and geodetic meridians is known as magnetic declination. These declinations change during the day (diurnal), and they change by the day and annually. The changes in declination are known as diurnal variations, daily variations and annual variations. Unpredictable variations are called irregular variations. Unpredictable, but important changes in variations, are called secular variations.

When the compass needle points westward of true north, the magnetic declination is west. When the compass needle points eastward of true north, the magnetic declination is east. (Note: All magnetic declinations in Oregon are between 18° east and 23° east.) Figure 4.2 illustrates the relationship of magnetic and true meridians with easterly and westerly variations.

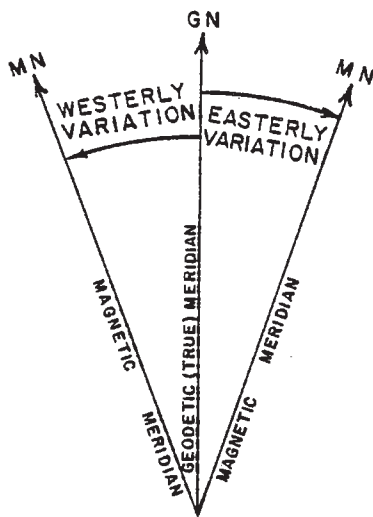


Fig. 4-2

Remember, the magnetic declination at any point is not a constant value, but is always changing.

Angular values added to the magnetic azimuth of a line gives the true azimuth of the line. Because of the constant variations in magnetic declination, true azimuths determined this way cannot be relied on closer than to about 15 minutes of arc (.25 degrees).

Information on past and present declination of the earth's magnetic field is available from the "Environmental Data Service, National Oceanic and Atmospheric Administration" of the U.S. Department of Commerce (abbreviated N.O.A.A., formerly the U.S. Coast and Geodetic Survey). The present value of magnetic declinations of cities, townships, or other points of interest, can be derived from isograms or isolines³ on isogonic charts from the N.O.A.A.

Information on the magnetic fields in past years, often needed for plotting or rerunning old surveys, is available from the N.O.A.A. Tables are available giving values for specified locations of magnetic declina-

tion on a 1° geographic grid from the earliest date of valid observations to the present; at ten-year intervals up to the year 1900, and at five-year intervals thereafter. To derive values from the tables, the cartographer must interpolate for geographic position and for year. As an alternative to the hand computation from tables, a computer derived table can be furnished by the N.O.A.A. giving values for specified location in specified years.

On some maps and charts there are two 360° divisions of the circle; one circle inside the other. The outside circle is usually based on geodetic north and the inside circle is based on magnetic north. This graphic configuration is known as a chart rose. The magnetic variation is noted in the center of the chart rose for the year stated. Included in the chart rose is a notation as to the annual increase, or decrease, in variation (to the nearest minute of variation). At some geographic locations there may be no annual change in variation. This will also be noted in the chart rose. On many of the old Government Land Office plats, the variations are noted at each section corner, and at the right-hand side of the plat. These were the variations at the time the townships were surveyed; however, they will not be the present variations. In the original survey of Township 31 South, Range 13 West, W.M., the variations were from 18°30' east to 19°15' east. Figure 4-3 illustrates how this is noted on the G.L.O. plat.

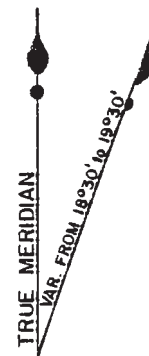


Fig. 4-3

LOCAL ATTRACTION

Local attraction is a term to denote any local influence that causes deviations of the magnetic needle in a compass. A deviation is when the local attraction causes the needle to be deflected from the magnetic meridian; being the angle between the compass magnet and the true magnetic meridian.

Some sources of local attraction are (1) magnetite (loadstone), (2) metal structures, (3) electric power lines, (4) steel railroad rails, (5) surface and underground pipes, (6) automobile and trucks, (7) wire fences, and (8) other permanently fixed objects of iron and steel. Ordinary iron ores do not attract a magnetic compass needle unless those ores contain magnetite or pyrrhotite.

AZIMUTH

Azimuth is direction, expressed as a horizontal angle, measured clockwise from a zero line (north or south). Every line has two azimuths depending on the observer's position. For example, in figure 4-4 a survey progressing from point A to point C generates the forward azimuths a or a' . When observing from point C to point B, the back azimuths b or b' are generated.

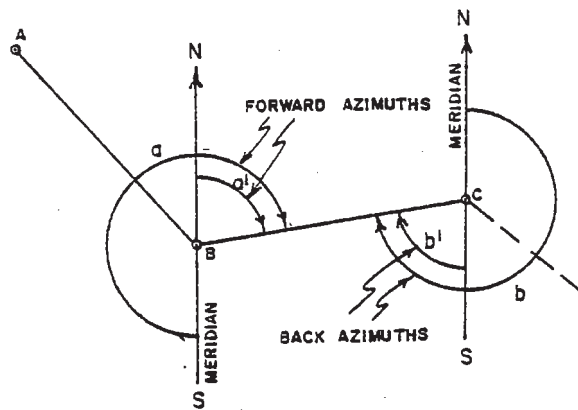


Figure 4-4

The forward and back azimuths are written as angles in the sexagesimal units. Forward and back angles of a line should differ by 180° for the purpose of plane surveying. Azimuths may be categorized as *true azimuths*, *grid azimuths* or *magnetic azimuths*.

True Azimuth

True azimuths are based on a true north (geodetic) meridian. Unless noted, as grid or magnetic azimuths, in some manner, azimuths should be considered as being based on a true north meridian.

Grid Azimuth

Many surveys are based on the Oregon Coordinate System or on a local coordinate system. Coordinate systems are based on the assumption that a small portion of a geometric figure will nearly coincide with a narrow strip of the earth's surface, and that the surface of this geometric figure can be developed into a plane. A system of squares, called a rectangu-

lar grid, is superimposed over the developed plane surface. One line of this grid, the principal meridian, coincides with the geodetic meridian. All other grid meridians differ from geodetic north by the value of θ , the mapping angle.

Grid azimuths must always be determined with the north grid meridian designated as zero.

Magnetic Azimuths

Magnetic azimuths are measured with magnetic north, as the line of zero azimuths.

Magnetic compasses are usually only used in surveying to detect large errors in horizontal angles, measured by more accurate methods, or to obtain approximate values for angles. Although forward and back azimuths of a line should differ by 180° , compass measured distances may vary several degrees from 180° because of local magnetic attraction. This factor, however, is usually corrected when the final survey drawing is prepared.

QUADRANTS

A quadrant⁴ of a circle is an arc of 90° ; or one quarter of a circle. The NE quadrant of a circle lies between 0° north and 90° east. The SE quadrant of a circle lies between 90° east and 180° south; the SW quadrant between 180° south and 270° west; and the NW quadrant between 270° west and 360° or 0° north.

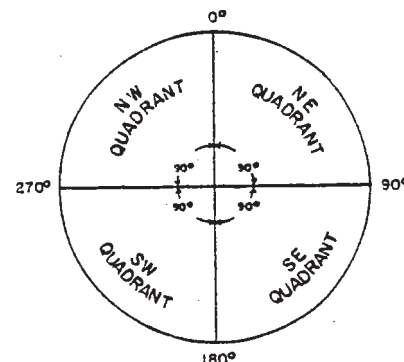


Figure 4-5

Quadrants are an important part of the bearing system of direction. In that system, the quadrants are as labeled in figure 4.5, but the cardinal points have slightly different sexagesimal values; north is 0° and south is 0° , east is 90° and west is 90° .

Quadrants of rectangular coordinates are any part of the four parts into which a plane is divided by the coordinate axes lying in that plane. For example: The quadrants of a section are the NE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ and SW $\frac{1}{4}$ of the section; the quadrants of a V4 section are the NE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ and SW $\frac{1}{4}$ of the $\frac{1}{4}$ section.

BEARINGS

The bearing of a line is its direction within a quadrant of a circle with reference to a meridian.

Bearings are measured clockwise and counterclockwise; clockwise in the NE and SW quadrants, counterclockwise in the NW and SE quadrants.

A bearing is identified by naming the end of the meridian from which it is reckoned (north or south), and the direction from that meridian (east or west). Thus an angle generated from the north end of the meridian and turning clockwise in an easterly direction would be a NE bearing. If, for example, the angle generated was 45° , the bearing would be $N 4^\circ E$.

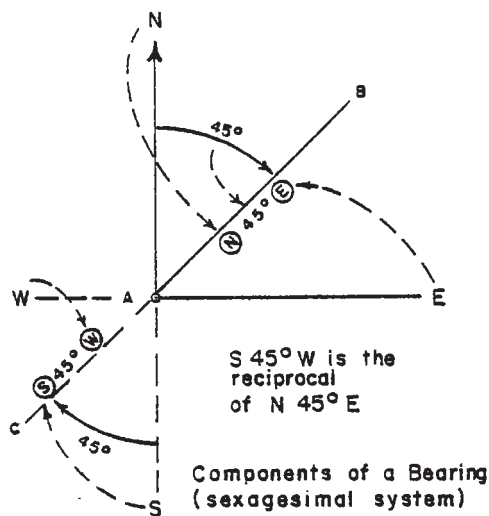


Figure 4-6.

Every bearing has a reciprocal of that bearing; for example, the reciprocal of line AB in figure 4-6 is line AC. Line AC has an identical angular value to that of AB; however, line AC would be generated from the south end of the meridian in a westerly direction. Therefore, it would be identified by the letters S and W, or $S 45^\circ W$. Likewise, the reciprocal of a NW bearing would be a SE bearing of equivalent value.

Another method of clarifying the direction of a bearing is to use the first and last letters in the bearing (the only letters in a bearing) to determine what quadrant the bearing is running from. For example, the bearing $N 42^\circ 30' W$ would be running from the angle point (A

in figure 4-6) through the NW quadrant. Imagine that each point in a traverse is the center of a compass. In figure 4-7, line AB is running from point A from the SE quadrant to point B. Therefore, line AB would be a south and east bearing, or $S 40^\circ E$. Likewise, line BC is running from the SW quadrant so the bearing is a south and west bearing, or $S 44^\circ W$, and line CD would be a north and east bearing, or $N 72^\circ E$.

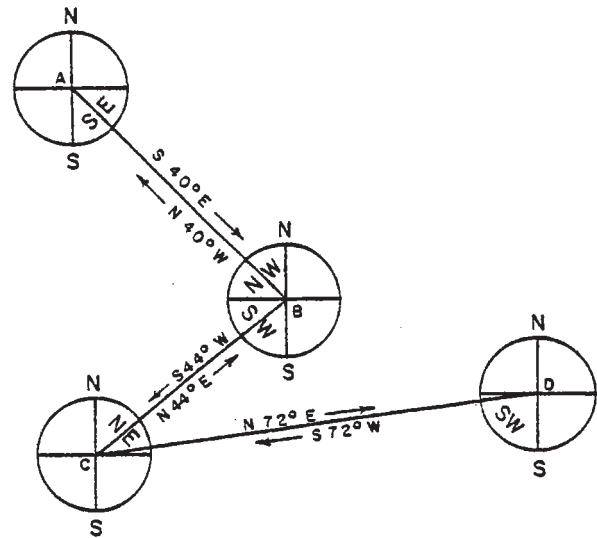


Figure 4-7

The traverse DC, CB and BA would be the reciprocal, of traverse AB, BC and CD. Line DC would be running from the SW quadrant and would therefore be a south and west bearing, or $S 72^\circ W$ (the reciprocal of $N 72^\circ E$). The bearings $N 44^\circ E$ and $N 40^\circ W$ would be the reciprocals of $S 44^\circ W$ and $S 40^\circ E$.

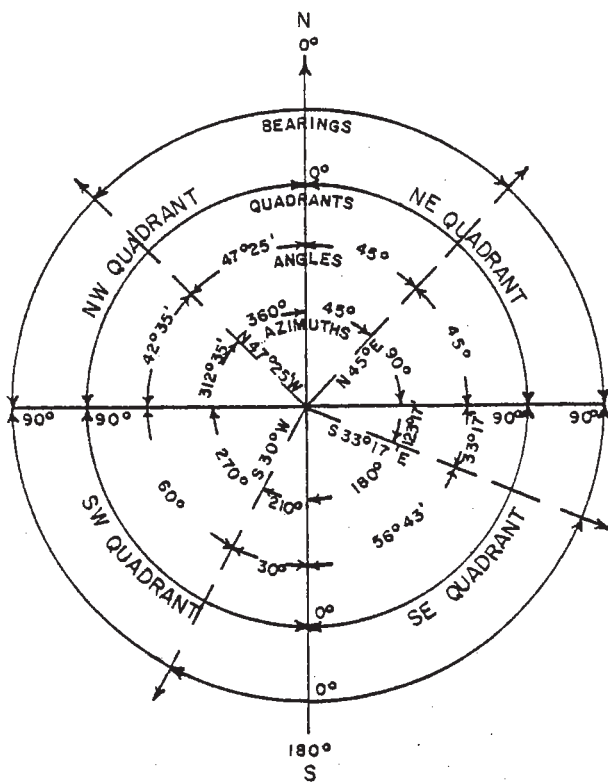
At present, bearings used in cadastral cartography are in sexagesimal units. They can be in degrees, minutes and seconds.

Bearings, like azimuths, can be true, grid or magnetic.

Figure 4-8 illustrates the relationship between azimuth, bearings, quadrants and angles.

DEFLECTION ANGLES

A deflection angle is the clockwise or counterclockwise angle from the prolongation of a line. Deflection angles are always less than 180° . Figure 4-9 illustrates clockwise and counterclockwise deflection angles



RELATIONSHIP BETWEEN AZIMUTH, BEARINGS, ANGLES and QUADRANTS.

Figure 4-8

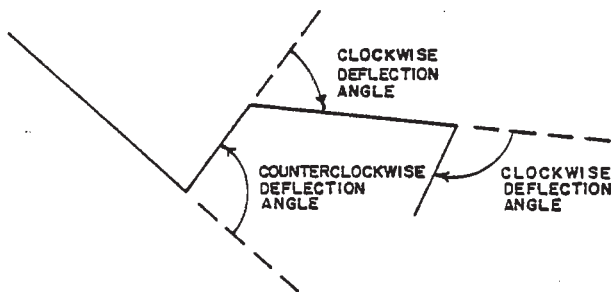


Figure 4-9

PLOTTING ANGLES & BEARINGS

The most accurate method of plotting a traverse is by plotting by coordinates. If a traverse is to be plotted by angles or bearings, an *engineer's drafting machine* must be used.

Angles can be plotted with hand protractors; however, this is a very poor tool for accurately plotting a traverse. It is a common source of plotting errors. In addition to being inaccurate, protractors are more

time consuming than a good drafting machine. The protractor is, however, an excellent tool for checking for large angular errors.

The Drafting Machine

Cadastral cartography demands the utmost skill and accuracy in laying out angles and bearings. A drafting machine is a precision instrument that is used to lay out angles and bearings. When compared to a hand protractor, the drafting machine can save up to 50 percent of the time required to plot by protractor. Because the machine has the ability to retain a constant meridian, accuracy can be increased as much as 75 percent when compared to hand protractors.

A drafting machine combines the features of a T-square, triangle, straightedge and protractor. There are drafting machines for architectural drafting, mechanical drafting, structural drafting, and civil engineering drafting. The only significant difference between the different types of drafting machines is in the type of *drafting machine head*. For cartography, the *civil engineering head* is desirable.

Drafting machines are available for any size table, and there are special machines designed for tilt-top drafting tables.

The civil engineering drafting machine head is, in effect, a precise *engine divided protractor* designed for extreme accuracy in plotting. Some civil engineering heads have double verniers that read up to one minute of arc. Most civil-engineering drafting machines, such as Bruning Machines, have automatic stops at 15-minute intervals.

The machines are equipped with *base-line* settings which will allow the cartographer to adjust the drafting machine to any meridian. Figure 4-10 illustrates the working components of a typical drafting machine (in this case, a Bruning 48-110 civil engineering machine).

The features of each make machine will vary, but in effect, most machines have nearly the same components. The quality of engineering head and ease of operation are the two main features to examine when choosing a machine.

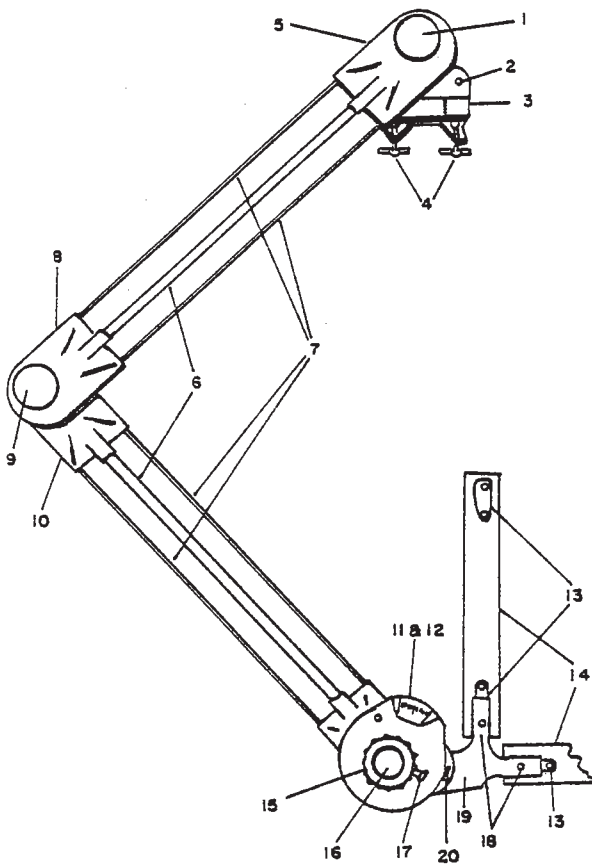
Drafting machines can be purchased that operate on a sliding track rather than rotating swivel arms. These are best suited to large drafting tables. They are ideal for laying out large base control maps.

When the drafting machine is mounted to the drafting table, a meridian will remain constant anywhere on the table (as long as the head remains locked in place). Figure 4-11 illustrates how a meridian remains constant even though the drafting machine arm is ro-

tated. In figure 4-11, only the lower arm was rotated; however, either arm can be rotated without losing the meridian. This ability to maintain meridian is one of the key features that makes a drafting machine superior to a hand protractor.

By releasing the base-line brake, the machine can be oriented to any other meridian; for example, from a true meridian to a grid meridian.

With the base-line brake locked, the protractor can be adjusted to any angle or bearing.



1. Mast control knob	11. Protractor circle
2. Leveling screws	12. Protractor vernier
3. Clamp casting	13. Chuck plates
4. Clamp screws	14. Straightedges
5. Clamp bracket	15. Base-line lever
6. Arm	16. Head control knob
7. Bands & covers	17. Touch control button
8. Upper elbow bracket	18. Scallock ®
9. Elbow control knob	19. Scale square
10. Lower elbow bracket	20. Wing nut

Figure 4-10

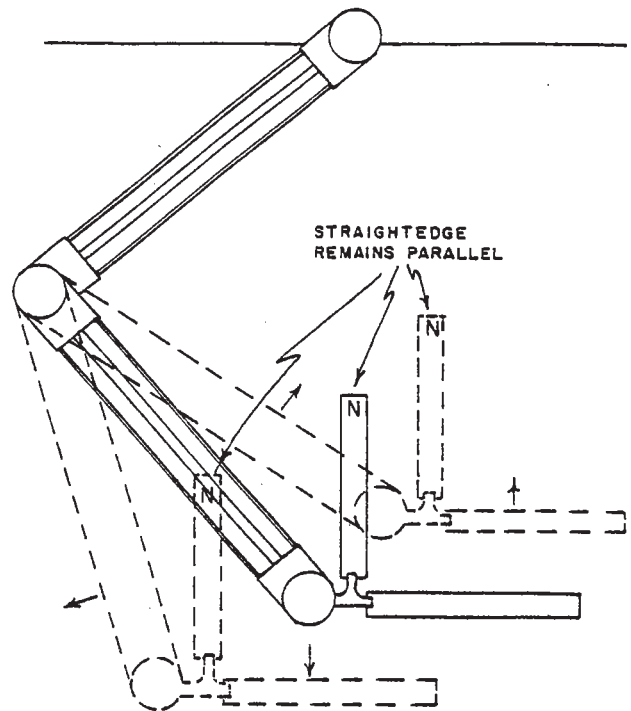


Figure 4-11

The Drafting Machine Protractor

The part of the machine that shows the units, or divisions of arc, is the protractor. It consists of the circle, on which the divisions of *degree* are shown; and the *vernier*, in which the divisions of *minutes* are shown. Figure 4-12 illustrates a typical protractor circle and vernier.

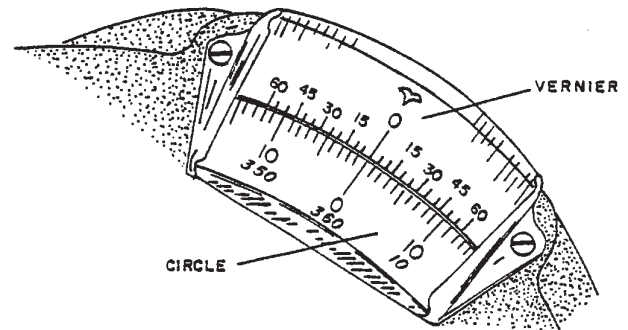


Figure 4-12

Most protractor circles are marked from zero degrees to three hundred and sixty degrees; and in ninety-degree quadrants each from zero degrees to ninety degrees (for reading bearings).

The smallest accurate reading of a protractor is referred to as the least count of the vernier. In figure 4-12, the *least count* of the vernier is five minutes. This is acceptable for cadastral purposes; but a vernier with a least count of one minute, such as that

illustrated in figures 4-13 and 4-14, is desirable for cadastral cartography.

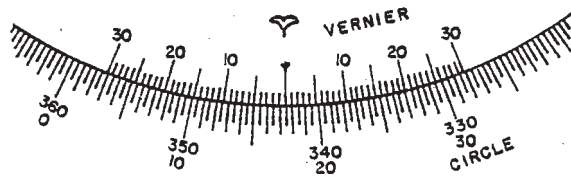


Figure 4-13

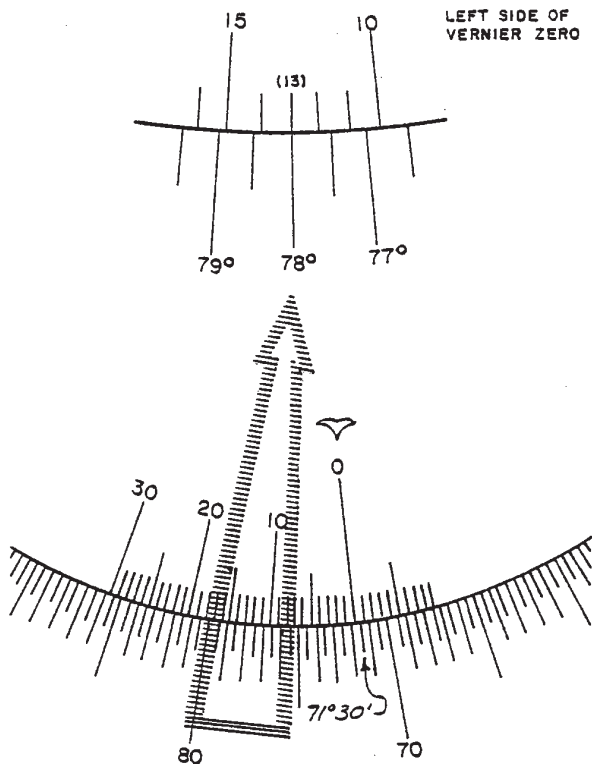


Figure 4-14

The protractor on a drafting machine is very similar to that of a surveyor's transit; and for all practical purposes, the drafting machine is *the cartographer's transit*.

Verniers

The vernier in figure 4-12 is an outside vernier, that is, it is located on the outside edge of the circle. Some verniers, such as the verniers in figures 4-131 and 4-14, are *inside verniers* located on the inside edge of the circle. The location of the vernier does not affect the manner in which it is to be read.

Reading a vernier is a stumbling block for most beginning cartographers; however, with a little practice it is no more difficult than reading an engineer's scale. Some of the important rules for using the protractor circle and vernier are:

1. If the protractor does not have an attached magnifying glass, use a hand magnifying glass to get an accurate reading.
2. Always view the protractor from directly above the circle and vernier. This will prevent erroneous readings resulting from *parallax*. Always read the side of the vernier in which the angle is being generated.
4. Always make sure that you are reading angles in the right quadrant.
5. Never put a pen or pencil mark on the circle or vernier. The circle and vernier should be kept as clean as possible.
6. Always make certain that you are oriented to the proper meridian and have the base line brake tightened.
7. Straight edges should always be tightened so that there is no play in either straightedge.
8. Never lay an angle with a triangle. Always use the drafting machine straightedge.
9. Always make certain that the vertical and horizontal straightedges are at 90° from each other. Most cartographers use the horizontal straightedge for all bearings because it is difficult to maintain 90° between the two straightedges.
10. Always tighten the *wing nut* (No. 20 in figure 4-10) after the protractor is set on the desired bearing.

In addition to the above rules regarding the use of the machine:

1. When plotting a bearing, the pencil lead should be sharp and the point of the lead should be snug against the straightedge.
2. The drafting media must be securely fastened to the drafting table surface.
3. After leaving your work for a considerable amount of time, such as overnight, check the machine with the meridian you are using. A good rule is to check the machine setting as often as possible.

Failure to abide by the above rules will result in costly errors.

Figure 4-13 shows a typical *inside vernier* protractor.

The following step-by-step instructions are for setting a bearing on the enlarged view of an inside vernier protractor shown in figure 4-14. The given bearing is N 71°43' E.

1. Depress the touch control button (or equivalent device) and line up the zero on the circle with the zero on the vernier. Release the touch control button. (The protractor will probably

have an *automatic stop* which will secure the zero setting.)

2. When set at zero, the horizontal straightedge should be in a vertical position. If not, loosen the wing nut and align the straightedge as close as possible to the chosen meridian. Tighten the wing nut.

Often it is simpler to establish an east-west parallel (or base line). By doing this it is not necessary to rotate the horizontal straightedge to a vertical position.

3. Loosen the *base-line lever* and align the straightedge to the meridian (or east-west base line). Tighten the base-line lever.

On some drafting machines step 3 can be eliminated by carefully aligning the machine at step 2.

You are now ready to set the bearing (N 71°43'E) on the protractor.

4. Depress the touch control button and set the protractor in the proper quadrant (in this case, the NE quadrant, or between zero degrees north and ninety degrees east).
5. With the touch control button still depressed, set the 71° reading on the circle, with the zero reading on the vernier.

We know that 43' lies between 30' and 1°, so:

6. Move the straightedge in a *counterclockwise* direction until the 71°30' graduation on the circle lines up with the zero graduation on the vernier.

To set the machine at 71°43', we still need an additional 13' of arc.

$$71^{\circ}30' + 13' = 71^{\circ}43'$$

However, the circle is not graduated to 43' so we must use the vernier.

7. With the touch control button still depressed, slightly move the straightedge in a counterclockwise direction until 13' on the vernier is in line with the nearest degree graduation on the circle (in this example, at 78°). Release the touch control button. The bearing is set.

8. Check your setting before plotting the line.

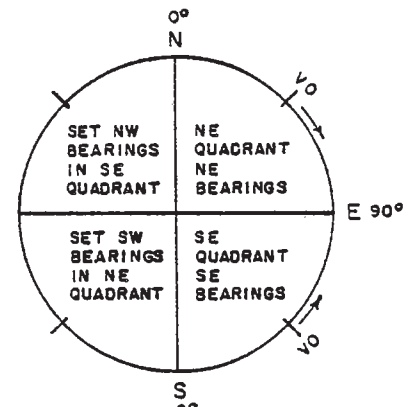
Remember, the knowledge of *direction, angles, azimuths and bearings* will be worthless if you do not exercise care when setting the protractor.

The best method of practicing machine –protractor settings is to practice setting the machine on lines of known bearings on an existing map.

Figure 4-15 illustrates one very important rule: NW bearings are always set, on the machine, as if they were SE bearings (the reciprocal of NW); and SW

bearings are always set, on the machine, as though they were NE bearings (the reciprocal of SW).

VO represents vernier zero. The direction of the arrow represents the proper side of vernier readings, when turning bearings in that quadrant.



VO represents vernier zero. The direction of the arrow represents the proper side of vernier readings, when turning bearings in that quadrant.

Figure 4-15

By doing this, the straight-edges will not have to be set to the left of the drafting machine head, which is nearly impossible on many machines, and impossible on others.

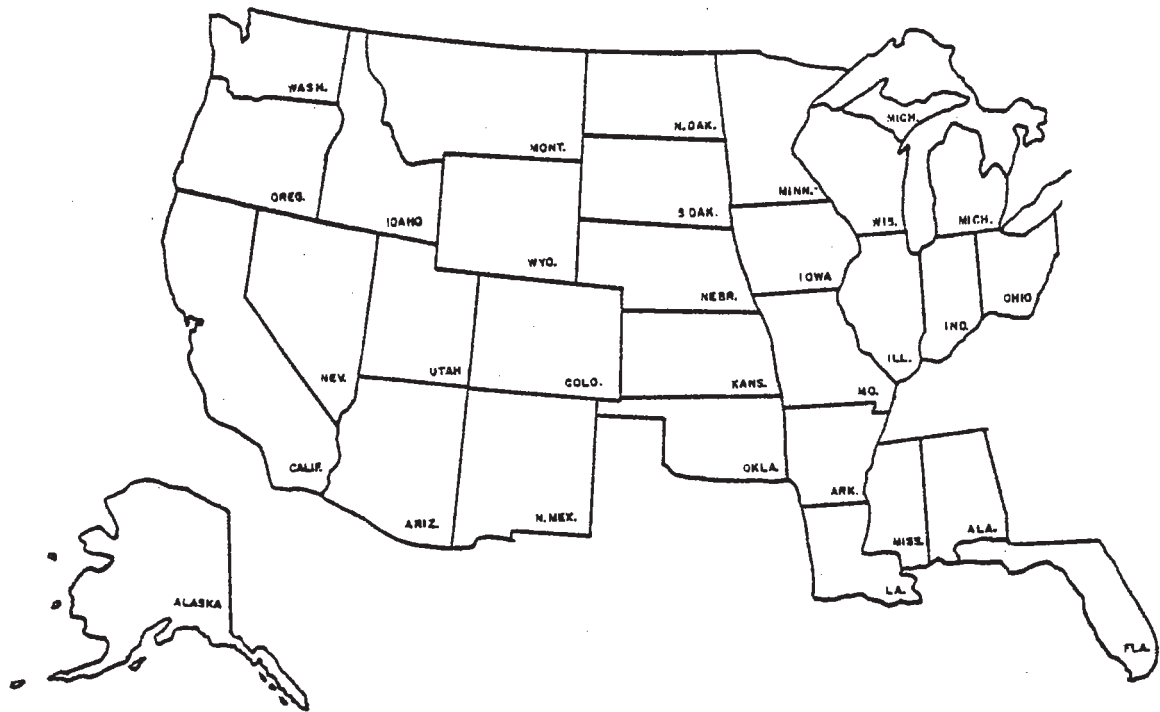
Note: Each manufacturer of drafting machines will have special names for machine components. For example, the Bruning *base-line control lever* is called a *base-line selector* on "Universal Drafting- Machine Corp." machines. The Bruning touch control knob is and the Bruning *wing nut* is called a *vernier clamp* by Universal. Regardless of the part name, they are located in the same - general location on each machine,- and their operation is the same.

PROBLEMS & ERRORS

Many direction problems and errors are not due to poor surveys. If angles and bearings do not fall in place with common lines on a map, the first step to solving the problem is to carefully retrace your steps in plotting. In many instances it is the cartographer who has made the error, not the surveyor. Problems and errors could be the result of any of the following:

1. Transposition of bearings or dimensions from a survey to a map.

2. Careless setting of the drafting machine protractor, or parallax.
 3. Erroneous linear measurements. Many times it is the mismeasurement of distances that create bearing and angle problems.
 4. Failure to check drafting machine settings.
 5. Loose straightedge.
 6. Paper not firmly attached to drafting table surface.
 7. Accumulative plotting errors. (A very common problem when plotting by bearings and angles. The accumulative errors can be virtually eliminated by plotting by coordinates.)
 8. Failure to recognize surveys where assumed meridians have been used by the surveyor. Often, certain lines are assumed to be based on geodetic north, when actually they are not. The assumed meridian is usually a product of the laymen, rather than the professional surveyor.
 9. Failure to orient lines to known lines of accuracy.
- And, of course, some lines plotted from surveys appear to be incorrect when, in fact, they are correct. For example, many overlaps appear to be the result of incorrect bearings when actually the overlap exists on the ground. This problem will be discussed elsewhere in the manual.



U.S. RECTANGULAR SURVEY STATES

CHAPTER 5

U.S RECTANGULAR SURVEY SYSTEM

Introduction

The system of rectangular townships, six miles square, and consisting of thirty-six one square mile sections, is technically called *the system of rectangular surveys*. It is also referred to as the *surveys of the public lands of the U.S.*, or *Government Land Office surveys*.

The state standard cadastral map system is referenced to the system of rectangular surveys. The map areas, numbers, tax lot numbers and scales are directly tied to the rectangular survey. The tie is essential because the rectangular survey is the reference base for nearly all deeds, surveys, plats, and assessment records.

When preparing, installing or maintaining a cadastral map system, hardly a day will go by that the cartographer isn't working with some element of the rectangular survey system. It is, therefore, essential that each cartographer be well versed in the principles of that system.

This chapter is devoted to the key principles, laws and problems related to the system. The methods of survey not related to cartography have been purposely omitted; however, if you wish to pursue the technical survey requirements, we recommend reading the 1973 BLM *Manual of Instructions on the Survey of the Public Lands of the U.S.*¹

Brief History

In the Colonial States and other New England and Atlantic Coast States (except Florida), and later West Virginia, Kentucky, Tennessee and Texas, the only system used to describe properties was the *metes and bounds* method.

As the country began to expand, it became necessary to develop a more uniform system of surveying and describing government lands being conveyed to citizens.

In 1784 the U.S. experimented with several rectangular survey systems, such as the ten-mile square township system recommended by Thomas Jefferson. In April of 1785 Congress approved a seven-mile square rectangular survey system, and in May of 1785 the law was amended and the six-mile square township rectangular survey system was adopted.

In 1812 the General Land Office (G.L.O.) was created to take charge of "all acts and things touching or re-

specting the public lands of the U.S.;" which included the surveying of the public lands. In 1946 the G.L.O. was abolished and absorbed into the newly created Bureau of Land Management.

The rules and regulations were established in 1785 and have been continuously revised to the present. Detailed regulations were printed in the Manuals of 1855, 1881, 1890, 1894, 1902, 1930, 1947, and 1973.

After admission of the States into the Union, the U.S. continued to hold title and administer the laws to unappropriated lands. Various enabling acts provided that the title to unappropriated lands within each State shall remain in the U.S. Congress alone has the power, derived from article IV, section 3, of the U.S. Constitution, of disposing of the public domain. It is a well-settled principle of law that the U.S., through the Department of Interior, has the authority and duty to extend surveys to include lands erroneously omitted from earlier surveys.

Navigable Waters

The beds of navigable waters are *not public domain* and are *not subject to survey and disposal* by the U.S.; the sovereignty is in the individual States. Under U.S. law the navigable waters have always been, and shall always be a *common highway*. This includes all tide-water streams whose natural and normal condition, at the date of admission of the State into the Union, was such as to classify the same as navigable water. (See *navigable river*, *navigable stream*, *navigable in fact*, *navigable waters of the U.S.* and *test of navigability* in the glossary.)

Swamp and Overflowed Lands

In the Act of March 12, 1860, (12 U.S. Stat. 3) swamp and overflowed lands were granted to the State of Oregon.

The provisions of the grant apply to the elevations situated below the uplands; wherein the lands are of such character that without the construction of levees or drainage canals the areas would be wet and unfit for agriculture. The grants apply to all swamp and overflowed lands that were unappropriated at the dates of the granting acts, and whose character *at that time* would bring them within the provisions of the grant.

System of Rectangular Surveys

General Scheme

According to the laws of the U.S.: (1) the public lands of the United States shall be divided by lines intersecting true north and south lines at right angles so as to form townships six miles square; (2) the townships shall be marked with progressive numbers from the beginning; (3) the townships shall be subdivided into 36 sections, each one mile square and containing 640 acres as nearly as may be; and (4) the 36 sections shall be numbered, respectively, beginning with the number 1 in the northeast section, and proceeding west and east alternately through the township with progressive numbers to and including 36. (R.S. 2395; 43 U.S.C. 751)

In accordance with the foregoing legal requirements, the public lands are surveyed under the method called *the system of rectangular surveys*, which embraces the following procedures:

“(1) The establishment of independent *initial points*, each to serve as an origin for surveys to be extended in separated localities.”

The initial point for Oregon is at geodetic coordinates:

latitude 45°31'11"
longitude 122°44'34"

“(2) The survey of principal meridians and base lines, originating at the initial point.”

The principal meridian for Oregon and Washington is the *Willamette Meridian* adopted in 1851.

“(3) The establishment of *guide meridians* initiated at base lines, and of *standard parallels* initiated at the principal meridians, at intervals short enough to maintain a workable adherence to the legal definition of the primary unit, the township six miles square.”

“(4) The survey of township exteriors within the framework so established. Townships are numbered to the north or south commencing with number 1 at the base line, and with range numbers to the east or west beginning with number 1 at the principal meridian.”

“(5) The subdivision of the townships into 36 sections by running parallel lines through the township from south to north and from east to west at a distance of one mile. The sections are numbered commencing with number 1 in the northeast section of the township, proceeding thence west to section 6, thence south to section 7, thence east to section 12, and so

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Figure 5-1

on, alternately, to number 36 in the southeast section.” See figure 5-1.

The law also prescribes that (1) the corners marked in public land surveys shall be established as the proper corners of sections, or of the subdivision of sections, which they were intended to designate, and (2) the boundary lines actually run and marked shall be and remain the proper boundary lines of the sections or subdivisions for which they were intended, and the lengths of these lines as returned shall be held as the true length thereof. (R.S. 2396; 43 U.S.C. 752.)

The original corners *must stand as the true corners* they were intended to represent, *even though not exactly where professional care might have placed them in the first instances.*

When compared to subsection (2) above, the last statement sounds contradictory; however, the statement is based on a long established principle of law that *the corner as placed in the ground by the original surveyor is the corner in fact, regardless of where original survey dimensions and bearings might have placed them.*

Principal Meridian

The principal meridian, or Willamette Meridian, is to conform to the geodetic (true) meridian, extending north and south from the initial point. Regular section and section corners are established at intervals of 40 chains, and regular township corners at intervals of 480 chains. Corners designated as meander corners are established at the intersection of the line with meanderable bodies of water.

Base Line

The base line is extended east and west from the initial point on a true parallel of latitude. Standard quarter corners and section corners are established alternately at intervals of 40 chains and standard township corners at intervals of 480 chains. Meander corners are established where the line intersects meanderable bodies of water. (See Chapter on riparian rights)

Standard Parallels

Standard parallels, also called *correction lines*, are extended east and west from the Willamette Meridian.

The parallels were to be run at intervals of 24 miles north and south of the base line; however, some have been placed at intervals of 30 and 36 miles. When placed at 30 and 36 miles, intermediate correction lines are to be established, to which names, such as *Fifth Auxiliary Standard Parallel North*, may be given. These lines are, in all respects, like regular standard parallels.

Guide Meridians

Guide meridians are extended north from the base line, or standard parallels, at intervals of 24 miles east and west from the Willamette Meridian. The guide meridians are terminated at the points of their intersections with the standard parallels. The guide meridians are to be projected on a geodetic meridian, and the fractional measurement is placed in the last half mile. Figure 5-2 shows four quadrangles embrac-

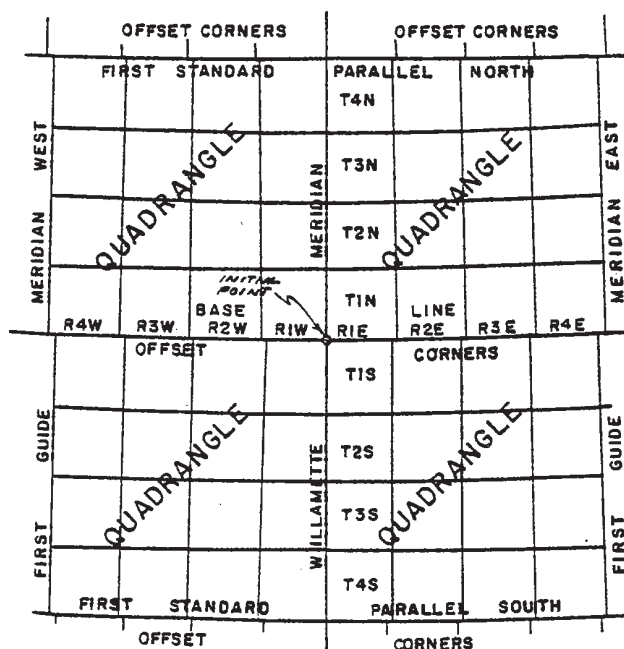


Figure 5-2

ing 16 townships bounded by standard lines, showing the coordinate system of numbering townships.

Some guide meridians were placed at intervals exceeding 24 miles. In this case new governing lines are established, and these new guide meridians have names such as *Grass Valley Guide Meridian*.

Township Exteriors

The *south* and the *east* boundaries of a township are normally the governing lines of the subdivisional surveys. Many previously established exteriors were defective in one way or another. Errors of former surveys, however, are not to be incorporated into surveys of abutting townships. Where the defective township exterior cannot be used, other controlling lines known as sectional correction lines and sectional guide meridians are employed.

Meridional Boundaries

Whenever practical, township exteriors are surveyed successively through a quadrangle in ranges of townships beginning with the townships on the south (figure 5-2).

The meridian township boundaries have precedence in the order of survey and are run from south to north on true meridians. Excesses and deficiencies are placed in the north half-mile.

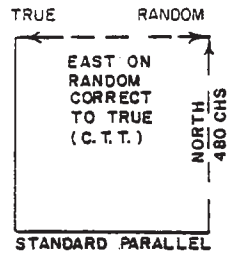
Latitudinal Boundaries

The latitudinal township boundary is run first as a random line, setting temporary corners, on a cardinal course, from the old toward the new meridian boundary, and is corrected back on a true line if conditions are ideal. Where both meridian boundaries are new lines or where both have been established previously, the random, latitudinal boundary is run from east to west. In either case, if the defective conditions are not met with, the random line is corrected back on true line. Fractional measurements are placed at the last half-mile.

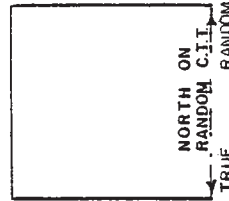
Figure 5-3 illustrates the regular order of completing township exteriors. The solid lines represent previously surveyed lines, and the dash lines represent new lines surveyed. The arrows represent the direction of the survey, and double arrows indicate a random line to be corrected to true (abbrev. C.T.T.).

Remember, exterior township lines are run first; and exterior section and quarter section corners are run before the interior is subdivided into sections.

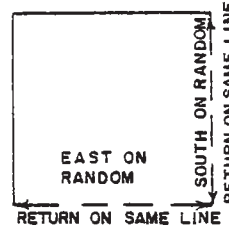
The regular order of completing exteriors is often departed from. The departure from the regular order



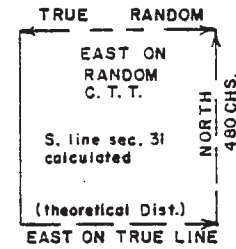
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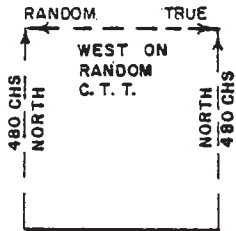
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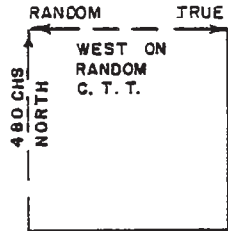
A



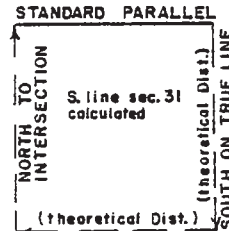
B



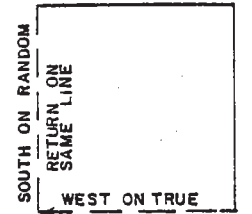
C



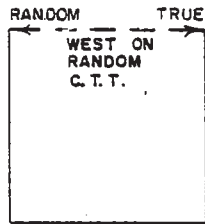
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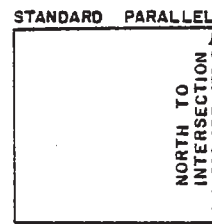
C



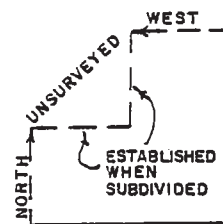
D



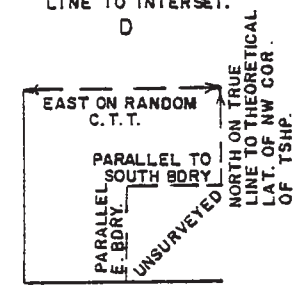
E



F



E



F

Figure 5-3

Figure 5-4

is always based on the principle of accomplishing the same relationship of one township boundary to another as would result from regular establishment under ideal conditions. Figure 5-4 illustrates some of the departures to the regular order of completing exterior boundaries. The solid lines represent previously surveyed lines, and the dash lines represent new lines surveyed. An arrow indicates direction of the survey, and double arrows indicate a random line to be corrected to true.

The township interior (the sections) are to be subdivided after the exterior boundaries are run.

A random line, run upon the cardinal course, is made the true line where the falling would otherwise require a correction exceeding 14' of arc. Where the random latitudinal boundary closes on a new meridional exterior the temporary township corner is adjusted to the latitude of the opposite township corner. But where both meridional boundaries have been previously surveyed, a closing township corner is established at the point of intersection of the random latitudinal line with the meridian boundary, or its projection to the north or south as the case may be.

A random meridian boundary is made the true line if the falling plus the correction for parallelism of the meridian subdivision lines result in calculated bearings (in the northernmost miles of the latter lines in excess of 14' (fourteen minutes) from cardinal).

The 14' limit for exteriors applies only to the establishment of new boundaries. If a boundary is accurate within 21' of cardinal, it is not considered defective.

Partially Surveyed Exteriors

Where the end portions of a township exterior have been previously surveyed and fixed in position by use, the fractional unsurveyed middle part is completed by random and true line without offset, regardless of the deviation from the cardinal direction. As a general rule, the fractional measurements are placed in the north or west half miles.

Figure 5-5 (from the BLM Manual) illustrates representative cases of incomplete township exteriors, showing methods for completion.

Rectangular Limits

"The normal township includes 36 sections, only 25 of which are returned as containing 640 acres each. Sections against the north and west boundaries, except section 6, contain regular aliquot parts totaling 480 acres with four additional fractional lots in each section. Section 6 contains regular aliquot parts totaling 360 acres with seven additional fractional lots." (BLM 1973 Manual)

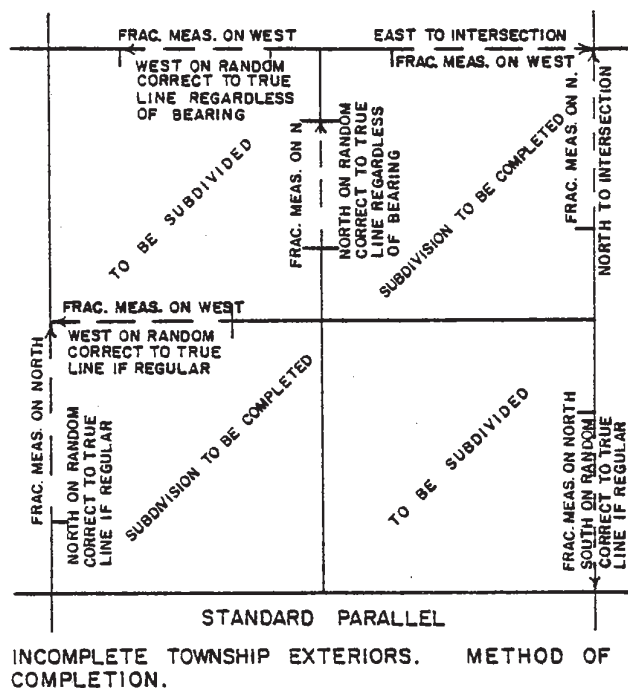


Figure 5-5

The ideal section is allowed to give way to one that is termed *regular*. The amounts of variance from regular are still considered regular and are referred to as *rectangular limits*.

- (1) Alignment. Section boundaries must not exceed 21' from cardinal, in any part, nor may the opposite (regular) vary more than 21' (21 minutes).
- (2) Measurement. The distance between regular corners are allowed adjustments not to exceed 25 links

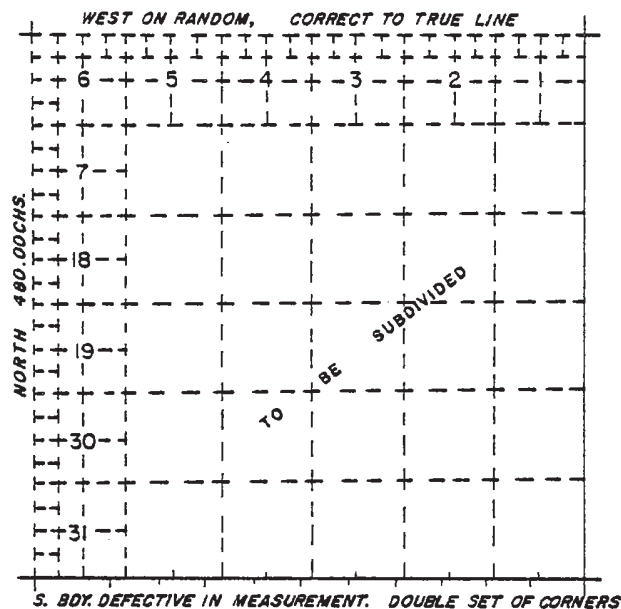


Figure 5-7²

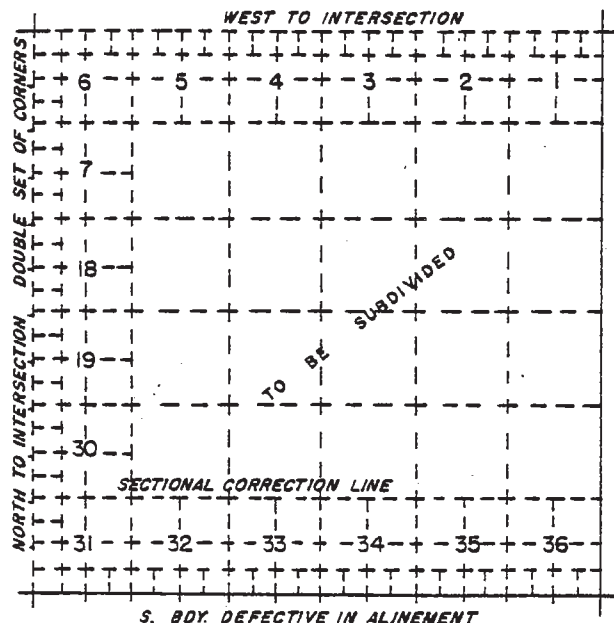


Figure 5-6²

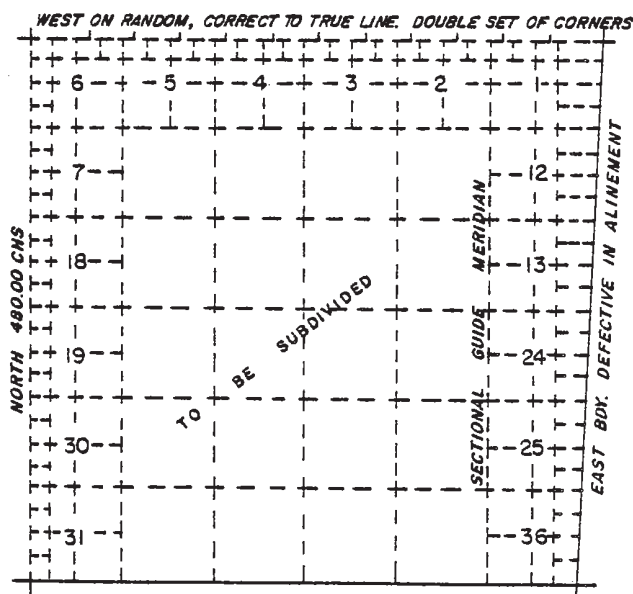


Figure 5-8²

in 40 chains. Township exteriors, or portions of exteriors, are defective when not within above limits.

- (3) Position. The corresponding section corners upon opposite boundaries are to be so located that they may be connected by true lines deviating no more than 21' from cardinal.

NOTE: The above *limits* are not the same as *allowable error of closure*.

Defective Township Exteriors

Township boundaries already established may be defective in alignment, measurement or position.

The position of the new exteriors, or of corners set on defective township boundaries in the new survey, must be established by an actual rerunning of the lines. Data acquired in surveying subdivisional lines closing upon a defective exterior is not acceptable in lieu of retracement or resurvey.

The south boundary of a township is regularly the governing latitudinal boundary. If the south boundary is defective, a sectional correction line is required.

The east boundary of a township is regularly the governing meridian boundary. If defective, a sectional guide meridian is required.

New east and south boundaries of a township became the closing meridian and latitudinal boundaries of the townships to the east and south respectively.

Where the previously established north or west boundaries are defective in measurement or position and subdivisional surveys have been initiated from them, the original corners are changed only to refer to sections to the north or west.

Closing section corners are established when subdividing. New $\frac{1}{4}$ corners are placed on the *old line* at mean distances between section corners, or at 40 chains from one direction, depending on the plan of the subdivision of the section. Where the previously established north or west boundaries are defective in alignment, but not in measurement or position, no changes are required.

Figures 5-6 through 5-8 illustrate the guiding principles involved in establishing new governing boundaries where previous exteriors are defective. Each diagram illustrates a simple condition affecting one boundary only, and examples are taken only from regular orders of procedure. The same procedures hold true under irregular order.

Subdivision of Townships

The boundaries of a township are within satisfactory governing limits for control of the subdivisional survey when the lines may be theoretically projected from the boundaries without closely approaching the rectangular limits. The danger zone has already been placed at theoretical bearings exceeding 14' from cardinal, and the corresponding zone in respect to lengths of lines may be placed at theoretical adjustments exceeding 33 links per mile.

Meridianal Section Lines

These lines have precedence in the order of survey. They are initiated at the section corners on the south township boundary and are run north parallel to the governing east boundary. Meridian lines are numbered counting from the east and are surveyed successively in the same order. Regular $\frac{1}{4}$ section and section corners are established at intervals of 40 and 80 chains as far as the northernmost interior corner.³

The last mile of a meridianal line is continued as a random line, each successive random line being parallel to the true east boundary on a section to which it belongs "... the random line is then corrected to a true line ... and permanently establishing the quarter-section corner on the true line at a distance of 40 chains from the south, placing the fractional measurement in the north half mile."

Where the north boundary of the township is a base line or standard parallel, the last miles of the meridianal section lines are continued as true lines parallel to the east boundary of the township. At 40 chains from the south $\frac{1}{4}$ corners are established, closing corners are established at the points of intersection with the north boundary. New $\frac{1}{4}$ section corners are established at mean distances between closing corners, or at 40 chains from one direction, depending on the plan of the subdivision of the section.

Latitudinal Section Lines

The latitudinal section lines, except in the west range of sections, are normally run on random lines from west to east, parallel to the south boundaries of the respective sections.

In the west range of sections, the random latitudinal section lines are run from east to west, parallel to the south boundaries of the respective sections. Permanent $\frac{1}{4}$ section corners are established on the *true lines* at 40 chains from the east, placing the fractional measurements in the west half miles.

Accumulated Error

Error in the alignment of the meridional section lines is taken up in part in the measurement of latitudinal lines, which must be within 50 links of 80 chains in length, except in the *west range* of sections where the convergency of the meridional lines is provided for. The accumulated error in alignment for the five miles of true meridional line is taken up in the sixth mile, which is run random and true. Here the true line must be within 21' of cardinal. Accumulated error in measurement in running north is placed in the last half fractional mile. Here the meridional distance is checked by a calculated closing around the last section, and the latitudinal error must not exceed 25 links to come within limits of closure. Limit of rectangularity will be exceeded if the accumulated error is greater than $3\frac{1}{2}'$ in alignment or $8\frac{1}{3}$ links per mile in measurement.

Figure 5-8 shows sectional guide meridians to be used when the east exterior is defective.

Figure 5-9 shows the proper sequence of numbers on section line when the normal order of subdividing is adhered to.

Summary

The object of the BLM rules is to secure the maximum number of normal sections. The sections adjoining the east boundary are regular if they conform with the usual rectangular limits. In this case, $\frac{1}{4}$ corners are placed on latitudinal section lines at midpoint.

59	58	43	32	21	10
57		42	31	20	9
56	55	41	30	19	8
54		40	29	18	7
53	52	39	28	17	6
51		38	27	16	5
50	49	37	26	15	4
48		36	25	14	3
47	46	35	24	13	2
	45	34	23	12	1

Figure 5-9

The sections adjoining the south boundary of the township are not regular unless the meridional lines are established at 80 chains in length, and the sections are otherwise in conformity with the usual rectangular limits.

Closing Section Lines

Guide meridians are closed against standard parallels. Township and section lines are closed on standard parallels. Both township and section lines may be made closing lines to maintain rectangularity. A different type of closing line occurs where the lines cross or close on boundaries of reservations, grants, State boundaries, or the lines of various kinds of claims.

Closing corners are normally established at intersections with a surveyed reservation, grant or State boundary.

Quarter-section corners are established between closing corners for sections closing on reservation or grant boundary.

The BLM normally does not locate quarter-section corners on state lines since they do not have the authority to survey state boundaries.

Closing corners are not set at the intersection with the line of a surveyed mineral claim, forest homestead claim, small holding claim, or the like; unless required to provide an interval of monumentation of one-half mile or less.

Where a section line or township line crosses a surveyed claim, the bearing of the intersected claim line and the distance to the nearest corner are determined and noted (on the plat).

Remember, the accuracy of lotting in the section is dependent on the accuracy of the claim location. All bearings, distances and ties should be used by the cartographer to obtain accurate claim-section relationships.

Subdivision of Sections

Revised statutes, secs. 2396, 2397 (43 U.S.C. 752 and 753), contain fundamental provisions for the subdivision of sections into $\frac{1}{4}$ and $\frac{1}{4} \frac{1}{4}$ sections. The sections are not subdivided by G.L.O. or B.L.M. unless provision is made in special instructions; however, certain subdivision-of-section lines are always protracted upon the official plat.

Under the general land laws, the *unit of administration* is the $\frac{1}{4} \frac{1}{4}$ section of 40 acres.

Lands, by rectangular survey, are identified on the ground by fixed monuments (not to be moved, altered, destroyed) established in the survey. *A U.S. patent con-*

veys title to an area defined by those fixed monuments, and related by description and outlined to the official plat.

It is the responsibility of the local surveyor to identify lands which have passed into private ownership. The B.L.M. assumes no responsibility, control, or direction over the acts of local and county surveyors in the matter of the subdivision of sections where lands have passed into private ownership.

Subdivision by Protraction

The sections bordering the north or west boundary of a township, excepting section 6, are further subdivided by protraction into parts containing two *regular half-quarter sections* and *four lots*.

Section 6 has lots protracted against both the north and west boundaries, and so contains two *regular half quarter sections*, one $\frac{1}{4} \frac{1}{4}$ section and *seven lots*.

The lots are numbered in a regular series progressively from *east to west* or from *north to south* in each section.

Regular $\frac{1}{4} \frac{1}{4}$ sections are *aliquot parts* of $\frac{1}{4}$ sections based on *midpoint protraction*.

Sections which are invaded by meanderable bodies of water, or by approved claims at variance with the regular legal subdivisions, are subdivided by protraction into regular and fractional parts.

The subdivision-of-section lines are to be terminated at a meander line or claim boundary (but the position of the sub-division-of-section lines is controlled precisely as though the section had been completed regularly).

In the case where a section, whose boundary lines are in part within the limits of a meanderable body of water or within the boundaries of a private claim, the fractional section lines are completed in theory (as if the section were normal); and the protracted position of the lines is controlled by the theoretical points so determined.

Figures 5-10 through 5-12 illustrate the subdivisions of sections and examples of subdivisions by protraction. Figures 5-13A through 5-13F illustrate subdivisions of fractional sections. M.P. means *mid-point*.

When the length or width of a township exceeds 480 chains to such an extent as to require two or more tiers of lots adjoining the north or west boundary, the past practice has been to lot all of the area beyond the regular legal subdivision as shown in figure 5-14. In Oregon, some sections will have as many as 60 lots in a section. (See figure 5-15).

In order to avoid confusions of descriptions, lotting is usually extended throughout the fractional half of the section, such as section 6 of T.32S. R.42E W.M. in Malheur County (figure 5-15).

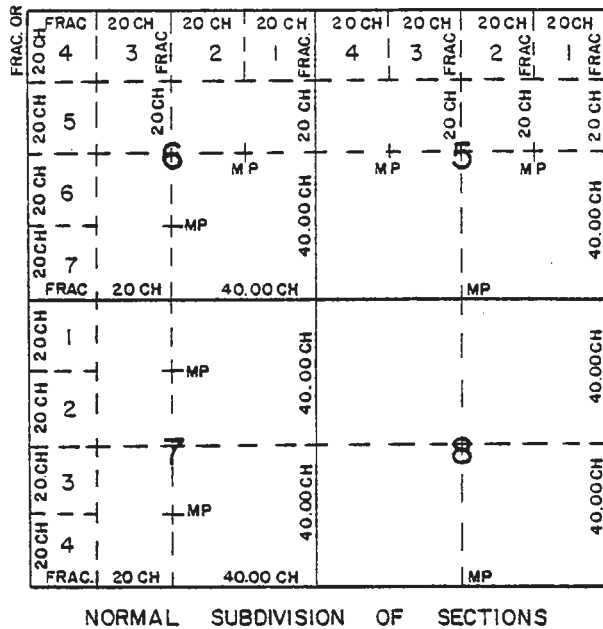


Figure 5-10

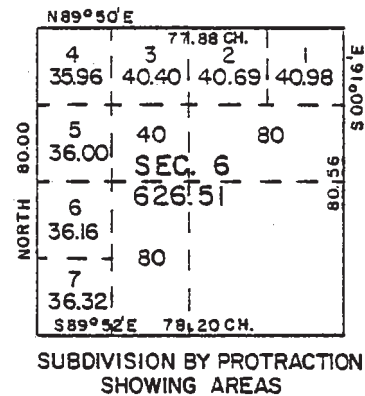


Figure 5-11

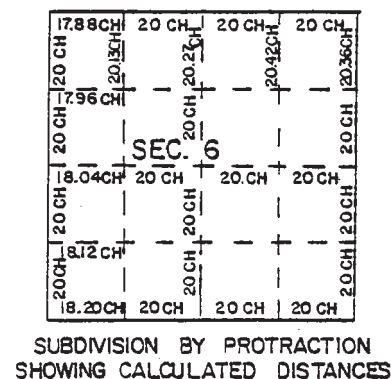
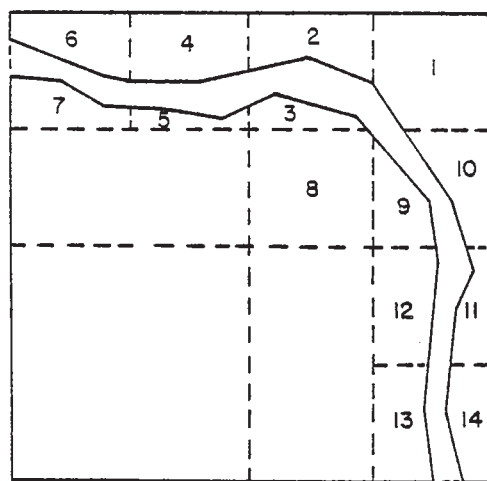
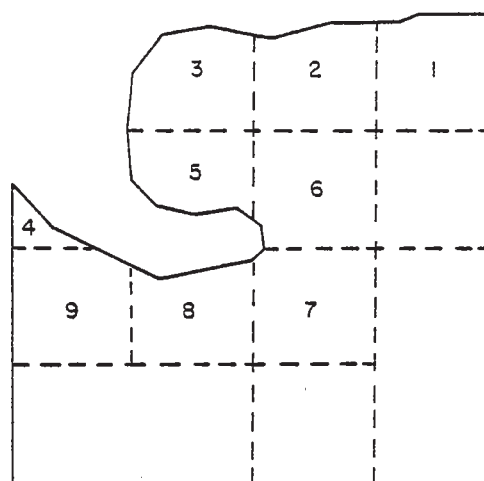


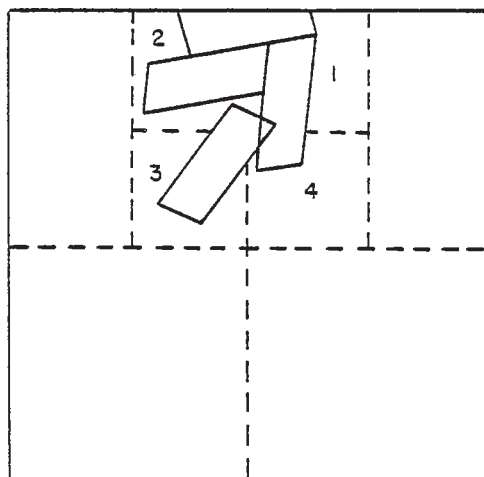
Figure 5-12



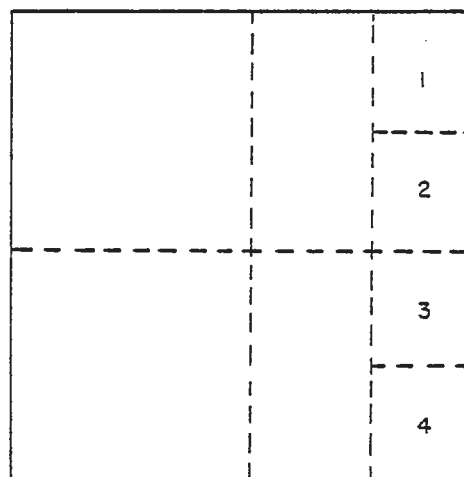
MEANDERABLE RIVER
A



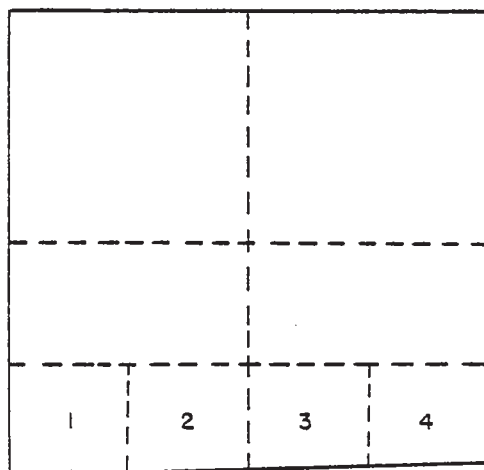
MEANDERABLE LAKE
B



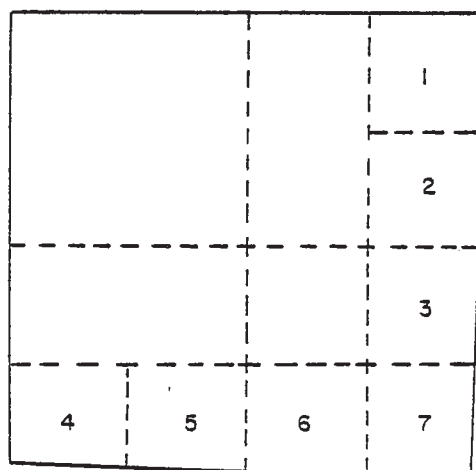
MINERAL CLAIMS
C



E. BDY. DEFECTIVE IN ALINEMENT
D



S. BDY. DEFECTIVE IN ALINEMENT
E



E. & S. BDRS. DEFECTIVE IN ALINEMENT
F

Figure 5-13

In modern practice, sections in excess of 120 chains are avoided by creation of half-townships or half-ranges. This cannot, however, be done with interior sections.

Subdivision of Sections into 1/4 Sections

To subdivide a section into 1/4 sections, run straight lines from the established 1/4 section corners in a straight line to the opposite 1/4 section corners. The point of intersection of these *centerlines* or 1/4 lines will be the *corner common to the several 1/4 sections*, or the *legal center* of the section.

Subdivision of Fractional Sections

The law provides that where opposite corresponding 1/4 section corners have not been or cannot be fixed, the subdivision-of-section lines shall be ascertained by running from the established corners north, south, east or west, as the case may be, to the water course, reservation line, or other boundary of the fractional section, as represented upon the official plat.

The law presumes that the section lines are due north and south, or east and west lines; but usually this is not the case. Hence, in order to carry out the spirit of the law, it will be necessary in running the center lines through fractional sections; to adopt mean courses where the section lines are not geodetic; or to run parallel to the east, south, west or north boundary of the section, as conditions may require.

Subdivision of Quarter Sections

Preliminary to the subdivision of 1/4 sections, the 1/4 1/4 (1/16 section) corners will be established midway (half-way) between the section and 1/4 section corners and between the 1/4 section corners and the center of section, except on the last half mile of the lines closing on township boundaries, where they should be placed at 20 chains, proportionate measure, counting from the regular 1/4 section corner.

The 1/4 1/4 (1/16 section) corners having been established as directed above, the center lines of the 1/4 section will be run straight between opposite corresponding 1/4 1/4 corners on the 1/4 section boundaries. The intersection of the lines thus run will determine the legal center of a 1/4 section.

Subdivision of Fractional Sections

The subdivision of fractional 1/4 sections will be run from properly established 1/4 1/4 corners, with courses governed by the conditions represented upon the official plat, to the lake, water course, reservation

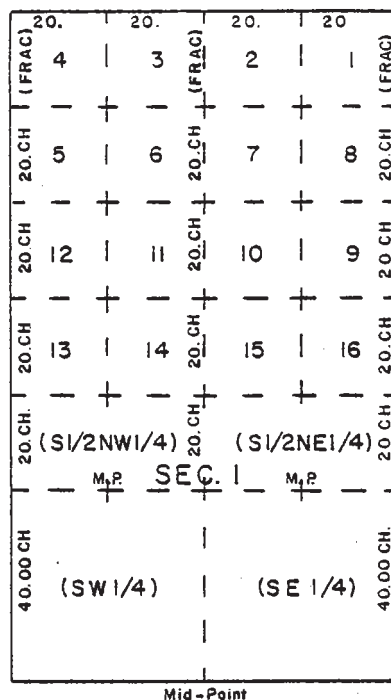


Figure 5-14

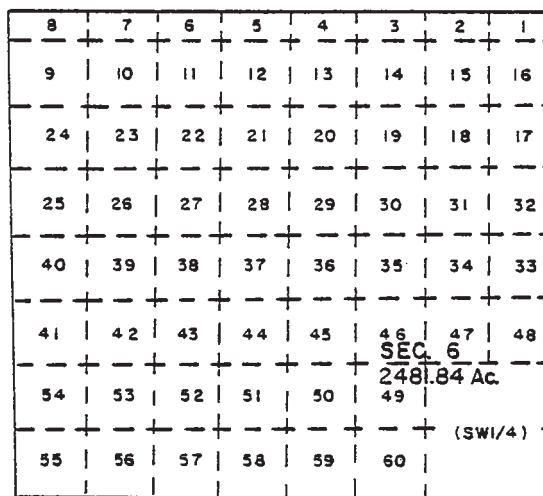


Figure 5-15

or other irregular boundary which renders such sections fractional.

Reasonable discrepancies between former and new measurements may generally be expected when retracing the section boundaries. The shortage or surplus is distributed by proportion in establishing a 1/16 corner, or 1/4 1/4 corner. In this manner the discrepancies between original and new measurements are equitably distributed. See figure 5-13.

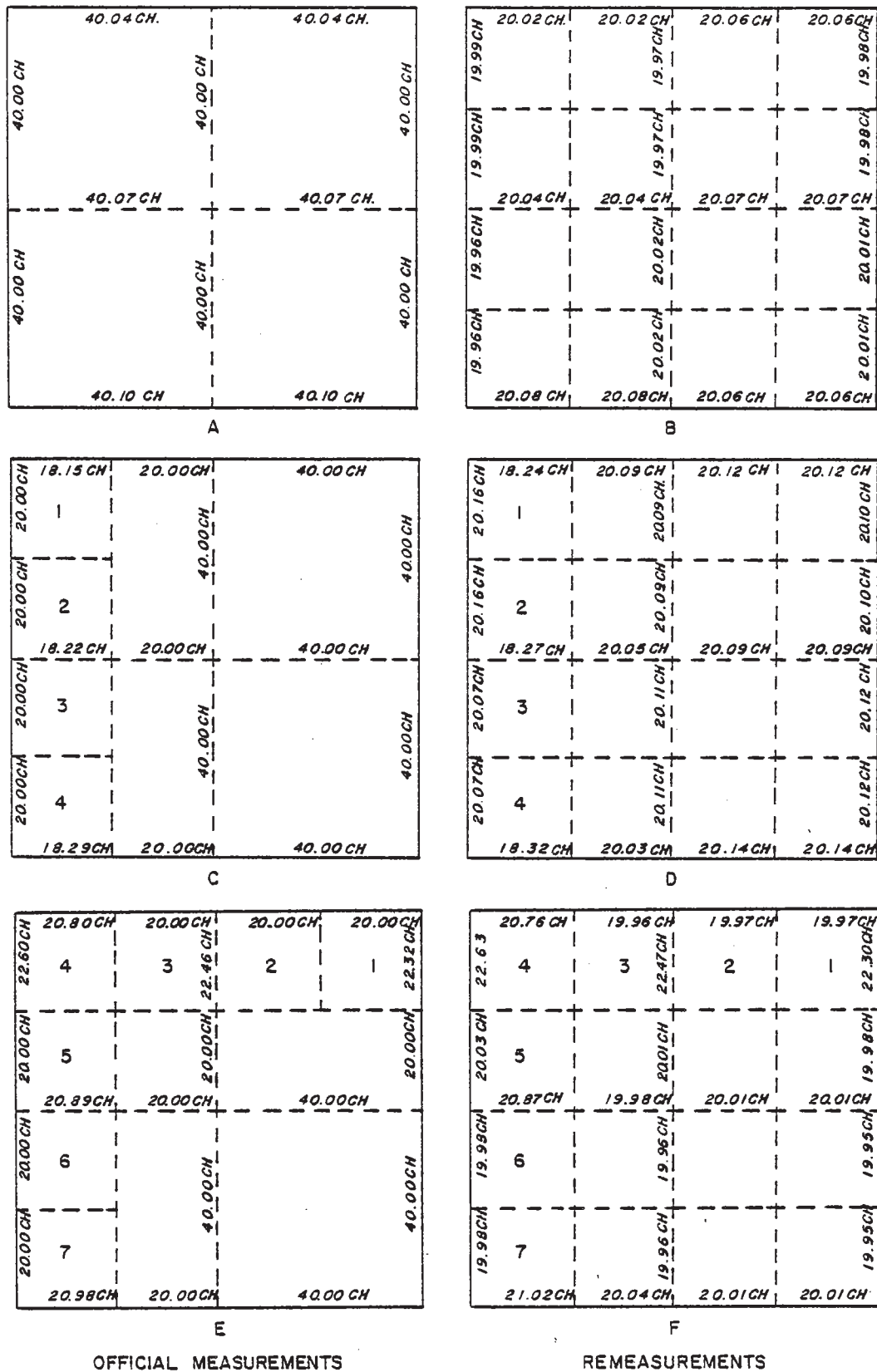


Figure 5-16

Example of subdivision by survey showing relation of official measurements and calculated distances to remeasurements, and indicating proportional distribution of differences.

(BLM Manual)

Summary

It is emphasized that when entrymen⁴ have acquired title to certain legal subdivisions, they have become owners of the identical ground area represented by the corners established on the ground, which should conform to the official plat.

A private survey made for the purpose of marking on the ground a theoretical line, platted but not run by the U.S., where executed within allowable departure from geodetic course, and relied upon by owner under title passed by the U.S. in the placing of improvements on the patented land, will not be disturbed, but it will be adopted by the U.S. as a boundary for closure of the survey of the adjoining public land. (*Algoma Lbr. Co. v. Kruger*, 50 L.D. 402 (1923))

Meandering

The traverse of the margin of a permanent natural body is termed a meander line. All navigable bodies of water and other important rivers and lakes are segregated from the public lands at mean-water elevation (see glossary). In the original surveys, *meander lines are run for the purpose of ascertaining the quantity of land remaining after the segregation of water areas.*

Numerous decisions in the U.S. Supreme Court assert the principle that *meander lines are not boundaries defining the area of ownership of lands adjacent to the water.* The general rule is that *meander lines are run not as boundaries, but to define the sinuosities of the banks of a stream or other body of water, and as a means of ascertaining the quantity of land embraced in the survey; the stream, or other body of water, and not the meander line, is the boundary.* (See Chapter 10)

Meander lines will not be established at the segregation line between upland and swamp or overflowed land, but at the ordinary high-water mark of the actual margin of the lake or river.

Rivers

Facing *downstream*, the bank on the left hand is termed the *left bank* and that on the right hand is termed the *right bank*.

Navigable rivers and bayous, as well as non-navigable rivers which have a right angle width of 3 chains and upwards, are meandered on both banks, at the *ordinary mean high-water mark*.

Shallow streams and intermittent streams without well-defined channel or banks are not meandered, even when more than 3 chains wide. Tidewater streams are meandered at *ordinary mean high tide* as far as navigable even when less than 3 chains wide. Tidewater inlets and bayous are recorded and are

meandered if more than 3 chains in width, but when non-navigable are not meandered when less than 3 chains wide.

Lakes

All lakes of the area of 50 acres and upward are meandered.

Islands

Every island above the mean high water elevation of *any* meanderable body of water, except islands formed in navigable bodies of water *after the date of admission of Oregon into the Union*, is meandered and shown on the plat.

Even though the U.S. has parted with its title to the adjoining mainland, an island in a meandered body of water, navigable or non-navigable, in continuous existence since the date of the admission of Oregon to the Union, and omitted from the original survey, remains *public land of the U.S.*

Resurveys in Brief

A *resurvey* is a reconstruction of land boundaries and subdivisions accomplished by re-running and re-marking the lines represented in the original field notes and plat.

Government resurveys involve considerations of a different character from those relating to *original* surveys. The object is two-fold: First, the adequate protection of *existing rights* acquired under the original survey; and second, the proper marking of boundaries on remaining public lands.

Dependent Resurveys

A *dependent resurvey* is a retracement and re-establishment of the lines of the original survey in their true original positions according to the best available evidence of the positions of the original corners.

By law, and in fact, lands contained in a certain section of the original survey, and lands contained in the corresponding section of a *dependent resurvey* are identical.

Independent Resurvey

An *independent resurvey* is the establishment of new section lines and often new township lines, *independent* of and without reference to the corners of the original survey.

In the independent resurvey boundaries of patented lands which are not identical with those of the resurvey must be preserved.

Retracement

A *retracement* is a survey that is made to ascertain the direction and length of lines and to identify monuments and marks of an established prior survey.

Jurisdiction

The Act of March 3, 1909 (35 Stat. 845), as amended June 25, 1910 (36 Stat. 885); 43 U.S.C. 772 authorized the Secretary of the Interior to make resurveys.

The Act of September 21, 1918 (40 Stat. 965 43 U.S.C. 773), provided authority for resurvey of townships in which disposals exceed 50% of the total area.

The Act of July 14, 1960 (43 U.S.C. 1364), authorized the Secretary of Interior to accept contributions for cadastral surveys performed on federally controlled or intermingled lands.

The B.L.M. has *exclusive jurisdiction* over all matters pertaining to surveys and resurveys affecting public lands. As between owners of patented lands, final determination in the matter of fixing the position of disputed land boundaries rests with local courts of competent jurisdiction.

Bona Fide Rights of Claimants

The Act of March 3, 1909 (35 Stat. 845), as amended June 25, 1910 (36 Stat. 884; 43 U.S.C. 772) reads in part as:

“That no such resurvey or retracement shall be so executed as to impair the bona fide rights of claimants, entrymen, or owners or land affected by such resurvey or retracement.”

The rights of claimants are to be similarly protected under the provisions of the Act of September 21, 1918 (40 Stat. 965; 43 U.S.C. 773).

Bona fide rights are those acquired in good faith under the law.

When a resurvey plat does not show *new lot acreages* the original lot acreages must be used. This normally occurs on private lands, and the acres are not changed because of the principle of the protection of *bona fide rights*; because the original acreage is the *patented acreage*; and possibly because the original acreage is within tolerable limits.

Special Surveys of the U.S.

Special Surveys are surveys that involve unusual applications of, or departures from, the rectangular survey system. They often carry provisions of a special legislative act. Special surveys include surveys of tracts or lots, special subdivision of sections, metes and bounds surveys, and townsite surveys.

Tract or Lot Surveys

Special surveys may involve areas of land that are not aliquot parts of sections but are designated as *tracts* or *lots*. In common usage the term *tract* is applied to an expanse of land of no, particular size, often irregular in form. As regards the *rectangular survey* a tract usually ties in one or more sections and cannot be identified with any particular section, such as *donation land claims*. Tracts within a township are numbered beginning with 37 or the next highest unused numerical designation to avoid confusion with section numbers.

Subdivision of Sections—Special

Special surveys of subdivisions of sections include Indian allotment surveys, subdivisions within reclamation projects, the determination of boundaries between intermingled public and patented lands within a section, the subdivision of sections into small tracts, and various fragmentary surveys.

If a section is subdivided, the center $\frac{1}{4}$ section corner is established and monumented. If a $\frac{1}{4}$ section is subdivided, all $\frac{1}{16}$ corners are established and monumented.

Metes and Bounds Surveys

Metes and bounds surveys are required to define the boundaries of irregular areas of land, which are not conformable to legal subdivisions. This type of survey may involve mineral claims, small-holding claims, private land grants, forest-entry claims, national parks and monuments, Indian reservations, lighthouse reservations, trade and manufacturing sites, homestead claims in Alaska, or the like.

Metes and bounds surveys located upon surveyed lands are usually connected to rectangular survey corners.

Townsite Surveys

U.S.R.S. 2380 and 2381 (43 U.S.C. 711, 712) and numerous special acts make provisions for the executive withdrawal of public lands for townsite purposes.

A townsite survey, in public-land surveying practice, is a survey made within one or more regular units of the township subdivision by which the land is divided into blocks, streets and alleys as a basis for the disposal of title in village or town lots.

Townsite surveys fall into two general classes: those with few or no prior improvements and those where villages or towns already exist.

"In the typical U.S. surveyed townsite, the block dimensions are usually between 300 and 400 feet. The *principal streets* are usually made 80 feet in width, though frequently as much as 100 feet where greater width is called for. Less important intersecting streets, though narrower, are seldom given a width of less than 60 feet." (1973 BLM. Manual of Surveying Instructions 7-20, p. 162.)

"The normal frontage of lots is 50 feet. Unless conditions require a special plan, the whole system is laid out on cardinal." (BLM Manual.)

Small Tract Surveys

The Act of June 1, 1938 (52 Stat. 609), as amended by the Act of June 8, 1954 (68 Stat. 239; 43 U.S.C. 682a), provides for the sale or lease of small tracts not exceeding five acres.

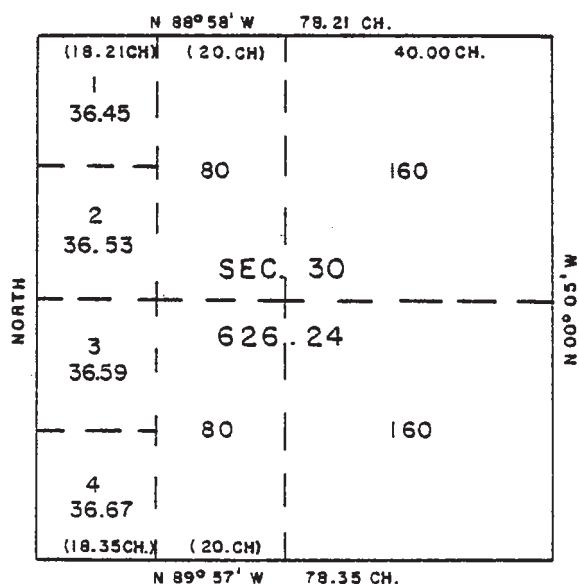


Figure 5-17

Mineral Segregation Surveys

A *mineral segregation survey* is metes and bounds survey made to define the limits of *non-mineral* public land adjoining one or more mining claims and to supply data for lotting the non-mineral land against the claim.

Mine Surveys

This class of survey is important in connection with the leasing of mineral lands, particularly *coal lands*. The field work usually consists of a *dependent resurvey* and partial subdivision of the section or sections involved, a traverse of the main entries to the mine with ties to the portals and improvements, and the marking of the section and subdivision of section lines within the mine which divide private and public ownership.

B.L.M. Policy on Area Computation

According to subsection 9-24 (p. 195) of the U.S. B.L.M. Manual of Surveying Instructions, "The deficiency in area which results from the convergence of meridians is placed normally in the fractional lots adjoining the west boundary of the township. Sections 7, 18, 19, 30 and 31 each usually contains 1 to 4, inclusive, whose meridional dimensions are all even

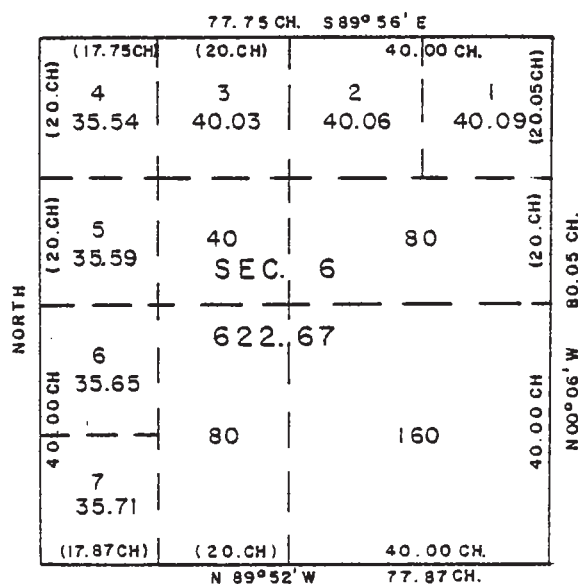


Figure 5-18

20.00 chains; the dimensions of the latitudinal boundaries of these lots are computed proportionally from the fractional measurements ascertained on the section lines. The area, in acres of each government lot is then found simply by adding the lengths, in chains, of its north and south boundaries."

For example, taking section 30 (figure 5-17) the dimensions of latitudinal boundaries and the areas are found as follows:

	Lot 1	Lot 2
N. Dim.	18.21 chs.	18.245 chs.
S. Dim.	<u>18.245 chs.</u>	<u>18.28 chs.</u>
	36.455	36.525
	36.45(+) acres	36.53(-) acres

	Lot 3	Lot 4
N. Dim.	18.28 chs.	18.315 chs.
S. Dim.	<u>18.315 chs.</u>	<u>18.35 chs.</u>
	36.595	36.665
	36.59(+) acres	36.67(-) acres

The areas of lots 5, 6 and 7, section 6, are ascertained similarly, making due allowance, when calculating the length of the north boundary of lot 5, for any material variation from 20.00 chains in the meridional dimension. (figure 5-18.)

The surplus, or deficiency in area, which results from the discrepancy in the meridional measurements between the exterior boundaries and the subdivisional lines is placed normally in the fractional lots adjoining the north boundary of the township. Sections 1 through 5 each usually contains lots 1 through 4, whose dimensions on their latitudinal boundaries are all treated as an even 20.00 chains; the meridional dimensions of these lots and their areas are computed on the plan for computing fractional lots adjoining the west boundary of the township.

The areas of lots 1, 2 and 3, section 6 (figure 5-18), are ascertained similarly, making due allowance when calculating the length of the west boundary of lot 3, for the departure across lot 4, where more or less than 20.00 chains. The area of lot 4, section 6, in acres equals the product of its mean dimensions in chains, divided by 10.

The following is an example of ascertaining the areas of the fractional lots in section 6 (figure 5-18):

	Lot 1	Lot 2
E. Dim.	20.05 chs.	20.037 chs.
W. Dim.	<u>20.037 chs.</u>	<u>20.024 chs.</u>
	40.087	40.061
	40.09 acres	40.06 acres

	Lot 3
E. Dim.	20.024 chs.
W. Dim.	<u>20.011 chs.</u>
	40.035
	40.03(+) acres

	Lot 4
E. Dim.	20.011 chs.
W. Dim.	<u>20.000 chs.</u>
	20.005 mean

N. Dim.	17.75 chs.
S. Dim.	<u>17.78 chs.</u>
	17.765 mean
$2.0005 \times 17.765 = 35.539$ acres	
	35.54 acres

	Lot 5	Lot 6
N. Dim.	17.78 chs.	17.81 chs.
S. Dim.	<u>17.81 chs.</u>	<u>17.84 chs.</u>
	35.59 acres	35.65 acres

	Lot 7
N. Dim.	17.84 chs.
S. Dim.	<u>17.87 chs.</u>
	35.71 chs.

"In irregular sections and in sections which are invaded by meanderable bodies of water, or by lines of segregation, the center lines of the section and the center lines of each quarter section in turn are given calculated values based upon the balanced field closing sheets. Points of intersection of the center lines with the meander lines or other lines of segregation are then computed in order to complete the boundaries of each fractional lot. With the results of these computations at hand the area of each fractional lot

may be most readily computed by the method of *double meridian distances*.¹⁵

For example, to compute the area of Diamond Rock (lot 4) in Section 18 (figure 5-19) use the following procedures:

1. To compute an area by double meridian distance, the closing error of the figure is eliminated, or the traverse of its boundary is balanced, by the most applicable rule (see Chapter 9).
2. The double meridian distances (D.M.D.'s) of the several courses are computed by:
 - a. The D.M.D. of the first course equals the departure, or the increment in easting or westing, of the course itself.
 - b. The D.M.D. of the second course, and each succeeding course in turn, is ascertained by taking, the D.M.D. of the preceding course, plus the departure of the preceding course, plus the departure of the course itself.
 - c. The D.M.D. of the last course is numerically equal to its departure, but with opposite sign, thus verifying the value of each preceding D.M.D.

3. For convenience in making the computations, the differences in

$\left\{ \begin{array}{l} \text{latitude} \\ \text{departure} \end{array} \right\}$ to the $\left\{ \begin{array}{l} \text{north} \\ \text{east} \end{array} \right\}$ are treated as of positive sign;
 to the $\left\{ \begin{array}{l} \text{south} \\ \text{west} \end{array} \right\}$ as of negative sign.

4. The point of beginning is taken at the westernmost salient of the figure and the direction of the traverse is run counterclockwise. On this plan each D.M.D. and the algebraic sign of the final results are positive.
5. Multiply the latitude of each course by the D.M.D. of the course. The positive products are arranged in a column for "north areas"; the negative products in a column for "south areas."
6. The sum of the negative products is subtracted from the sum of the positive products.
7. The area, corresponding to the unit of measurement that is employed, is ascertained by taking one-half the last result.
8. Where the unit of measurement is the chain (as in the example of figure 5-19, and the computations of figure 5-20), the area in square chains is divided by 10 to give the area in acres.

The computation of lot 4 of section 18, in figure 5-19, is shown in figure 5-20.

Knowing *how* the U.S. acreages were computed will be helpful when confronted with illegible acreage figures on photocopies of the U.S. survey plats. If the preceding computations are followed, the acreage of any lot can be confirmed.

On standard lots (uninterrupted by special survey lines such as meanders, mineral survey, townsite surveys, etc.) the U.S. acreage is official. For example, the U.S. patented acreage (36.53) of lot 2 in sec. 30 (figure 5-17) is official. If the land is in private ownership, even a government survey cannot change the lot acreage. The only way the lot acreage can be changed (assuming it is in U.S. ownership and not private) would be by a resurvey.

The same is true of the areas of sections designated as 20.00 acres, 40.00 acres, 80.00 acres, 160.00 acres, 640.00 acres, etc. If the lands are in private ownership, the patent acreage stands. B.L.M. attorneys advise against changing the patent acres; unless, of course,

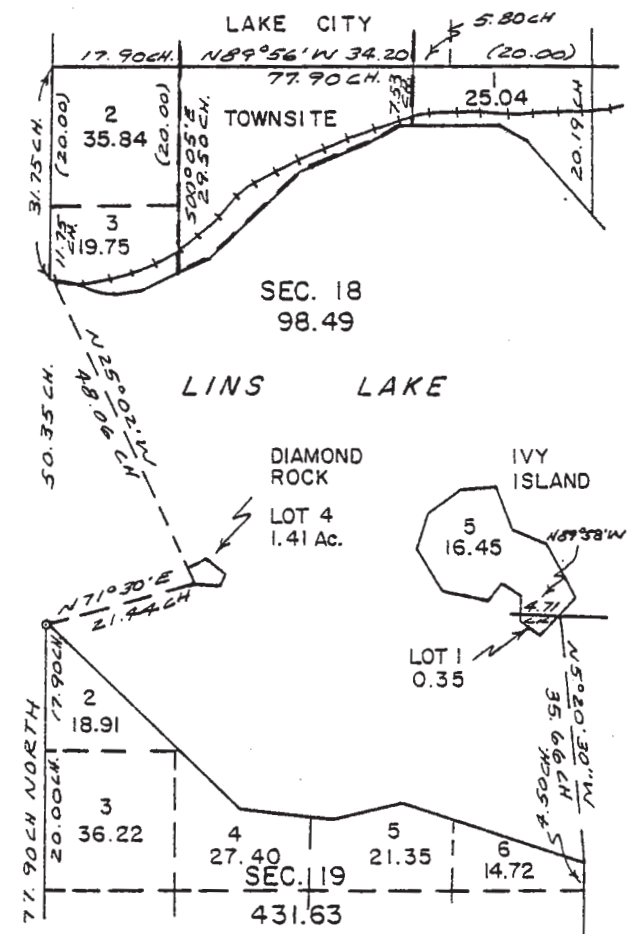


Figure 5-19

Fig. 5-20
COMPUTATION OF AREA OF LOT 4

No.	Course	Distance	Latitudes		Departures		D. M. D.'s	N. areas	S. areas	Totals	
			North	South	East	West				Lat. N.	Dep. E.
Tie	N. 71°30' E.	21.44	6.80		20.33					6.80	20.33
					+ .005						
5	S. 86°46' E.	3.19		0.18	3.185		4.73		0.85	6.62	23.52
4	N. 33°00' E.	2.20	1.845		1.20		9.12	16.83		8.465	24.72
3	N. 48°30' W.	3.50	2.32			2.62	7.70	17.86		10.785	22.10
2	S. 61°15' W.	2.90		1.395		2.54	2.54		3.54	9.39	19.56
1	S. 16°30' E.	2.70		2.59	.77		.77		1.99	6.80	20.33
			4.165	4.165	5.155	5.16		34.69	6.38		
					.005			6.38			
		14.49	4.165	4.165	5.16	5.16		28.31	Double area.		

Begin total lots. and depts. at M.C. or W. bdy. sec. 19, for purposes of platting.	D. M. D.'s	14.15 Square chains
	(1) 0.77 9.12 (4)	1.41 Acres ← RESULT
	+ .77 + 1.20	
	+ 3.19 - 2.62	
Numbering of courses as taken from field notes, order reversed to counterclockwise	(5) 4.73 7.70 (3)	Begin D. M. D.'s at angle point of meanders farthest west, end of course No. 2 running SW., or end of course No. 1 running NW.
	+ 3.19 - 2.62	
	+ 1.20 - 2.54	
	(4) 9.12 2.54 (2)	

the area in question is occupied by many parcels (i.e., urban lands, small rural parcels, suburban parcels, etc.). The Department of Revenue, however, recommends changing the area of a section if:

1. The owner requests the change;⁶ and
2. he supplies a *registered survey* (that is - one executed by a registered Oregon Land Surveyor or Registered Engineer; stamped with the official seal of the surveyor or engineer; and, signed by the surveyor or engineer);
3. and, the acreage of the registered survey is correct.

NEVER CHANGE A PATENT ACREAGE TO CORRESPOND WITH ACREAGE DERIVED DIRECTLY FROM AERIAL PHOTOS. Such areas would seldom be accepted by the courts.

The lots bordering meanders are not as sacred as those we have just discussed. Although the acreage of the lots should not be changed, the assessable acreage of the lot owner will seldom be identical to the lot acreage. This policy is based on two principles:

PRINCIPLE: *Meander lines are not run as boundaries, but to define the sinuosities of the banks of a stream of other body of water, and as a means of ascertaining the quantity of land embraced in the survey; THE STREAM, OR OTHER BODY OF WATER, AND NOT THE MEANDER LINE, IS THE BOUNDARY.*⁷

In other words—the meander line does not mark or limit the ownership boundary; therefore,

PRINCIPLE: *The acreages of meandered lots are the quantities of land remaining after the U.S. Survey segregation of water areas. They are not ownership acreages and, therefore, are not the assessable acreages. The assessable acreages are ascertained by computing acreages to the mean high water mark (navigable rivers); to the center of non-navigable streams; or other legal riparian boundaries. (See Chapter 10 on Riparian Rights.)*

Areas of Lots on Resurvey Plats

Where lots have been alienated (by the U.S.) subsequent to the former subdivision of the U.S. survey, the lotting will not be changed by the resurvey. In such cases, the G.L.O. (or B.L.M.) plat will carry a notation that refers to the lottings of the previous plat:

U.S. plat represents a dependent resurvey of the original township boundary and subdivisional lines designed to restore the corners in their true original locations according to the best available evidence.

Except as indicated hereon, the lottings and areas are as shown on the plat (or plats) approved (date or dates of former survey plat or plats).

The reference to modified lottings or areas is omitted when there are no exceptions.

On plats of dependent resurveys the areas of the subdivisions are shown only in those exceptional cases where the differences between the actual quantity of the vacant subdivisions, as found by resurvey, and the former area, as returned on the original approved plat, are so great as to warrant revision. According to the U.S. regulations "in that case the question of a revision rests upon the element of *quantity* rather than upon that of *distortion*. For practical purposes a variation of 2.00 acres to the quarter-quarter section has been found advisable before making a change."⁸ A new lot number and area are assigned to each vacant subdivision (not alienated) which is to be revised.

Remember the acreages of alienated lots cannot be revised in the resurvey. If alienated lot acreage is revised, U.S. records should be checked to see if a patent was issued. In most cases where it appeared as though alienated lot acreages were being changed, research revealed the lots to actually be in U.S. ownership—not private ownership.

An exception is sometimes made to the 2-acre minimum where it is shown that more exact acreage is needed for proper management of U.S. lands.

Mineral Surveys

Mineral surveys are made to mark the legal boundaries of mineral deposits or ore-bearing formations on the public domain, where the boundaries are determined by lines other than the normal subdivision of the public lands.

Each survey is given but one number. A location under the mining laws can legally be made only of a tract or piece of land embraced within one set of boundary lines.

The position of the official survey upon the ground is fixed by ties to corners of the public survey or mineral location monument (M.M.). In either case, the corner must be within two miles of the claim.

Mineral location monuments are usually located at a point, visible in every direction, where the permanency of the monument will not be endangered. Mineral

monuments usually are tied to geodetic coordinates and can therefore be tied to state plane coordinates.

When plotting large groups of claims, the best procedure is to locate the mineral monuments and the claim and section corners to those monuments. The plats of claims usually show ties to corners of overlapping or adjacent claims; these ties should be closely adhered to in cadastral mapping.

Annotations

Navajo Co. v. Apache Co., 26 Ariz. 74, 721 Pac. 837:

If all the corners marked in the surveys, returned by the surveyor general, are established as proper corners of sections, or subdivisions of sections, which they were intended to designate, the corners of half and quarter sections, not marked on the surveys, are placed as nearly as possible equi-distant from two corners which stand on the same line.

Poleske v. Jones, 192 Iowa 1015, 185 N.W. 917:

Centers of sections cannot be ascertained by running a line, (on a cardinal) directly south from the $\frac{1}{4}$ section corner on the north line, and marking off 160 rods on such line. The lines must be run from $\frac{1}{4}$ section corner to $\frac{1}{4}$ section corner, and the legal center of the section is placed at the intersection of these lines.

Barringer v. Davis, 141 Iowa 419, 120 N.W. 65:

A government survey, even though incorrect, is conclusive where there is a controversy between persons asserting conflicting claims under grants or parents based on such survey.

Greer v. Squire, 9. Wash. 359, 37 Pac. 545:

Corners shown to have been originally set by U.S. surveyors are conclusive and must be accepted as the true corners, no matter how inaccurately they may have been originally established.

Hubbard v. Dusy, 80 Cal. 281, 22 Pac. 214:

Where it is doubtful which of two lines or monuments is the true government line, that one is to be so considered which more nearly conforms to the U.S. field notes (or plat).

The following ruling is very important to cadastral cartography.

Goodman v. Myrick, 5 Ore. 65; Van Dusen v. Shively, 22 Ore. 64, 29 Pac. 76:

Where there is a discrepancy in a government survey, between the monument and the distances given in the field notes (or on the plat), the monuments will control...

In Hall v. Tanner, 4 Pa. 244, 45 Am. Dec. 686, it was said:

"It has ever been held that the marks on the ground constitute the survey. The courses and distances are only evidence of the survey."

Henrie v. Hyer, 92 Utah 530, 70 Pac. (2d) 154:

Official government surveys are not open to attack between private parties in boundary disputes.

Vaught v. McClymond, 116 Mont. 542, 155 Pac. (2d) 612:

Errors in U.S. surveys cannot be corrected by the courts since such surveys create boundaries and do not merely ascertain them.

Wing v. Wallace, 42 Idaho 430, 246 Pac. 8:

A resurvey does not affect the rights previously vested. Its purpose is to ascertain the lines of the original survey without regard to their correctness.

Feghtly, Historical Development of Land Surveys, 38 111. L. Rev. 220:

Lines established by official surveys control over those made by private parties.

Goff v. Avent, 122 Miss. 86, 84 So. 134:

If a deed description is by rectangular survey section numbers, the land conveyed is such as it physically exists on the ground, the original government corners and lines being such sections' true and only boundaries.

R.L.C. (1939) Subsection 1022. Single and double proportionate measurement, post, subsection 384, 385.

"A proportionate measurement is one that gives concordant relation between all parts of the line . . ." and new distances are to be of the same relation to the original record length...

Dept. of Justice Opinion, Oregon, 150-01-813-72; 1620:

"Surveys made by the authority of the United States or the State of Oregon may be considered as evidence in any court in this State, and unlike private surveys, need not be arrested." ORS 41.540.

The same is true of Bureau of Land Management field notes. ORS 209.090.

"The statutes reflect the generally accepted rule that a resurvey is evidence, although not conclusive evidence, of the location of the original line, and the question of whether the resurvey accurately retraces the original survey, is a question of fact. United States v. Hudspeth. 384 F.2d 683. 1967."

"Although some practical problems may arise, I see no legal reason why the assessor may not employ the resurveys in preparation and maintenance of his maps, as the resurveys represent the best information available."

" . . . I would suggest assessors remain aloof from controversies involving title and boundaries until such time as the conflict is resolved between the parties in interest."

ORS 307.080 MINING CLAIMS

"Except for the improvements, machinery and buildings thereon, mining claims are exempt from taxation prior to obtaining a patent therefor from the United States."

Lee Wilson & Co. v. United States, 245 U.S. 24:

"First. Where, in a survey of the public domain a body of water or lake is found to exist and is meandered, the result of such meander is to exclude the area from the survey and to cause it as thus separated to become subject to the riparian rights of the respective owners abutting on the meander line in accordance with the laws of the several states. Hardin v. Jordan, 140 U.S. 371; Kean v. Calumet Canal Co., 190 U.S. 452, 459; Hardin v. Shedd, 190 U.S. 508, 519."

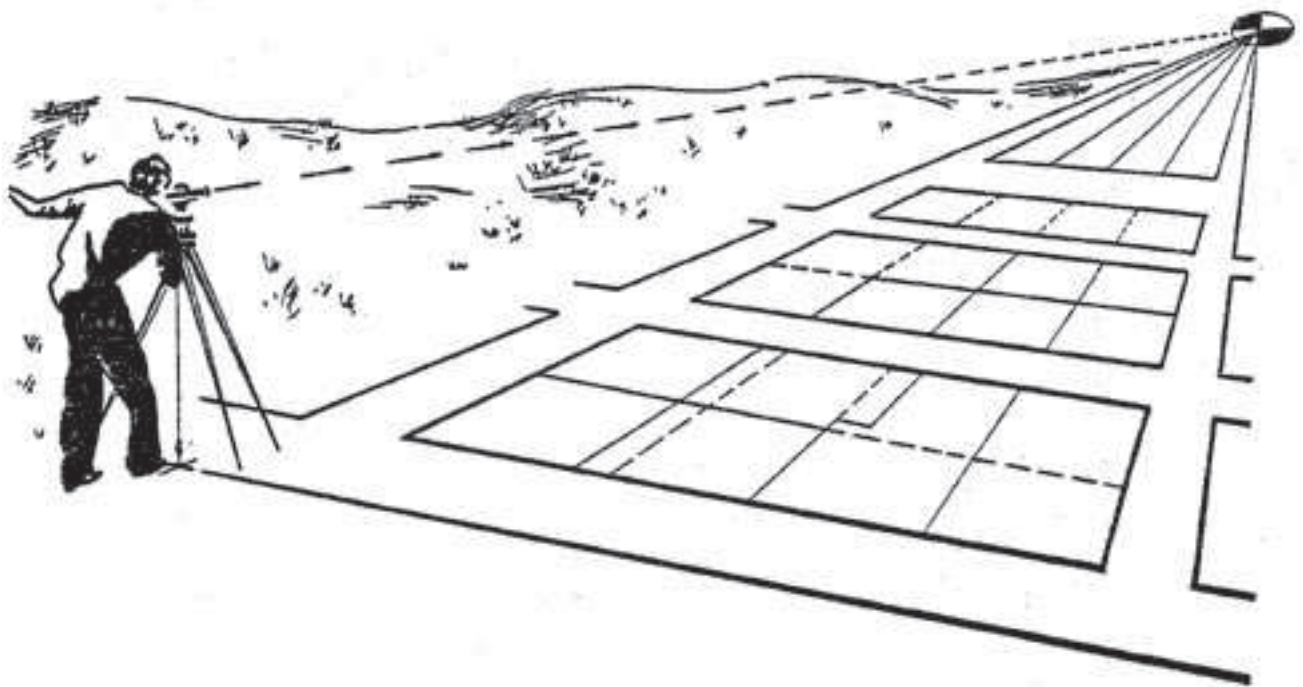
"Second. But where upon the assumption of the existence of a body of water or lake, a meander line is through fraud or error mistakenly run because there is no such body of water, riparian rights do not attach because in the nature of things the condition upon which they depend does not exist and upon discovery of the mistake it is within the power of the Land Department of the United States to deal with the area which was excluded from the survey, to cause it to be surveyed and to lawfully dispose of it. Miles v. Cedar Point Club, 175 U.S. 300; French-Glenn Livestock Co. v. Springer, 185 U.S. 47; Security Land & Exploration Co. v. Burns, 193 U.S. 167; Chapman & Dewey Lbr. Co. v. St. Francis Levee District, 232 U.S. 186."

"If in the making of the survey of public lands, an area is through fraud or mistake meandered as a body of water or lake where no such body of water exists, riparian rights do not accrue to the surrounding lands, and the Land Department, upon discovering the error, has power to deal with the meandered area, to cause it to be surveyed, and lawfully dispose of it."

"The fact that its administrative officers, before discovery of the error, have treated such a meandered tract as subjected to the riparian rights of abutting owners, under the State laws, and consequently as not subject to disposal under the laws of the United States, cannot stop the U.S. from asserting its title in a controversy with an abutting owner; and even as against such an owner, who acquired his property before the mistake was discovered and in reliance upon action and representations of Federal Officers carrying assurance that such riparian rights existed, the U.S. may equitably correct the mistake and protect its title to the meandered land. The equities of the abutting owners, if any, in such circumstances are not cognizable judicially, but should be addressed to the legislative department of the Government." (Moon Lake Case)

Endnotes

1. The B.L.M. Manual, now out of print, is the authority for most of the material in this chapter.
2. From the 1973 Manual of Instructions for survey of public lands of U.S.
3. Ibid.
4. One who makes an entry of land under the public land laws of the U.S.
5. U.S. B.L.M. Instructions
6. Such requests should always be in writing.
7. *Minto v. Delaney*, 7 Ore. 337; *Weiss v. Oregon Iron & Steel Co.*, 13 Ore. 496, 11 Pac. 255.
8. U.S. B.L.M. regulations.



CHAPTER 6

SURVEYS AND SURVEYING

INTRODUCTION

Surveys are the building blocks of the cadastral map. They supply the angular and linear measurements necessary for obtaining accurate map geometry. The surveys fortify the cadastral map with concrete evidence that is needed to convince taxpayers and other map users that the lines and points of the map are reasonably accurate and reliable. It has been found that cadastral maps based on surveys are questioned and criticized less often than maps made without reference to surveys.

Moreover, survey plats supply the cartographer with a graphic representation of property boundaries that are often ambiguously defined in deeds. Another benefit to be derived from the survey plat is the wealth of information that the surveyor often includes on his drawing; information such as: (1) ties to important monuments, triangulation stations, abutting properties, engineering stations, bench marks, plane and geodetic coordinates; (2) monument identification; (3) route traverse measurements; (4) right-of-way widths; (5) meanders of bodies of water; (6) survey and boundary conflicts; (7) ownership names; (8) deed recording references; (9) street intersection ties; (10) areas; (11) names of physical and cultural features; (12) ties and references to prior land surveys; and often, (13) the locations of improvements on land.

Since the lines of cadastral maps have their origins in surveys, many of the procedures, techniques, mathematical operations and approaches to the problem solving of the cartographer are like that of the surveyor; the cartographer and surveyor use the same units of measure for angular and linear measurements, the same trigonometric principles and formulas and the same geographic concepts.

The cartographer must also consider most of the same legal principles that must be considered by the land surveyor. He must be proficient at researching deed records, survey files, and other land data reference sources to obtain the documentary evidence needed to solve boundary and ownership problems. Moreover, in problem solving the cartographer is faced with a task that most surveyors are not; that is, analyzing and evaluating all surveys, selecting the surveys considered reliable for map control and using the selected surveys to establish map geometry. The cartographer cannot accurately and effectively arrive at a solution to that problem if not equipped with the legal principles associated with land surveying.

It must be understood that the information supplied in this chapter is very basic. The extent of theory and

practice of advanced land surveying is far beyond the scope of this manual. The chapter will neither make the cartographer a qualified surveyor, nor will it transform one into an expert on surveying. Such qualifications can only be obtained through the study, training and experience required of a professional, registered land surveyor (or registered engineer). Continued study of surveying will, however, be beneficial to both the cartographer and the cadastral mapping program.

SURVEYING

Surveying is the science of determining the relative positions of points on or near the surface of the earth. They are usually made to measure these points on either a vertical or horizontal plane. Figure 6-1 illustrates the two planes.

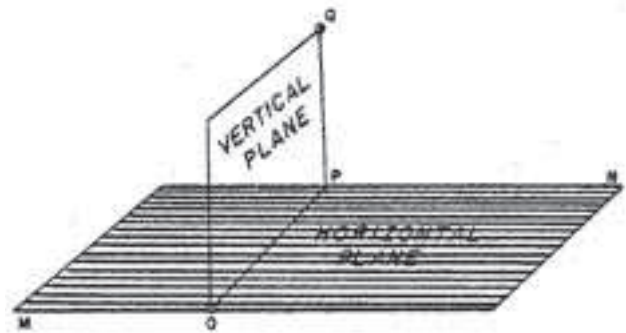


Figure 6-1

In figure 6-1 MN is the horizontal plane and OQ is the vertical plane. PQ is the elevation and OP, although lying in the vertical plane of OQ, is on the horizontal plane. Surveys of angles and distances on the horizontal plane are called either horizontal surveys or plane surveys.

It should be evident from the above illustration that the term plane, as used in surveying, refers to a relatively flat surface. The surface of the earth, however, is not flat. In fact it is an ellipsoid with a polar diameter about 27 miles less than the equatorial diameter. If we were to take the term plane literally, there would be only minute areas on the earth's surface that could be considered flat, such as an airport landing strip, small section of highway or small body of water. In fact the only true plane on the earth's surface is at the point of tangency of the plane and curved surface (see figure 6-2). In surveying, however, areas of less than 100 square miles are usually considered to be relatively flat enough that the effects of the earth's curvature can be ignored.

Horizontal surveys of these small areas are considered as plane surveys. Surveys of larger areas are called *geodetic surveys*.

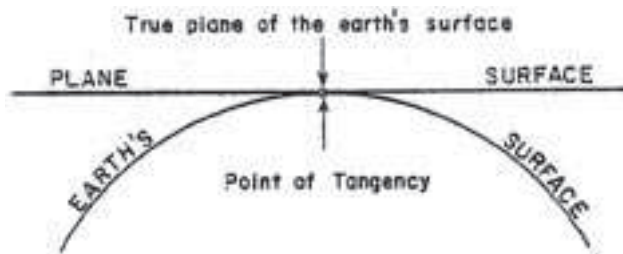


Figure 6-2

The distance and direction in plane and geodetic surveys are measured by use of survey instruments. The distances are measured in units of length (linear measurements) and the directions are measured in units of arc (angular measurements).

Geodetic Surveys

In geodetic surveys all effects of the earth's curvature and shape must be considered in making the survey computations. The standard geodetic survey datum is known as the geodetic coordinates. These are expressed as latitude and longitude.

Geodetic surveys, involving greater distances than plane surveys, are the framework for the National mapping and charting operations.

Plane Surveys

The plane survey is the category of survey more often used in the cadastral map process. In plane surveys the relative positions of the survey stations are measured with respect to the horizontal, plane. However, the effects of the earth's curvature sometimes requires limited consideration. For example, in a long traverse survey it is customary to determine the astronomical azimuth at intervals of several miles along the traverse. Then to check the measured values of angles between adjacent astronomic azimuth stations, the convergence of meridians must be considered.

TYPES OF SURVEYS

Surveys are usually classified by names descriptive of the function of the survey, such as *cadastral surveys*, *construction surveys*, *engineering surveys*, *topographic surveys*, *route surveys*, *underground surveys*, *aerial surveys*, *geological surveys*, etc.

Cadastral Surveys

A property survey is technically referred to as a cadastral survey. It is usually of the plane survey category. The purpose of the cadastral survey is to: (1) obtain evidence of property corners, lines and monuments by taking linear and angular measurements of the property lines; (2) furnish information for writing deed descriptions; (3) determine areas of land parcels; (4) set corners that establish the boundaries of a new parcel of land; (5) or to obtain the necessary data for various mapping purposes.

Included in this type of survey are the Rectangular Surveys of the U.S. Public Lands.

Construction Surveys

Construction surveys are conducted to obtain data essential to the planning and cost estimating of proposed construction projects; and to establish control points, lines and grades for construction operations.

These types of surveys often provide usable data for map control and boundary control. In addition, they are valuable sources of data for appraisal purposes.

Engineering Surveys

Engineering surveys are executed to obtain and provide information upon which an engineering project is planned, established on the ground and constructed. Many engineering surveys can only be conducted by registered professional engineers.

Most engineering surveys are plane surveys. Many are of the exact same nature as the construction survey. Others are surveys that extend over considerable distances, such as: highway surveys, railroad surveys, transmission line surveys, etc.

Topographic Surveys

Topographic surveys are made to determine the shape of a particular piece of the earth's surface; and to locate and display both the physical natural land features and the physical cultural features. They may be either geodetic or plane, or horizontal or vertical (or both).

Route Surveys

Most route surveys are also engineering surveys. They are the surveys of the routes of highways, railroads, pipelines, transmission lines, irrigation ditches, etc.

Underground Surveys

Underground surveys are performed to locate workings below the ground, such as mining tunnels, railroad tunnels, etc.

Prior to conducting most underground surveys, a surface survey must be executed. This is necessary because all errors in angles and distances must be eliminated. Control points cannot be referenced in a tunnel like they can be on the surface.

Aerial Surveys

Aerial surveys are surveys made by photogrammetric procedures to enable the surveyor to delineate topographic features. Photogrammetry is the science of obtaining measurements by means of aerial photos.

Geological Surveys

Geological surveys are usually made to provide basic information for the conduct of public business at all levels of government. For example, the planning and execution of national and local land use or land related projects; the use and development of natural resources; and for National defense.

The principle by-products of these surveys are *topographic maps, geological maps, soil maps, nautical charts, aeronautical charts, hydrographic charts, etc.*

Control Surveys

Control surveying (i.e., *geodesy*) is the common denominator that relates and coordinates the Nation's and the world's activities in a physical three-dimensional mode. The more commonly used geodetic data includes *latitudes, longitudes, elevations, and deflections of the plumb line and gravity values.*

One of the multitude of uses for this data is the construction of maps and charts which, in turn, relate the horizontal and vertical positions between all cartographic features on a given map with those features on any other map of the earth. The accuracy of cartographic representations thus is directly related to the accuracy of the geodetic control network.

Adequate and accurate control positioning is fundamental to a multitude of projects such as government construction work, transportation system coordination, cadastral mapping and social and environmental mapping projects. Specifications, such as those issued by the Federal Geodetic Control Committee, are promulgated for use by both the public and private sectors to aid in ensuring that control surveying activities will be systematically accomplished to meet national mapping needs.

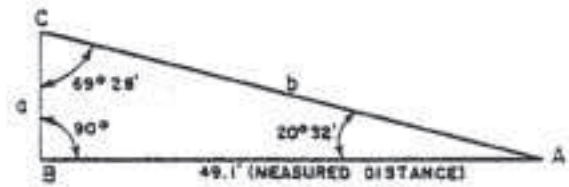


Figure 6-3

Control surveys consist of horizontal, vertical, gravimetric and astronomic surveys. Horizontal control surveys determine geographic positions referenced to a datum. Vertical control surveys determine elevations referred to a datum reference to tidal measurements.

Measurements of gravity and astronomy provide data for the establishment and adjustment of the National control networks. Surveys of large areas must take into account the curvature of the earth's surface, but for small areas, the curvature is often ignored.

Horizontal control is established by *triangulation, trilateration and traverse procedures* (in special cases astronomic position determinations or positions from electronic navigation or satellite-based systems may be used).

Triangulation

Triangulation is a system of joined or overlapping triangles in which the length of an occasional side, known as a *base line*, is measured and the other sides are computed from angles measured at the triangle vertices.

In the simplest form of triangulation, such as that in figure 6-3, one side, AB, and the three angles, A, B and C, of a triangle are measured, then the lengths of the other two sides, a and b, are computed.

After the lengths of a and b have been determined, the computed length for each side can be used as the known base of an adjacent triangle. This triangulation scheme, or *triangulation net*, can then be extended from triangle to triangle over great distances.

The most precise triangulation is *superior first-order* (class I) triangulation for transcontinental control. The purpose of such triangulation is for transcontinental traverses, satellite observations and lunar ranging. The control is of a specified accuracy of 1:1,000,000. Traverse spacing is at 750 km and stations are spaced at 15 to 30 km or greater. This type of triangulation control requires use of a satellite. Examples of use are positioning and orientation of North American Continent, continental drift and spreading studies. Figure 6-4 is an example of a first order triangulation net.

Triangulation is the easiest, cheapest, and most precise method of determining distance and direction over long

distances, over obstacles (such as water) where taping is impractical or impossible, or over areas where taping is awkward (such as in a city).

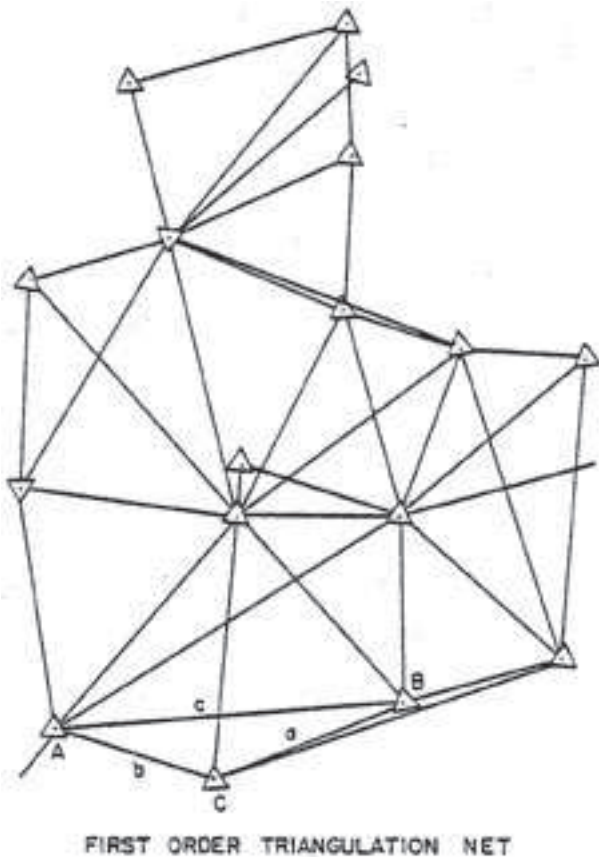


Figure 6-4

Trilateration

Trilateration is a method of surveying in which the lengths of sides are measured. The availability of EDM equipment makes this procedure economically feasible and provides accuracy sometimes superior to conventional triangulation and traverse. Trilateration is often used to measure the sides of the triangles of a triangulation net to strengthen the angular measurements.

Traverse

Traverse is a method of surveying in which a sequence of lengths and directions of lines between points on the earth are measured and used in determining positions of the points.

Triangulation, Trilateration, and traverse procedures may be used singly or in combination to obtain the accuracy and precision required operationally.

Vertical Control

Vertical control is established by spirit leveling usually of a high order of accuracy. It consists of the el-

evation of points with respect to each other and to a common datum. Geodetic leveling follows the geoid and its associated level surfaces, which are irregular, rather than mathematically determined ellipsoid.

The elevations of most major surveys, such as those of the Coast and Geodetic Survey, are based on the *National Geodetic Vertical Datum of 1929*. This datum was established by constraining the combined interconnected U.S. and Canadian networks of First-Order leveling, as it existed in 1929, to conform to mean sea level of various epochs, as determined at 26 long term tidal stations distributed along the Atlantic, Gulf of Mexico and Pacific coasts. Spirit level instrumental observed differences of elevation, starting at the various local mean sea levels, as defined at the 26 tidal stations were interconnected into a network consisting of approximately 103,000 km or First-Order lines. These observations, after orthometric corrections, corrections for other definable systematic errors, and simultaneous adjustments for loop misclosures, provided a set of orthometric elevations for all benchmarks in the adjusted system (in 1929). This operation is referred to as the *General Adjustment of 1929*, and the resulting elevations defined the datum to which all subsequent geodetic leveling in the U.S. has been adjusted.

SURVEYING EQUIPMENT

If you can make measurements with surveying equipment, you will have no trouble making measurements with cartographic equipment. This is because surveying equipment, although physically different, is graduated (with a few exceptions) like that used in cartography. For example, the transit horizontal circle is graduated identical to the engineering drafting machine head, and the surveying tape is graduated like the engineering scale (although the markings are somewhat different).

Surveying instruments are the devices with which measurements are made. Commonly used instruments are:

1. Levels. Levels are used to make vertical measurements. Some commonly used levels are:
 - a. Engineer surveyor's level
 - b. Engineer's dumpy level
 - c. Military level
 - d. Hand level
 - e. European engineer's level
 - f. Self-leveling levels
 - g. Builder's level
 - h. Tilting level
 - i. Clinometer

Figure 6-5 is a "wye" level. It is so named because it has telescope supports shaped like a "Y."

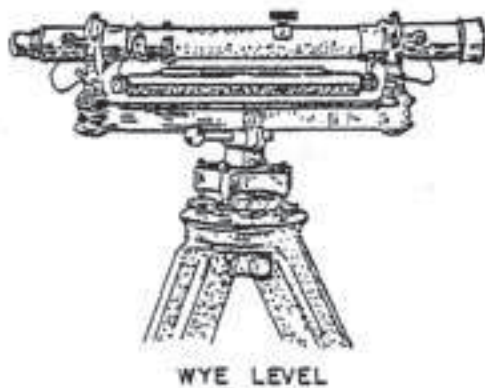


Figure 6-5

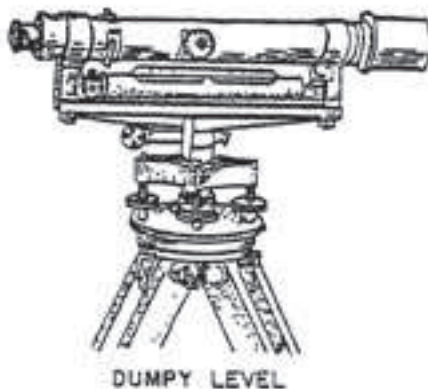


Figure 6-6

Figure 6-6 is a “dumpy” level. The dumpy level is made up of fewer parts than the wye level. Instead of Y supports, telescope collars are used to support the telescope in a fixed position parallel to the level bar. All parts of the dumpy level below the bar are the same as the parts of a wye level. The wye level has a removable telescope, whereas the dumpy level has its telescope permanently fastened to the supporting bar.

The principal features of a level are the telescope (for line of sight) and a spirit level tube for making the line of sight horizontal. Leveling adjustments are made with the leveling screws that support the telescope and spirit level tube.

Vertical distances are actually measured by sighting a graduated rod called a *level rod*. Like other surveying equipment for measuring lengths of lines, level rods usually are graduated in feet, tenths and hundredths.

2. Transits. Often called the *universal surveying instrument*, engineer transits are used for measuring horizontal and vertical angles, for prolonging straight lines and for measuring distances by stadia.

Some types of transits are the *American engineer's transit*, the *builder's transit* and the *builder's transit-level*.

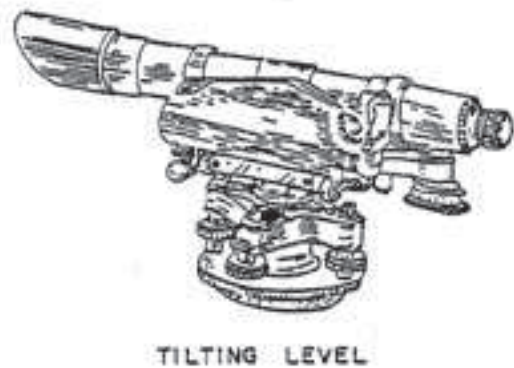


Figure 6-7

Most transits have a compass needle and dial centrally located on the upper surface of the instrument. There are two graduated circles for measuring angles; that is, to show how far the telescope has turned from a starting position. Vertical angles are read on the vertical circle and horizontal angles on the horizontal circle. The vertical circle is attached at one end of the horizontal axis. The horizontal circle is located on the top face of the lower circular plate.

Transits are equipped with *verniers* very similar to those attached to a drafting machine head; however, most transits, have three verniers for making accurate readings. One vernier is used with the vertical circle to read vertical angles. For reading horizontal angles there are usually two verniers placed on opposite sides of the horizontal circle.

Unlike the wye or dumpy levels, the transit usually has three spirit levels. Two are used for leveling the instrument head and are usually mounted on the upper plate of the instrument.

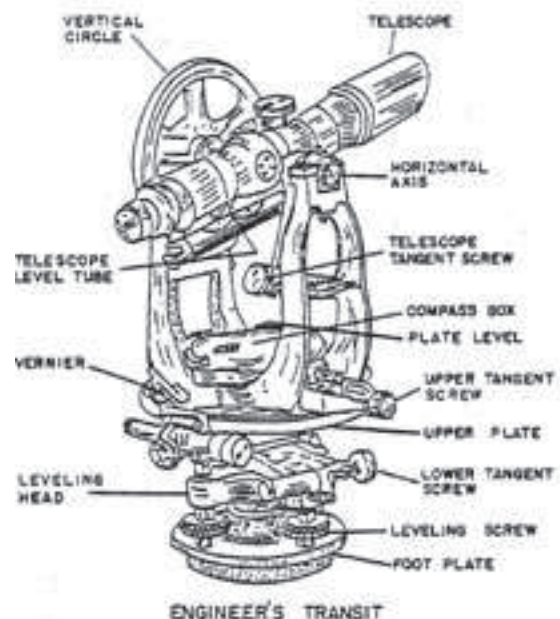


Figure 6-8

Usually, horizontal and vertical angles are measured with a transit (see figure 6-8). The compass is often used for a rough check on angles. The transit has a telescope which is attached at right angles to the horizontal axis (see figure 6-9). The telescope may be rotated in a vertical plane about the horizontal axis and clamped in any position. The horizontal axis is perpendicular to and can rotate about a vertical axis. Spirit levels (similar to those on a carpenter's level or shop level) make the vertical axis follow the direction of gravity.

The point in which the line of sight, the horizontal axis and vertical axis of a transit meet is called the *instrument center*. A point on the ground over which the center of the instrument is placed is the *instrument point* or *transit point*.

Every transit instrument is centered over a survey point with a plumb line and plumb bob.

A transit point or station usually is marked with a hub and tack. Lines joining transit stations are called *transit lines*. Traverses are formed by transit lines.

Sometimes it is convenient to think of the parts of a transit as being divided into three groups. Each group has a clamp screw to lock certain parts in position and a slow *motion screw* for a fine setting.

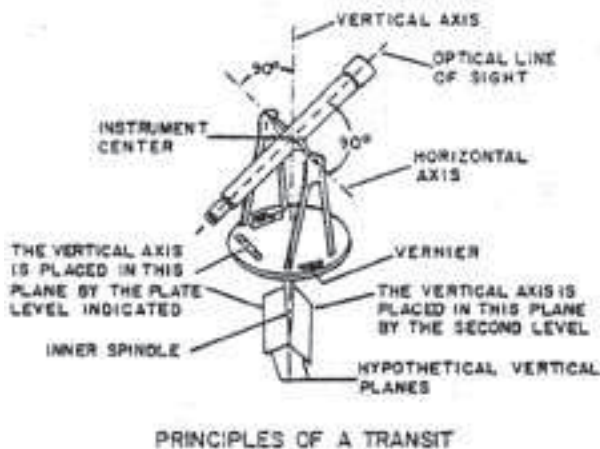


Figure 6-9

The *upper group* consists of the telescope, vertical circle, the verniers, the levels, the upper plate and the inner spindle. The lower plate, the horizontal circle and the outer spindle are in the *middle group*. In the *lower group* are the leveling head, the leveling screws, the bearing for the outer spindle, the shifting plate and the footplate.

The telescope on a transit is similar to the telescope on a dumpy or wye level. The chief parts of any transit telescope are the objective, the sunshade, the focusing wheel or pinion head, the cross *hairs*, and the eyepiece.

The *objective* is a lens, which forms, within the telescope, an image of the object sighted. The *sunshade* is a metal tube used to protect the objective from the glare of the sun. The *pinion head* is a wheel on the outside of the telescope tube, which can be moved until the image is distinct.

There are two types of telescope eyepieces inverting and erecting. With the *inverting* eyepiece an inverted image can be seen. Sometimes, extra lenses are placed in an eyepiece to deflect (turn) the light rays so that the image appears in its normal or upright position. This is an *erecting* eyepiece.

Two cross hairs are placed in the telescope tube near the place where the image is formed. They are used to align objects vertically or horizontally.

Telescopes are either external focusing or internal focusing. *External focusing* telescopes change in length as the focus wheel is moved. *Internal focusing* telescopes, always remain the same length. Internal focusing telescopes are better for surveying in bad weather or dust because the telescope tube is well sealed from the elements.

When the sunshade of a telescope is removed, the telescope is short enough that it can be rotated about the horizontal axis in a vertical plane. The operation of rotating the telescope end for end about the horizontal axis is called *plunging*. When the telescope spirit level is beneath the scope, the telescope is in its *normal* or *direct position*. When the spirit level is on top, the telescope is in the *inverted* or *reversed position*.

3. Theodolites. In a sense, a theodolite is a sophisticated transit capable of great precision. Some are accurate to the nearest second. Others, such as the European theodolite, are capable of accuracy to the hundredth of a second. There are two categories of Theodolites repeating *Theodolites* and *direction theodolite*

Repeating Theodolites display angles. Direction Theodolites, on the other hand, display direction instead of angles (direction being determined by subtracting the subsequent direction from the prior direction).

Most modern Theodolites - especially the European Theodolites are lighter, more streamlined, and more compact than the engineer transit. There are several features in theodolite which account for the greater precision as compared to the transit, but most of the increased precision is obtained by use of microscopic lenses for viewing direction or angle readings.

4. Reduction tachometer. Similar in appearance to the theodolite, reduction tachometers are primarily used for stadia measurements. This requires a special stadia rod called a *tachometer rod*. Some

are electronic and will provide accurate measurements well over a mile in length.

5. Electronic Distance Measuring instruments (E.D.M.). E.D.M. equipment is now being used by surveyors for very precise work. Two main advantages of E.D.M. devices are speed and precision over long distances. Measurements on some devices can be made in 15 seconds. Accurate measurements can be obtained from distances of 6,500 feet to 100,000 feet. Some, such as the Omega (used for extra long navigation), can measure distances up to 5,000 miles. Some commonly used E.D.M. instruments are:

- a. Tellurometer
- b. Geodimeter
- c. Electrotape
- d. Distomat
- e. Autotape
- f. Loran (A, B, & C)
- g. Moran
- h. Shoran
- i. Omega
- J. Lorac

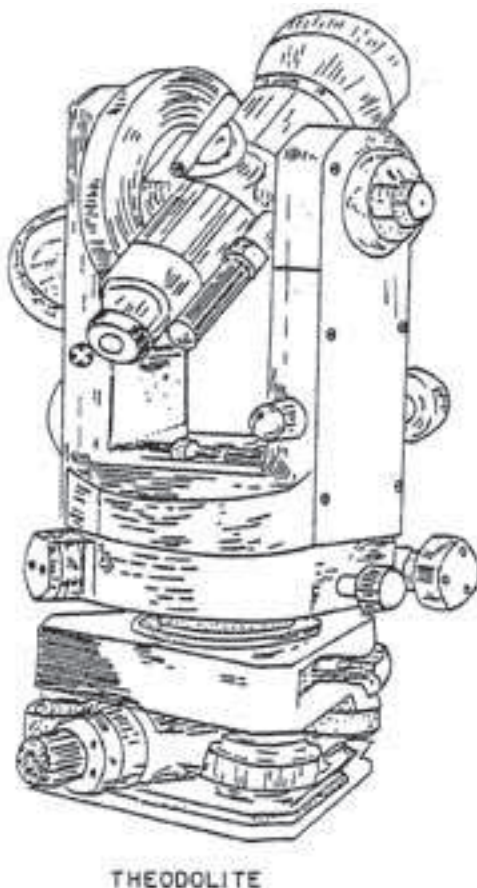


Figure 6-10

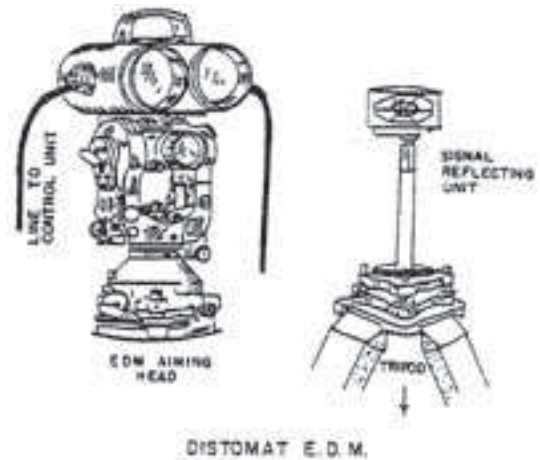


Figure 6-11

6. Alidade. Used on a plane table for graphic determinations of the relative directions to visible terrain points. Telescopic alidades are used with a stadia rod to measure horizontal distances and differences in elevation.

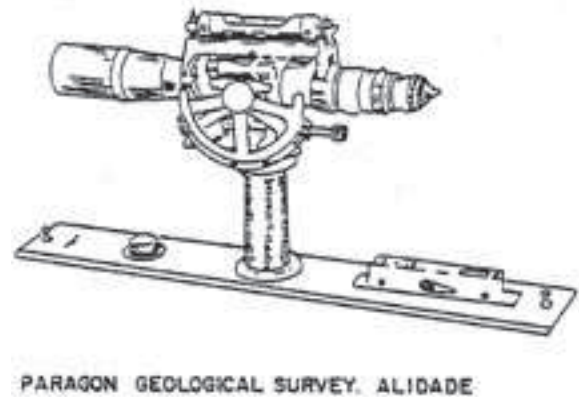


Figure 6-12

7. Subtense Bars High precision instruments, consisting of a hollow metal bar with a target at each end, a leveling head, bulls eye level and an orienting sight. The subtense bar can be rotated in azimuth and clamped in any position. Targets are free to move along the bar and are maintained at nearly constant distances apart. They are made in different lengths, the most common being 2 meters between targets. Theodolites are usually used with the bar to measure horizontal distances.

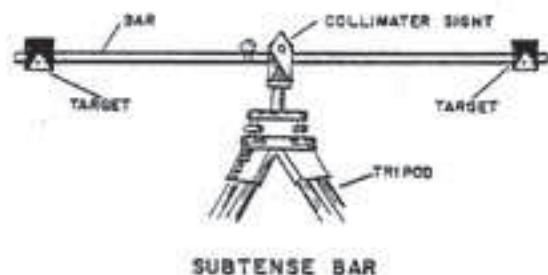


Figure 6-13

8. Stadia rods. These rods are used with a transit, or alidade, for low accuracy measurements of horizontal distances. In *stadia surveying* the surveying tape is not used to measure distances. Only a transit and a stadia rod are used. Distances are computed, using geometry and trigonometry, by observing the relationship of the telescope stadia hairs and the markings of the stadia rod.

Rods used for stadia work usually have large geometric designs on them so that they may be read at long distances. Some rods do not have numbers on them. From the geometric pattern, intervals of a tenth of a foot and sometimes a hundredth of a foot may be observed.

Stadia rods are generally 10 to 15 feet long, 3 to 5 inches wide and about $\frac{3}{4}$ inch thick.



SECTION OF A
STADIA ROD

Figure 6-14

9. Tacheometer rod. This is a special stadia rod that is used with a tacheometer.
10. Leveling rod. Used with a level, transit or alidade to measure differences in elevation (vertical distance measurement). The vertical distances are actually measured by sighting on the leveling rod. Like other surveying equipment, leveling rods usually are graduated in feet, tenths and hundredths.



DIETZGEN PHILADELPHIA
LEVELING ROD
(Self-Speaking Rod)

Figure 6-15

A rod which is read by the levelman directly through the telescope of his level is a *self-speaking* rod. The most common self-speaking rod is the Philadelphia rod shown in figure 6-15. The Philadelphia rod is equipped with a target, which can be set and clamped by the rodman at the direction of the levelman.

11. Compasses. The surveyor's compass is used for approximate measurement of angles and magnetic azimuths. It is usually used when making rough surveys, relocating lines of old surveys or making reconnaissance surveys. The principal parts of the compass are the *needle*, *needle circle* or *compass circle*, *counterweight* and *compass box*. Some are equipped with two *peep sights* and two *spirit levels*.
12. Surveying tapes. There are three basic types of surveying tapes: (1) metallic tapes for low precision work; (2) steel tapes used for horizontal distance measurements; and (3) invar tapes used for high precision measurements, such as base lines for triangulation nets (however, E.D.M. equipment eliminates the use of tapes in large triangulation networks).

Surveying tapes are usually 50 feet, 100 feet, 200 feet, 30 meters and 50 meters in length. They have various graduations from feet, to meters, decimeters, centimeters, and even millimeters.

13. Chains. See chain in the glossary.

Accessories

Surveying accessories, such as those listed below, assist in making measurements.

1. Tripods.
2. Plumb bobs.
3. Targets.
4. Taping arrows.
5. Taping stool.
6. Triangulation towers
7. Range poles.
8. Wooden stakes.
9. Tape repair kit.
10. Chaining pins.
11. Tension handle.
12. Tape thermometer.
13. Tape stretcher & spring balance.
14. Machete.
15. Metal bench marks.
16. Plumbing pole.
17. Magnifying glass.
18. Pedometer.
19. Engineer's field book.
20. Barometer and altimeter.
21. Hand held electronic calculator.

FUNDAMENTAL SURVEY OPERATIONS

Field Work

Some of the very basic field work operations are:

1. Measuring horizontal distances and angles to: establish points and lines of reference; locate, in relation to reference points and lines, boundary monuments, corners and lines, buildings, fences, rivers, bridges, etc.; stake out roads, ditches, canals, highways, railroads and other construction or engineering projects; establish triangulation nets and stations, parallel, and perpendicular lines; and measure inaccessible distances, and extend straight lines beyond obstacles.
2. Measuring differences in elevations, and determining elevations to: establish elevations between bench marks; determine the elevation of terrain features; stake out grades, cuts and fills for construction or engineering projects; and make topographic surveys in which the horizontal and vertical measurements are combined.
3. Making measurements of systematic movements of the earth's crust in areas subject to earthquakes. (Requires at least first-order surveying.)
4. Making hydrographic surveys along coastlines and inland waterways.
5. Making underground surveys of tunnels and mines.
6. Making field note records to provide a permanent record of fieldwork, methods, conditions, problems, etc., of the survey.

Office Work

Surveying also requires a considerable amount of office work, such as:

1. Working up final field notes.
2. Computation and/or mathematical adjustment of: bearings, azimuth, distance, closure, latitude and departure, relative positions, grades, areas, volumes, coordinates (plane and geodetic), traverse, triangulation, elevations, velocity (flow of water), etc.
3. Plotting survey data.
4. Mapping.
5. Research into historical records; deeds, surveys, maps, etc. This is a critical and time-consuming element of cadastral surveying.

Field Notes

Many of the problems experienced with survey plats are the result of transposing field note data. If the field notes are available, plat information can be checked for accuracy.

Surveyor's notes usually contain a complete record of all measurements made during the progress of the survey. The notes also contain sketches and narration.

Measurements are usually shown in tabulation form. Sketches are usually drawn at approximate scale; however, when important details must be noted, the sketches are exaggerated. If a page of notes is crossed out, the information has been rejected by the surveyor; the page will refer to a supplemental page where corrected data is shown.

Below is a sample of the recorded notes of an 1845 General Land Office dependent resurvey. The recorded GLO notes are usually retained by the county recorder, but may be obtained from the Bureau of Land Management.

Dependent Resurvey of the Subdivision Lines, T1S R26W., 5th Prin. Mer., Ark.	
Chains	Reestablishment of the Survey Executed by B.F. Owen, Deputy Surveyor, in 1845. From the cor. of secs. 35 and 36, on the S. bdy of the Twp. N. 0° 26'E, bet. secs. 35 and 36, marking and blazing the true line. 11.15 Descend 45 ft. over N. slope, through field. Right bank of the Quachita River, 135 lks. wide, course E. 12.50 Left bank of the first channel; thence over island. 14.60 Right bank of second channel. 120 lks. wide, course E. 15.80 Left bank of second channel; ascend 85 feet over S. slope to cor. 33.45 Farm road bears E. and W. 40.08 The 1/4 sec. cor. of secs. 35 and 36, determined from the remains of the original bearing trees: 1/4 S35 S36 1943 from which

Horizontal & Vertical Angles

Angles measured in surveying are either horizontal or vertical.

A horizontal angle is formed by two intersecting lines which lie in the horizontal plane (see figure 6-16). When two intersecting lines lie in the vertical plane the angle is a vertical angle. In surveying it is understood that one of the sides of a vertical angle lies in the horizontal plane.

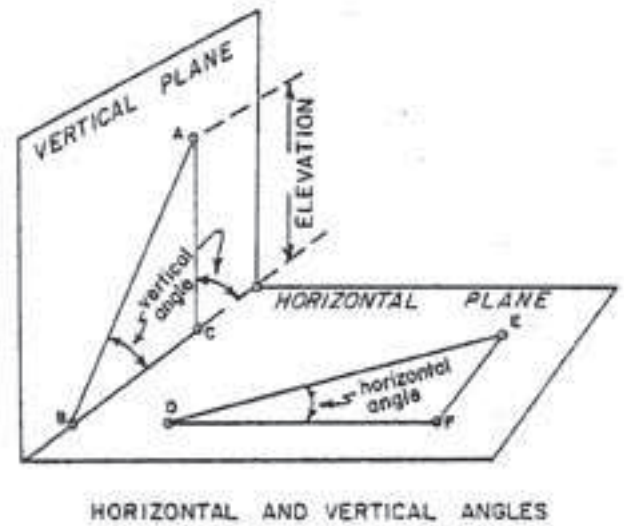


Figure 6-16

In figure 6-16 EDF forms a horizontal angle. In addition, FDE and EFD form horizontal angles. ABC, CBA and CAB form vertical angles. DE, DF and EF represent horizontal distances. In addition, BC is a horizontal distance made for a vertical measurement. BA and CA are vertical distances.

Meridians

In measuring, a horizontal angles, a reference line must be established. This will be the line from which angle measurements are based. Any fixed line of reference in a survey is called a *meridian*.

The earth rotates on an imaginary line called its axis. The two points at which this imaginary axis cuts the earth's surface are the north and south geographic poles.

A *true meridian* is a north-south line on the surface of the earth connecting the geographic poles. This line is determined by astronomical observation, usually of Polaris (the North Star) or the sun.

The earth, is a magnet. It has two magnetic poles. The North magnetic pole is located northwest of Hudson Bay in the vicinity of Boothia Peninsula. Since the needle of the surveyor compass is magnetized, it is attracted by these magnetic poles and points in their direction. A line of reference lying parallel to the direction indicated by the compass needle that is a *magnetic meridian*.

Actually, true and magnetic meridians are circles on the surface of the earth meeting at either a geographic or magnetic pole. But in plane surveying meridians are regarded as straight lines lying in a horizontal plane. The meridians are considered parallel since areas surveyed usually are small compared with the size of the earth and meridians approach one another slowly.

A line of reference can be chosen arbitrarily without special reference to the magnetic or geographic (also called geodetic) poles. Such a line is called an *assumed meridian*.

Magnetic Declination

The horizontal angle which the compass needle makes with a geodetic, or true, meridian is called the *declination of the needle*. In navigation this is known as *variation*. At any point on the earth this angle is the *magnetic declination*.

Because the earth's magnetic poles are constantly changing, the declination changes accordingly.

Isogonic Lines

Imaginary lines on the surface of the earth, passing through points having the same magnetic declination at any given time, are called *isogonic* lines. At all points on the isogonic line the compass needle makes the same angle with the true meridian.

The isogonic line intersecting points of no declination is called the *agonic line*. All points east of this line have a western declination, and all points west have an eastern declination.

Azimuth

The horizontal angle between a line and a meridian measured in a clockwise direction is called the *azimuth* of the line. Occasionally azimuth is measured from the south point of a meridian; however, it is usual practice in surveying to measure azimuth from the north end of the meridian.

True azimuth is measured from the geodetic meridian (true north). *Magnetic azimuth* is measured from the magnetic meridian (or magnetic north). In cartography it is essential to maintain true azimuth, especially in cadastral cartography.

Figure 6-17 shows a meridian NS with N toward the north. The azimuth of OA is 58° while that of OA' is 238° . The azimuth of OB is 320° .

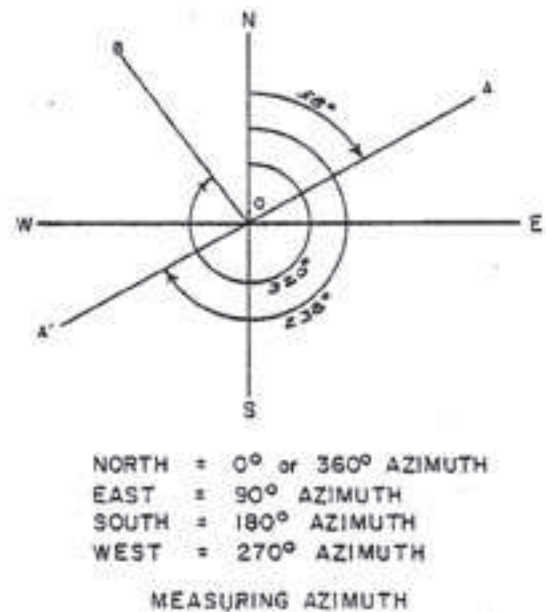


Figure 6-17

Forward and Back Azimuth

The word *azimuth* used alone implies *forward azimuth*. The azimuth of the backward prolongation (extension) of a line is its *back azimuth*. In figure 6-17 the back azimuth of OA' ($238^\circ - 180^\circ$) is 58° ; the forward azimuth of OA' is 238° . The forward azimuth of OA is 58° and the back azimuth of OA ($58^\circ + 180^\circ$) is 238° .

Rule - if the azimuth is less than 180° , the back azimuth is obtained by adding 180° . But, if the azimuth is more than 180° , then 180° must be subtracted to get the back azimuth.

Bearings

Instead of giving the azimuth for a line, we could state the acute angle between the line and a meridian. This angle is called a *bearing*. (Remember, an acute angle is greater than 0° and less than 90° .) A bearing is *never* greater than 90° .

(Refer to chapter on *Direction* for additional information on bearings.)

ORDERS OF ACCURACY

The methods of surveying are classified according to the precision of the survey methods and the degree of accuracy allowed. These specifications are referred to as *orders of accuracy*.

Prior to using earth satellites for surveying purposes, the orders of accuracy were *first-order*, *second-order*, *third-order* and *fourth-order*. First-order was the most accurate and fourth-order the least accurate.

Today, satellite survey measurements allow for accuracy of 1: 1,000,000. Surveys of this type are referred to as *superior*. In addition, second-order and third-order have been divided into four classes: *second-order-class 1*, *second-order-class 2*, *third-order-class 1* and *third-order-class 2*; class 2 of each being the lower degree of accuracy.

Figure 6-18 at the bottom of this page is a synopsis of horizontal control classifications as specified by the Federal Geodetic Control Committee. Note: fourth-order surveying is not recognized as adequate for governmental survey projects - that is, as regards geodetic control. The lowest order being third-order-class 2.

The tolerances defined in figure 6-18 are for the *National Horizontal Control Network*. This network must be of such accuracy and precision that, everywhere on the North American Continent, control (both in density and accuracy) meets user needs and National interest.

The orders of accuracy specified in figure 6-18 are for specific projects. They are not for *every* type of survey at *every* level of government. For example -Department of Commerce specifications for horizontal control trilateration start at 1:150,000 for class 2 third-order work and extend to first-order specifications of 1:1,000,000 (1 part in 1,000,000). On the other hand, the specifications for horizontal control traverse work is 1:600,000. At the local level, 1:25,000 might be considered a first-order survey, with fourth-order being 1:2,500 (that is the allowable discrepancy between any computed and measured distance. In the same survey the base line specifications might be 1:300,000 for first-order and 1:25,000 for fourth-order work).

In cadastral surveying the precision of the methods and the resultant accuracy of measurements would be separate and distinct from the accuracy of the location of the property boundaries. For example, although the methods and resultant measurements of a property

ORDER, CLASS	SUPERIOR	FIRST-ORDER	SECOND-ORDER CLASS I	SECOND-ORDER CLASS II	THIRD-ORDER CLASS I, II
General title	Transcontinental control.	Primary horizontal control.	Secondary horizontal control.	Supplemental horizontal control.	Local horizontal control.
Purpose	Transcontinental traverses. Satellite observations. Lunar rangings.	Primary arcs. Metropolitan area surveys. Engineering projects.	Area control. Detailed surveys in very high land value areas.	Area control. Detailed surveys in high value land areas.	Area control. Detailed surveys in moderate and low land value areas.
Network design	Control develops the national network		Control strengthens the national network.	Control contributes to the national network.	Control referenced to the national framework.
Accuracy	1:1,000,000	1:100,000	1:50,000	1:20,000	1:10,000 1:5,000
Spacing	Traverses at 750 km. Spacing--stations at 15 to 30 km. or greater. Satellite as required.	Arcs not in excess of 100 km. Stations at 15 km. Metropolitan area control 3-8 km.	Stations at 10 km. Metropolitan area control at 1-2 km.	As required.	As required.
Examples of use	Positioning and orientation of North American Continent. Continental drift and spreading studies.	Surveys required for primary framework. Crustal movement. Primary metropolitan area control.	Metropolitan area densification. Land subdivision. Basic framework for densification.	Mapping and charting. Land subdivision. Construction.	Local control. Local improvements and developments.

Figure 6-18 — Synopsis of Horizontal Control Classifications

boundary survey might qualify as first-order, a survey could still be incorrect if an incorrect datum, monument or reference line was referenced or measured.

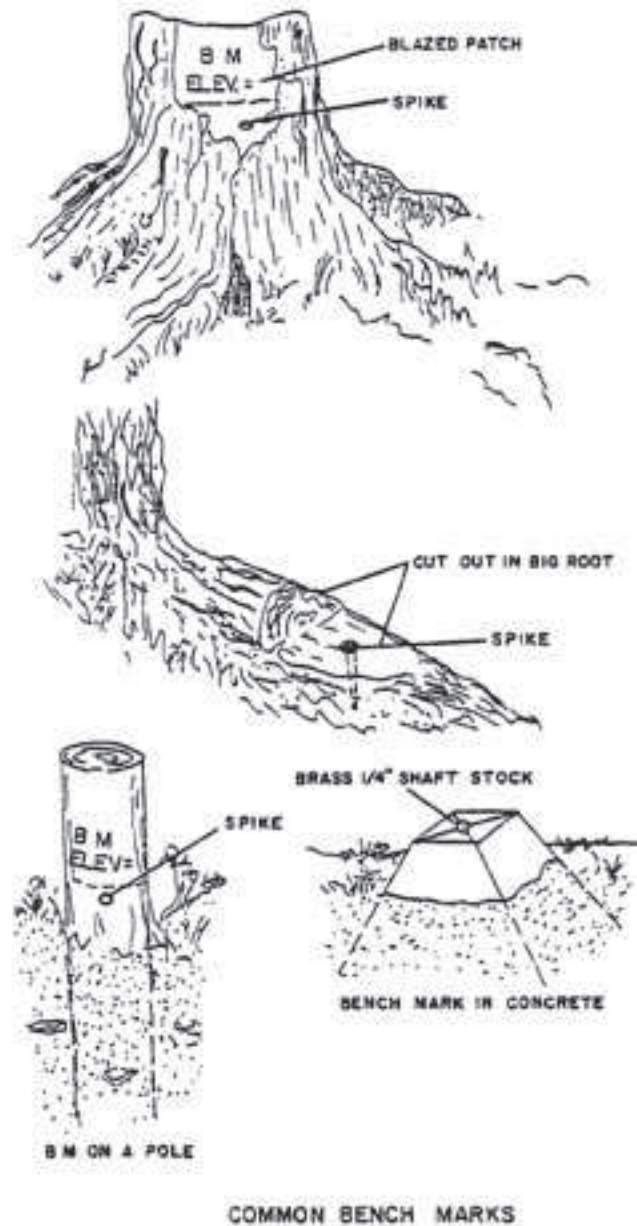


Figure 6-19

BENCH MARKS

Before a vertical distance can be stated, it has to be referenced to some standard datum from which the measurement is measured. A *datum* is something decided upon as a basis of reckoning—a reference element. For example, vertical distances representing elevation are usually referenced to mean sea level (the average height of the sea for all stages of tide). Mean sea level, then, is the datum. A point whose

elevation is known and marked is called a *bench mark* (abbreviated B.M.).

Benchmarks may be nails in the roots of trees, stakes in the ground; brass caps sunk in concrete, etc. Throughout the U.S. a series of benchmarks have been established by various government agencies. These consist of identification marker set in stone, iron pipe, or concrete and are usually marked with the elevation above mean sea level. Figure 6-19 illustrates some typical benchmarks.

MONUMENTS

The purpose of monumentation in surveying is to establish the permanent marking of lines, and to fix the property corner positions so that the location of the lands may always be definitely known. Monuments are also used to establish a reliable reference point to some datum, to a group of surveys (such as a mineral monument), to section comers, quarter comers, township comers, etc.

Monumentation of the surveys of the public land of the U.S. is an important factor in surveying. The laws relating to these monuments must be considered in surveying as well as cadastral cartography. For example, the law provides that the original comers established during the progress of the public land survey shall *forever remain fixed in position, even to disregarding technical errors in the execution of the survey, where discrepancies may have passed undetected prior to the acceptance of the survey.*⁴

The courts attach major importance to evidence relating to the original position of the U.S. rectangular survey monuments (i.e., section, quarter section, etc.); such evidence being given far greater weight than the record relating to bearings and lengths of lines.

In the U.S. survey, the following points were monumented: (1) section comers, (2) quarter corners, (3) township corners, and (4) meander corners. Also monumented were sixteenth section comers as the requirements of the written instructions, or the exigencies of the survey, demanded. The survey instructions provided for monumentation of angle points along irregular boundary lines, at corners of 2½ acre, or ¼ ¼ ¼ ¼-sections when special instructions called for such monumentation. Figure 6-20 illustrates two examples of U.S. survey monumentation of rectangular survey system comers.

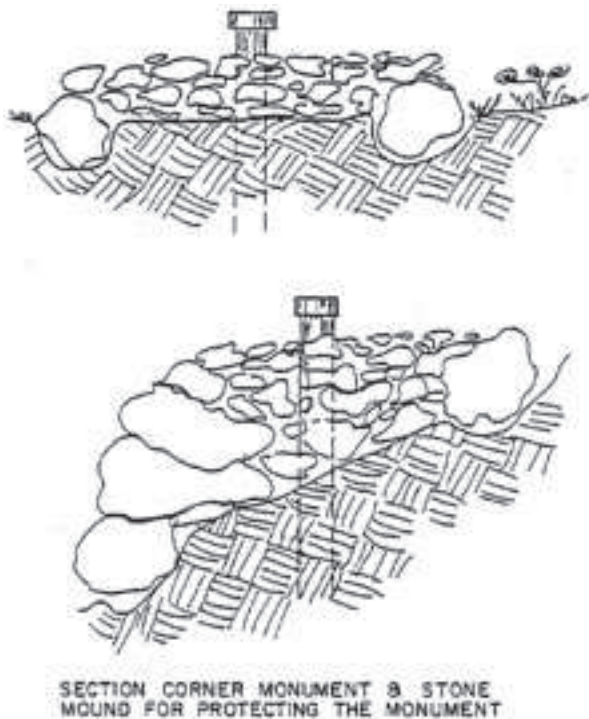


Figure 6-20

Witness Corner

By conventional usage, a witness corner is a monumented point usually on a line of a survey and near a corner. It is employed in situations where it is impractical to occupy the site of a corner. When the true point for a corner falls in an inaccessible place, such as an unmeandered stream, lake or pond, or upon a precipitous slope, ridge or cliff, where the corner cannot be occupied, a witness corner is established at some suitable point where the monument may be permanently constructed.

Reference Monument

A reference monument is an accessory and is employed in situations where the site of a corner is such that a permanent monument cannot be established or where the monument would be liable to destruction, and bearing trees or a nearby object are not available.

Witness Point

A witness point is a monumented station on a Line of the survey and is employed to perpetuate an impor-

tant location more or less remote from and without special relation to any regular corner.

Marking Lines Between Corners

In the rectangular survey system trees are marked to show the locality of section and township lines. The marks are usually a *blaze* or *hack* (see figure 6-21). In practice, the tree would actually be either blazed or hacked by the surveyor, but never both.

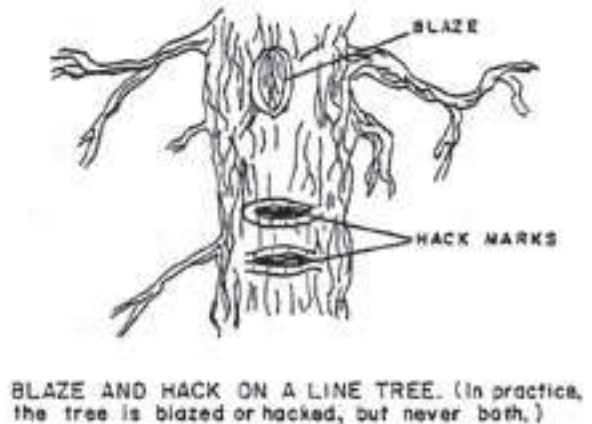


Figure 6-21

A hack is a horizontal notch cut well into the wood at about breast height. Two hack marks are cut to distinguish them from other accidental marks.

A blaze is a smoothed surface cut upon the tree trunk at about breast height. The bark and a small amount of live wood tissue are removed with an axe or other cutting tool, leaving a flat surface, which forever brands the tree.

Trees intersected by the line have two hacks or notches cut on each side facing the line. These are called *sight trees* or *line trees*. A sufficient number of trees standing within 50 links of the line, on either side, are blazed on two sides quartering the line in order to render the line conspicuous and readily traceable in either direction.

For additional information on the marking of monuments, see the *Manual of Surveying Instructions* published by the U.S. Department of the Interior, Bureau of Land Management.

SURVEY MEASUREMENTS

Taping

The *taping party* is normally a subparty of a traversing party, and its primary duty is to make the taped measurements and auxiliary measurements necessary to determine the horizontal distances between points.

The taping party is made up of the following:

1. Head tapeman
2. Rear tapeman
3. Recorder
4. Stretcherman
5. Rodman
6. Axman
7. Chief of taping party

For low-order taping two or more people will act in tile capacity of several of the above.

There are two basic methods for measuring distances with a tape. These are *slope taping* and *horizontal taping*. In the slope method, the tape is held as required by the slope of the ground. The slope of the tape is measured and the horizontal distance is computed. In the horizontal method, the tape is held horizontally and the positions of its pertinent graduations are projected to the ground with plumb bobs.

Breaking tape. The terms *breaking tape*, *break tape* and *broken tape measurements* refer to horizontal taping and plumbing by increments of less than one tape length; the terms have no reference to physically breaking a tape. See *breaking tape* in the glossary.

Measurements made by taping are subject to more errors than any other type of measurement made in surveying. The errors of taping are divided into *systematic errors* and *accidental errors*. Systematic errors in taping are those caused by known mathematical and physical laws for which a correction can be computed. Corrections can be computed for the *length of tape*, *method of tape support*, *effect of temperature*, *slope of tape* and *alignment of tape*.

Mistakes made in reading and recording measurements are often difficult to detect. Some of the common mistakes are:

1. Holding tape incorrectly.
2. Transposing figures.
3. Reading tapes upside down.
4. Measuring from wrong end of tape.
5. Reading the wrong footmark.
6. Subtracting incorrectly when reading tape.
7. Omitting an entire tape length.

Several of the above factors, such as transposing, can be determined from careful analyzation when plotting base control maps.

Determining Direction

The *angle-measuring party* is very flexible in size and may vary from one to a dozen or more men. This party may be a subparty of a *triangulation* or *traverse party*, or it may work independently. Each party will consist of at least one *instrumentman* and *rodman*.

A value for the horizontal angle between any two lines can be determined by pointing a transit or theodolite at a target on one of the lines being measured; pointing at a target on a different line, reading, the horizontal circle for each pointing; and finding the difference between the two readings. Angular values determined in this manner are subject to the effect of numerous errors and blunders. To increase the accuracy in angle measurement, angles are usually measured at least twice; once with the transit direct and once with the transit reversed. A greater number of measurements are often made to obtain a mean value with a minimum residual value.

There are two basic methods for the multiple measurement of a horizontal angle; the *repetition method* (normally used with a repeating instrument) and the *direction method* (normally used with any transit or theodolite, and always used with a direction type instrument such as the Wild T2 theodolite).

Repetition method. The 1-minute and 20-second transits are repeating instruments on which successive observations of a horizontal angle are added by repetition, and then a mean taken to obtain an accurate measure of the angle. This method measures angles to a degree of accuracy less than the last reading of the transit. A set of observations may consist of two, three or six repetitions of the angle with the telescope in the direct (or reversed) position; followed immediately by, three or six repetitions of the explement of the angle with the telescope in the reversed (or direct) position. Figure 6-22 illustrates a set of six repetitions, six direct and six reverses.

Direction Method. A theodolite is usually used in application of this method of measuring angles. The method consists of measuring the direction to each station from one taken as the initial station. The directions are the angles measured clockwise from the initial station to each of the other stations. The angle at a station between any two observed stations is the difference of their directions. In observing, a pointing is made on the initial station and then upon each station around the horizon in a clockwise direction closing on the initial station. The telescope is then

Horizontal Angles		State: Oregon		Obs: J. Doe		Rec: T. Coe		18 April 190		(4)
At: Δ Knob				Inst: IC		KBE 60606		Cloudy and cool		
				N 145 ft				15 Mite wind		
Objects observed	Tel	Rep	Readings	A	B	Mean	Mean of 5	Set Mean	Hor Adj	Remarks
Δ Shoulder	D	0	0° 00' 00"	10	05"					10:35 AM
Δ Knob	I	30	15 30							
	6	161	32' 40" 50"	45	30° 15'	26.7"				
	R	6	359 58 50' 00"	55			28.5	27.5	26.6	30° 15' 28.6"
Δ Knob	R	0	00 00 20' 30"	25						10:55 AM
Δ Top	I	82	41 00							
	6	156	06 30' 40"	35	82° 41'	01.7"				
	D	6	0 00 40' 40"	40	40		40	59.2	60.4	59.5 82° 40' 59.5"
Δ Top	D	0	0 00 25' 30"	27.5						11:10 AM
Δ Shoulder	I	247	03 40'							
	6	42	21 30' 60"	55	247° 03'	34.6"				
	R	6	0 00 20' 30"	25			35.0	34.8	33.9	247° 03' 33.9"

Figure 6-22

reversed and readings made counterclockwise; the double set of readings constitutes one *position*.

Deflection-angle measurement. Deflection angles are normally measured with an engineer transit. The angles are often measured in the performance of a route survey; but for normal surveying operations, clockwise angles are measured and deflection angles are computed (if required).

Errors in measuring horizontal angles. Instrumental errors can affect the measured value for a horizontal angle; but large discrepancies are usually the result of personal errors, such as:

1. Errors in centering the instrument and targets over the same stations.
2. Errors in leveling the instrument.
3. Errors in pointing the instrument.
4. Errors in reading the circle and verniers of the engineering transit.
5. Errors in making coincidence for reading the circle and micrometer scale of the Wild T2 theodolite.

The *natural errors* that affect horizontal-angle measurements are due to differential temperature within the instrument, horizontal refraction (horizontal bending of light rays between a target and the instrument) and phase (due to unequal illumination of a target).

Stadia Measurement

The word *stadia* ⁵ is, the Latin plural of *stadium*. When surveyors speak of surveying by the stadia method, they are referring to a particular method of measuring the length of lines. In stadia surveying a tape is not used for measuring distances. Instead, a transit and *stadia rod* is used to measure the distances. This is done by observing an intercept (distance) on the stadia rod, by possibly measuring an angle - geometry and trigonometry do the rest.

Vertical distances (differences in elevation between points) as well as horizontal distances can be derived from stadia measurement.

Horizontal distances obtained by stadia usually are not as accurate as taped (or chained) distances. However, stadia work is fast and accurate enough for some purposes, such as, making a rough check on distances, which have already been measured by a more exact method.

The transit used for stadia work must be equipped with *stadia hairs*. These are two hairs placed on each side of and parallel to the horizontal cross hair. Furthermore, they are so located that the cross hair is exactly halfway between them. The distance between the stadia hairs is the *vertical interval* between the hairs. The horizontal cross hair is called the *middle hair*. Figure 6-23 is an illustration of a telescope equipped with stadia hairs.

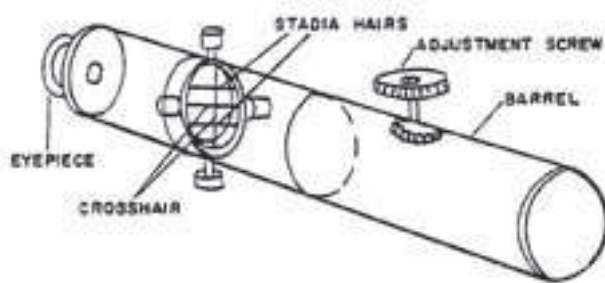


Figure 6-23

When viewing the stadia rod through a transit telescope, the stadia hairs will mark off an interval on the rod. The distance on the rod between the apparent positions of the two stadia hairs is the *stadia reading* (or *stadia interval*).

Usually stadia readings are determined by sighting the lower stadia hair at a convenient footmark and then observing the position of the upper stadia hair. For example, the lower hair might be sighted on the 2-foot mark and the upper hair might be in line with 6.37. By subtracting, the stadia reading would be 4.37 ($6.37 - 2.00 = 4.37$).

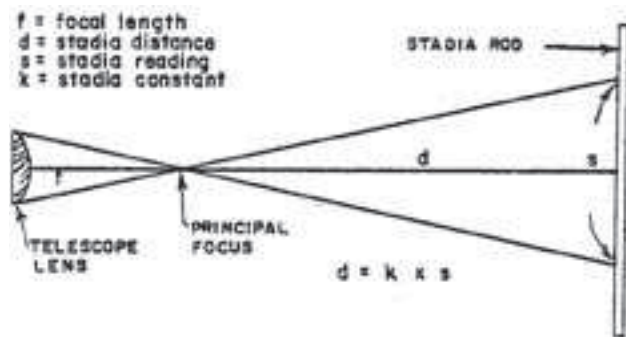


Figure 6-24

Stadia Constant

Light rays which pass through the lens (objective) of a telescope come together at a point called the *principal focus of the lens*. These light rays continue in a straight-line path as in figure 6-24. The distance between the principal focus and the center of the lens is called the *focal length* of the lens. For any lens the focal length does not change. If the focal length is divided by the distance between the stadia hairs, a number is derived that is called the *stadia constant*. Some surveyors use 100 as the stadia constant because the stadia hairs usually are so spaced that the interval between them will make the stadia constant equal to 100.

Stadia Distance

To find the distance from the principal focus to the stadia rod for a horizontal sight, read the interval in-

tercepted on the rod by the stadia hairs, then multiply the interval by the stadia constant. This distance from the principal focus to the rod is called *stadia distance* (d in figure 6-24). If the stadia reading were 1.95, the stadia distance would be 195 feet.

Instrument Constant

To get the distance from the instrument to the rod, the distance from the principal focus to the instrument center must be added to the stadia distance. This distance from the center of the instrument to the principal focus is the *instrument constant*. (Usually the instrument constant is determined and supplied by the manufacturer.)

If using an internal focusing scope, the value of the instrument constant need not be considered. For *external focusing* telescopes the instrument constant usually varies from 0.75 feet to 1.40 feet. (If the constant is unknown, the value of one foot will usually suffice.)

Horizontal Stadia Formula

The desired horizontal distance needed is from the instrument center to the rod (note - the rod must be plumb). It is necessary to add the instrument constant to the stadia distance. This sum is the *corrected distance*.

The formula for computing horizontal distances when the sights are horizontal is:

$$h = ks + (f + c)$$

Where

- h = horizontal distance from the center of the instrument to the vertical stadia rod.
- k = stadia constant (100)
- s = stadia rod reading
- $f+c$ = instrument constant, zero for internal focusing, and 1 foot for external focusing telescopes.
- f = focal length of lens.
- c = distance from center of instrument to center of lens.

The instrument constant will be the same for all readings.

The concept discussed to this point is based on the fact that the stadia hairs subtend a constant angle. Therefore, the value of a stadia intercept is directly proportional to the distance between the observing instrument and the rod. In figure 6-25 "a" represents the fixed angle subtended by the stadia hairs, and a , b and c represent stadia intercepts at different horizontal distances between the instrument and rod.

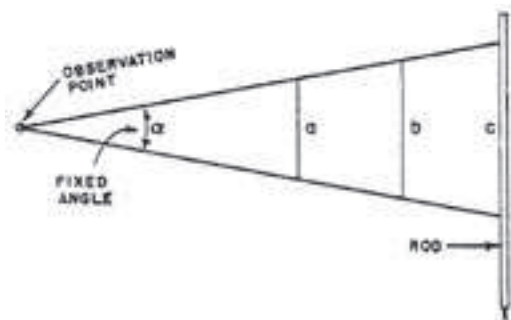


Figure 6-25

Stadia measurements are normally measured on a stadia rod or on a *Philadelphia leveling rod*. With a stadia rod, the intercepts are usually read to the nearest hundredth of a foot by estimating between the 1/10-foot marks. With the Philadelphia rod the intercepts are measured directly to hundredths of a foot.

Formula for Inclined Sights

Most often the sightings necessary in stadia work are not horizontal. It is usually necessary to incline the telescope upward or downward at an angle (a). Sometimes a Greek letter is used to designate an angle alpha (a), the first letter of the Greek alphabet.

The vertical angle (a) may be either an angle of elevation or an angle of depression, as in figure 6-26. If the line of sight is elevated above the horizontal, the resultant angle is called an *angle of elevation*. If the line of sight is depressed below the horizontal, the vertical angle is an *angle of depression*.

In either case the horizontal and vertical distances can be found by using the formulas:

$$\begin{aligned} h &= ks \cos^2 a + (f + c) \cos a \\ v &= \frac{1}{2} ks \sin 2a + (f + c) \sin a \end{aligned}$$

Where:

- h = horizontal distance
- v = vertical distance
- ks = stadia distance
- a = angle of inclination
- $f + c$ = instrument constant

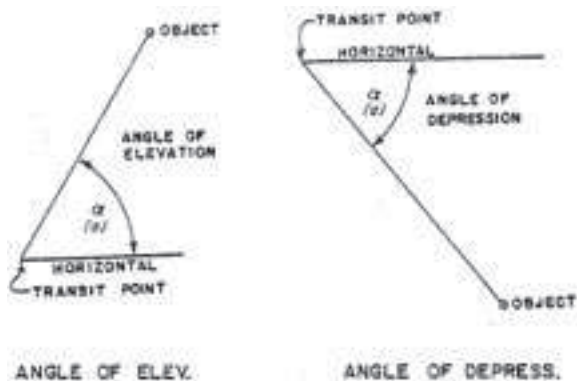


Figure 6-26

Remember, to find $\sin a$ and $\cos a$:

$$\sin a = \frac{\text{opp. side}}{\text{hypotenuse}}$$

$$\cos a = \frac{\text{adj. side}}{\text{hypotenuse}}$$

Example. In figure 6-27 we have a stadia interval of 8.45 and an angle of elevation of $25^\circ 14'$. The instrument constant = 1.0.

Substituting the formula for the horizontal distance, where $\cos 25^\circ 14' = 0.90458$:

$$\begin{aligned} h &= 100(8.45)(0.90458) + (1)(0.90458) \\ &= 845(0.90458) + 0.90458 \\ &= 765.29 + 0.90 \\ &= 766.19' \end{aligned}$$

Therefore, the horizontal distance (h) = 766.2, or 766 feet.

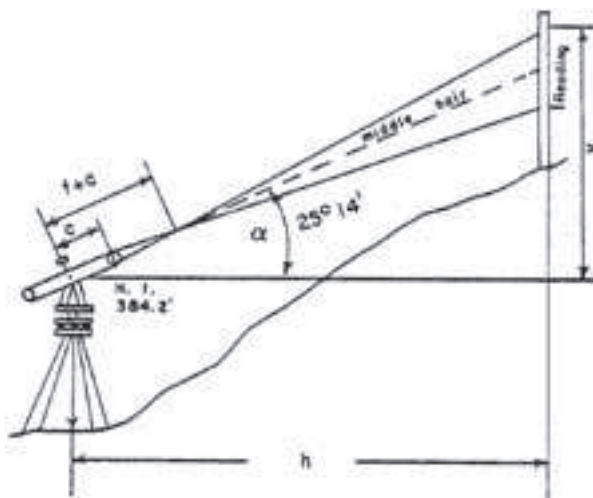


Figure 6-27

Substituting the formula for the vertical distance, where $\sin 25^\circ 14' = 0.42631$ and $\sin 2a$, or $\sin 50^\circ 28' = 0.77125$:

$$\begin{aligned} v &= 50(8.45)(0.77125) + (1)(0.42631) \\ &= 84.5(0.77125) + 0.42631 \\ &= 65.17 + 0.43 \\ &= 65.60' \end{aligned}$$

Therefore, the vertical distance (v) = 65.6 feet.

To get the elevation of the ground at the base of the rod the center hair rod reading must be subtracted from the vertical distance, and the height of the instrument must be added to the difference. If H.I. in figure 6-27 is 384.2', and the center hair rod reading is 4.5, then the ground elevation would be:

$$65.6 - 4.5 + 384.2 = 445.3 \text{ feet}$$

If the angle of inclination were depressed, the center hair rod reading would have to be added to the vertical distance; and the sum would have to be subtracted from the height of the instrument; or

$$384.2 - (326.3 + 4.5) = 53.4 \text{ feet}$$

NOTE: Time can be saved in computing horizontal and vertical distances by using *stadia tables* that can be found in most survey reference books - or textbooks.

It has been found that stadia readings, are generally too large and result in some error. To compensate for these errors the instrument constant may be regarded as zero (0). The last terms in the formulas for inclined sights vanish (become zero). The *approximate* expressions for horizontal and vertical distances are:

$$\begin{aligned} h &= ks \cos^2 a \\ v &= \frac{1}{2} ks \sin 2a \end{aligned}$$

Stadia measurements are affected by numerous factors that may cause quite large errors in the values for horizontal distances; the use of incorrect values for the stadia constants, incorrect adjustment of instruments, incorrect plumbing of the stadia rod, inaccuracies in rod graduations and differential refraction.

TRAVERSING

In surveying, *traversing* is defined as the field operations of measuring the lengths and directions of a series of straight lines connecting a series of points on the earth. The points connected by the lines of a traverse are known as *traverse stations*, or as *traverse-angle stations*.

The measurements made in traversing are often used to compute the relative horizontal positions of the traverse stations on the state plane coordinate system. From these computed relative positions, additional data can be computed for the layout of roads, transmission lines, plant sites, etc. Traversing operations are conducted for mapping, large construction projects, (roads, railroads); and for many other engineering projects.

Classification of Traverses

A traverse is always classified as either a *closed traverse* or an *open traverse*. A closed traverse would be like that of a property boundary. An example of an open traverse would be a highway survey. Traverses are also classified by the instruments used, such as a *transit-tape* traverse; by the quality of the results obtained, such as a *third-order* traverse; and by the purpose served, such as a *county road-centerline* traverse.

Closed Traverses

A closed traverse starts and ends at the same point, or at points whose relative horizontal positions are

known. The loop *traverse*, as the name implies, forms a continuous loop enclosing an area. A *connecting traverse* starts and ends at separate points whose relative positions have been determined by a survey of equal or higher order accuracy.

Open Traverses

An open traverse ends at a station whose relative position is not previously known; and, unlike a closed traverse, provides no check against mistakes and errors.

A *random traverse* is a special adaptation of an open traverse. It is run between two stations to determine their relative positions, after which the traverse is usually closed by running in the computed line between the two points.

If any part of a traverse is measured indirectly, the traverse is an open traverse. For example, the traverse in figure 6-28 appears to be a closed traverse (or loop traverse); however, line FA has been computed from the measured values of the traverse A, B, C, D, E, F. The traverse, then, is open.

NOTE: If by chance an intended loop traverse does not *mathematically* close, it is still considered as a closed traverse rather than an open traverse.

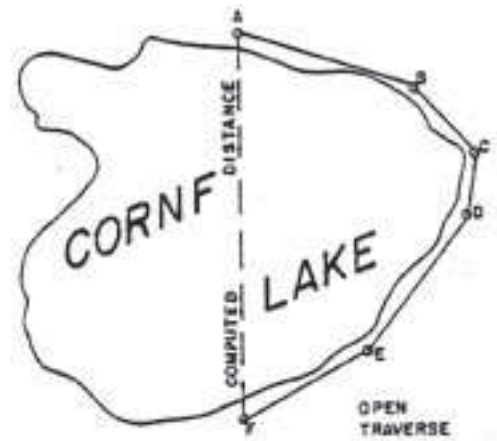


Figure 6-28

Traverse Taping Stations

For many traverses, such as a road, highway, or railroad centerline traverse, distances are referenced to the beginning of the survey and stakes or iron pins are set at 100-foot, or shorter, intervals. The stakes or pins at the 100-foot intervals are called *taping stations*; *engineer stations* or simply *stations*. Stakes or pins set between the taping stations are called *plus stations*. The use of the word station should not be confused with the term *traverse station*.

HORIZONTAL LOCATION OF DETAIL

A large part of surveying involves the location of detail points relative to survey lines and stations. This data is often useful in mapping operations. For example, a traverse is run for the location of a transmission line easement. Nontraverse detail tied to the survey, such as road intersections, section corners subdivision corners and triangulation stations, provide excellent horizontal map control.

The survey location of detail provides for control of the survey. At times the detail is known to tie into other control systems. At other times the control system is tied into geodetic control so that positions of all detail points are known with respect to the worldwide geodetic system.

The main control for the location of detail is often a single traverse. At other times a triangulation network supplemented by traverses will form the main control system.

How Detail is Located

Detail can be located by the *angle and distance* or *radiation method*, by determining the *angle at one station and distance from another*, by the *intersection method*, by *distances from two stations*, by *range ties*, by *swing offsets*, by *perpendicular offsets* or by the *coordinate method*.

Angle and distance method. This method locates points by an angle from a station and a distance from the same station. This is also known as the *radiation method* and is excellent for locating close points. Figure 6-29 illustrates the location of points by radiation.

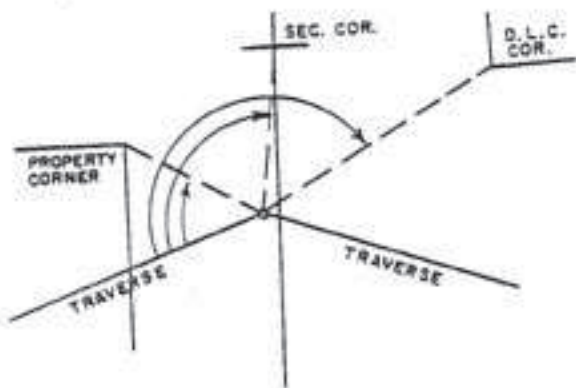


Figure 6-29

Angle at one station and distance from another. Sometimes it is necessary to locate a point by measuring an angle at one station and a distance from another one as shown in figure 6-30. In this example, trees on the

line CP and the line EP prevented the measurement of an angle to P from either C or E.

The trees, however, do not interfere with distance measurements from either C or E, but the lake prevents this measurement from D.

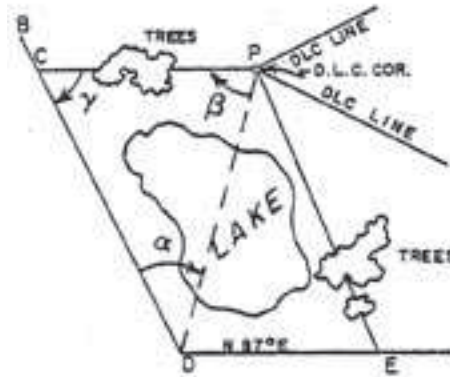


Figure 6-30

To compute the position of P, the distance DP, or the angle must be computed. These values are computed by the following equations:

$$\sin \beta = \frac{CD \sin a}{CP}$$

$$Y = 180^\circ - (a + \beta)$$

$$DP = \frac{CP \sin Y}{\sin a}$$

Intersection method. By this method, points can be located by measuring the horizontal angles *a* and *b*, in figure 6-31, measured at stations A and B. The measured length of the line AB is used as a baseline, and the position of the point is computed. This method is often used to locate distant or inaccessible points.

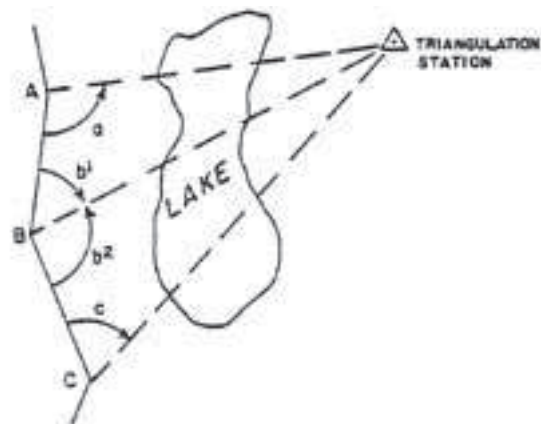


Figure 6-31

Swing offsets. The swing-offset method (figure 6-32) is used for locating points close to the control lines. Measurement of a swing-offset distance provides an

accurate determination of the perpendicular distance from the control line to the point being located.

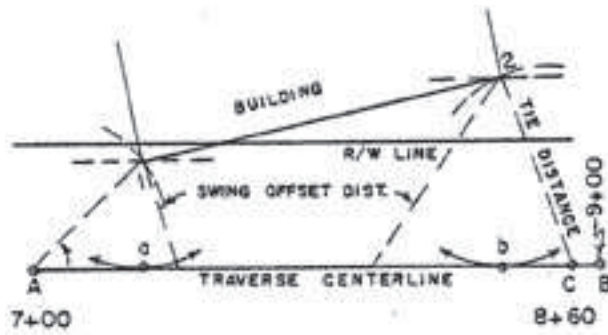


Figure 6-32

Perpendicular offsets from a control line. This method is used for locating detail of irregular lines, such as the bank of a stream (figure 6-33). The control line is located and perpendicular offsets are measured to define the irregular shape on the map.

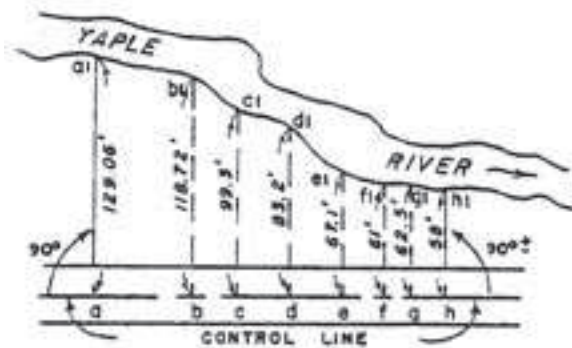


Figure 6-33

When the distances are short, the 90° angles are usually estimated; but when the distance are long, the angles are usually laid off with an instrument.

TOPOGRAPHIC SURVEYS

A *topographic survey* is made to determine the shape or relief of part of the earth's surface and the location of natural and artificial (cultural) objects thereon. The result of this type of survey is usually shown on a *topographic map*.

For mapping large areas, modern photogrammetric methods have almost entirely replaced field topographic survey methods.

LEVELING

Determining elevations by means of a leveling instrument is called leveling (or running level lines). It may also be called establishing *vertical control*. Direct leveling is the most common type. In direct leveling el-

evations of points are determined by measuring their vertical distances above or below a level line. A level line is determined with a wye level; dumpy level or other type of level by using the spirit level with the parallel telescope. Direct leveling gets its name from the fact that vertical distances are read directly from a graduated level rod. A *vernier*⁶ is often used to read a rod accurately.

A vernier is a small scale placed parallel to, and in contact with, the main scale so that the fractional parts of the smallest division on the main scale can be accurately measured.

Figure 6-34 shows a direct *vernier*. It has 10 divisions. The total length of these 10 divisions is the same as the length of 9 divisions on the main scale.

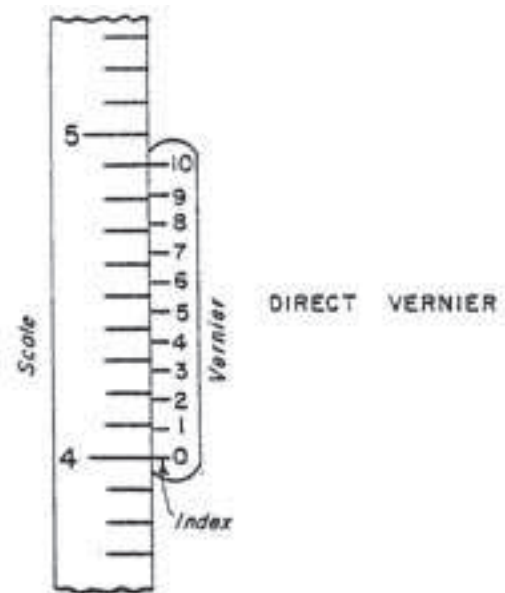


Figure 6-34

With the eye one cannot estimate very carefully the distance between two parallel lines; the eye can more easily decide when two lines coincide. This is the principle behind the use of a vernier.

The level rod most commonly used is the Philadelphia rod. The vernier attached to the target on the Philadelphia rod is used to take the rod reading to a thousandth of a foot. At the position of vernier zero, feet, tenths and hundredths can be read. Then thousandths can be read on the vernier by observing what mark on the vernier is exactly in line with a graduation on the rod.

In taking a rod reading the horizontal separation line of the red and white quadrants on the target is set by the rodman by means of signals given by the levelman. This separation line is fixed at the zero of the vernier. The levelman motions either up or down so that the rodman can place the target horizontal separation in line with the horizontal cross hair of the instrument. When

the horizontal separation and the horizontal cross hair coincide, the levelman signals “all right.” The rodman then tightens the target clamp. Then the rodman holds the rod on the benchmark again to make sure that the target has not slipped. When the rodman gets the “all right” signal from the levelman, he reads the rod to feet, tenths and hundredths of the nearest graduation below the target’s horizontal quadrant separation line. The thousandths are read by the rodman by noting the numerical graduation on the vernier that lines up perfectly with one of the hundredth graduations on the face of the rod. If, for example, a hundredth graduation is in line with the 4-line on the vernier, he must add .004 to the feet, tenths and hundredths that were read on the rod. (See figure 6-35.)

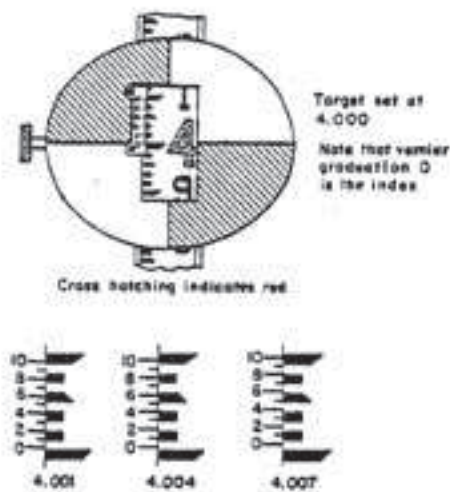


Figure 6-35

SURVEY PRECISION & ACCURACY

Precision refers to the refinement of instruments and methods used, and accuracy refers to the degree of perfection attained in the resultant survey data.

Precision also applies to the fidelity with which the required operations are performed. Precision is exemplified by the number of significant *figures* to which a computation is carried and a result stated.

Precision is of no significance unless the required accuracy is attained.

The quality of precision and accuracy in a survey is directly related to *mistakes or blunders, errors and discrepancies*.

Mistakes or Blunders in Surveys

Mistakes or blunders are quite distinct from *errors*. They result from a misunderstanding of the problem,

poor judgment, and confusion in the mind of the observer (sometimes the cartographer) and are indications of incompetence. Mistakes are detected and avoided by the systematic checking of survey work.

Sources of Errors

Instrumental. Instrumental errors arise from imperfections in the instrument.

Personal. Personal errors arise from the limitations of the human senses, principally sight, touch and hearing.

Natural. Natural errors arise from variations in temperature, humidity, wind, gravity, refraction and magnetic declination.

Types of Errors

Systematic Errors. Systematic errors occur in conformity with known mathematical and physical laws, and their correction can be computed and applied. Systematic errors are also known as *cumulative errors* (common to cartography), as many of these errors affect a measurement in the same way.

Accidental Errors. Accidental errors are caused by a combination of factors *beyond* the control of the observer. The magnitude and algebraic sign of these errors are matters of chance. A compensating effect may result when as many accidental errors are positive as are negative. Accidental errors often remain in surveys after mistakes have been eliminated and systematic errors have been reduced. The *theory of probability* is based on a study of the occurrences of accidental errors. Accidental errors are also called *random errors, irregular errors, and erratic errors*.

The relative importance of *systematic* and *accidental* errors depends on the purpose of the survey. When the purpose tolerates *low-accuracy measurements*, all errors will often be treated as accidental errors. In a survey requiring *high-accuracy measurements*, after the effects of all systematic errors have been corrected, the probable value of the accidental errors can be determined.

Discrepancies in Surveys

Discrepancy is the difference between two measurements of the same line or angle. It is also the difference between a measured and a known value for a quantity. A *small discrepancy* indicates that no mistakes were made and that *accidental errors* were small, but it does not indicate the magnitude of the systematic errors.

Resultant Error

The *resultant error* in any measurement is the difference between the measured value and the true value

for a quantity. Since the true value of a quantity can never be known, the value of the resultant error can never be known.

Residual Error

A *residual error* is the difference between the value of a quantity obtained by a single measurement and the mean value of that quantity obtained by a number of measurements. The residual error for a measurement is the value that most nearly approximates the resultant error. The residual errors for a series of measured values are used in determining probable error.

Theory of Probability

The theory of probability deals with the accidental errors in a series of like or related measurements. After the effects of mistakes and systematic errors have been eliminated from the measured values, the evaluation of the accuracy of the measurements is based on the *theory of probability*. This theory assumes that:

1. Small accidental errors occur more frequently than large ones.
2. Accidental errors are as likely to be positive as negative.
3. Very large accidental errors do not occur.
4. The probable number of uncompensated accidental errors is equal to the square root of the number of opportunities for these errors to occur.
5. The mean of an infinitely large number of like observations would be a true value.

Most Probable Value

The *most probable value* is determined from a series of measurements, each of which most nearly approximates the true value. Accidental errors cannot be eliminated because they exist in every observation of a quantity. After the elimination of the effect of mistakes and systematic errors, the most probable value for a quantity is mathematically determined as described below:

1. For a series of measurements of a single quantity, made under similar conditions, the most probable value is the arithmetical mean of measured values.
2. When there is a discrepancy between the sum of the measured values of several quantities and a known value that the sum should equal, and where each value has been measured with the same degree of precision, the most probable value for each quantity is obtained by distributing equally among the measured values. For example, if the sum of the

measured values for three angles of a triangle is 12 seconds of arc less than 180° , the most probable value is equal to the measured value plus 4 seconds of arc for each of the angles.

3. When the sum of the measured values for several quantities fails to equal their measured sum, and where each value has been measured with the same degree of precision, the most probable value for each quantity is obtained by distributing the discrepancy equally among all the measured values including their measured sum. Then if the adjustment is subtracted from each of the several measurements that were added together, it must be added to the measurement representing their sum, and vice versa. For example, three angles in a survey totaling less than 360° are measured at a point. The angle representing the sum of the three angles is also measured. Then, if the sum of the measured values for the three angles is 20 seconds of arc greater than the measured value representing the sum, 5 seconds of arc are subtracted from each of the three component angles, and 5 seconds of arc are added to the measured value representing the sum of the three angles.
4. When a different degree of precision has been used to measure the values which, when combined, equal a measured sum, the most probable value for each is determined by an adjustment of weighted observations.

Adjustment of Weighted Observations

The *weight* of an observation is the *relative value* of the observation when compared with other observations of the same or related quantities. The value measured by the most reliable method is always assigned the greatest weight. The most probable value is then determined by weights. When distances between points along a line are measured, the full length of the line is also measured. Or when adjacent angles about a point are measured, the total angle is also measured.

It is evident that any adjustment to the measured value for the full length of a line or arc should be greater than that applied to any portion. The weights assigned to the measured values are inversely proportional to their magnitude. When a cartographer decides that one survey value is probably more accurate than another, a higher weight is assigned arbitrarily to that value.

Assignment of Weights. Weights may be assigned to observed values by any of the following methods:

1. To horizontal angles:
 - (a) Directly proportional to the number of measurements in each set of readings for a single angle, and

directly proportional to the number of sets of readings for each angle in a series of angles.

(b) Inversely proportional to the squares of the probable errors.

(c) As designated by the surveyor or cartographer.

2. To horizontal distances:

(a) Directly proportional to the number of times each distance is measured, and inversely proportional to each distance in a series of distances.

(b) Inversely proportional to the squares of the probable errors.

(c) As designated by the surveyor or cartographer.

Use of Weights. In determining the most probable values, or the adjustments to be applied to measured values, weights are used as follows:

1. The most probable value (the weighted mean value) of a single quantity is the sum of the measured values, each multiplied by its weight, divided by the sum of the weights; or

$$X = ny_1 + ny_2 / y_1 + y_2$$

Where:

- x = weighted mean value
- y₁ = weight no. 1
- y₂ = weight no. 2
- n = measured values

for example:

The value of an angle was determined to be 47°24'30" by a series of 4 measurements; then it was re-determined to be 47°24'25" by a series of 6 measurements. The weighted mean value is:

$$\frac{(47^\circ 24' 30'' \times 4) + (47^\circ 24' 25'' \times 6)}{4 + 6} = 47^\circ 24' 27''$$

2. Adjustments to the measured values of a series of related quantities are inversely proportional to the corresponding weights. When adjustments are applied to the measured values, the results are the most probable values of the several quantities.

For example, the three angles A, B and C, of a triangle were measured at different times, angle A by 16 measurements, angle B by 12 measurements and angle C by 8 measurements. The sum of these three angles was found to be 15 seconds of arc less than 180 degrees. The adjustments to the three angles would be:

Angle A, 1/16

Angle B, 1/12

Angle C, 1/8

and for the sum of the angles,

$$1/16 + 1/12 + 1/8 = 13/48 = 0.2708.$$

The adjustments are:

$$A^1 = \frac{15}{0.2708} \times 1/16 = 3.5 \text{ secs.}$$

$$B^1 = \frac{15}{0.2708} \times 1/12 = 4.6 \text{ secs}$$

$$C^1 = \frac{15}{0.2708} \times 1/8 = 6.9 \text{ secs.}$$

The values A¹, B¹, C¹ when added to angles A, B and C respectively, gives the most probable value for each of the angles.

Probable Error

The probable error in a measured value is the most probable value of the resultant error in the measurement. This is a plus-or-minus quantity that may be larger than the resultant error, or smaller than the resultant error, and its probability of being larger is equal to the probability of being smaller.

In determining the value of the probable error the residual error is computed for each measured value. The value of the probable error is then computed by using the sum of the squares of the residuals as shown in 1 through 6 below.

The following equations are based on the assumption that a large number of observations of each quantity have been made. Good results can be made from as few as ten measurements; in practice, however, the equations are often supplied to as few as two measurements, but the results are not reliable.

1. When each value in a series of measurements has the same weight —

(a) The probable error, Em, in the most probable value of the quantity is:

$$Em = 0.6745 \sqrt{\frac{\sum v^2}{n(n-1)}} = \frac{0.6745}{\sqrt{n(n-1)}} \sqrt{\sum v^2}$$

In which is the $\sum v^2$ is the sum of the squares of the residuals, and n is the number of measurements of the quantity.

(b) The probable error, e, in each value of the series of measurements is:

$$Em = 0.6745 \sqrt{\frac{\sum v^2}{n-1}} = \frac{0.6745}{\sqrt{n-1}} \sqrt{\sum v^2}$$

in which is $\sum v^2$ the sum of the squares of the residuals⁷, and, n is the number of measurements of the quantity.

- (c) When solving equation (a) or equation (b), the values of

$$\sqrt{\frac{0.6745}{n(n-1)}} \quad \text{and} \quad \frac{0.6745}{\sqrt{n-1}}$$

can be taken from the table 26, in the Addendum, for any value of n between 2 and 35 inclusive.

2. When the values in a series of measurements of a quantity have different weights, the probable error, R_m , in the weighted mean value is:

$$R_m = 0.6745 \sqrt{\frac{\sum v^2 W}{(n-1) \sum W}}$$

In which $\sum v^2 W$ is the sum of the squares of the residuals each multiplied by its weight, n is the number of observations, and $\sum v$ is the sum of the weights.

3. The probable error, E_a in an area represented by the product of two lengths L_1 , and L_2 having probable errors E_1 and E_2 respectively, is:

$$E_a = \sqrt{L_1^2 E_2^2 + L_2^2 E_1^2}$$

4. The probable error, E_p , in the product of a constant; or known quantity, C , and a measured quantity for which the probable error is E , is

$$E_p = CE$$

5. The probable error, E_s , of the sum of several independent measurements for which the probable errors are $E_1, E_2, E_3, \dots, E_n$, is:

$$\sqrt{E_1^2 + E_2^2 + E_3^2 + \dots + E_n^2} = \sqrt{\sum E^2}$$

6. The probable error, E_d , in the difference between two independent measured values having probable errors E_1 and E_2 is:

$$\sqrt{E_1^2 + E_2^2}$$

Degree of Accuracy

The *degree of accuracy* is a ratio that expresses in general terms, the accuracy attained in survey and cartographic measurements. For example, a degree of accuracy of 1 in 5000 indicates that there are errors in the measurements amounting to one unit or less in

each 5000 units measured, or in the same proportion for a greater or lesser number of measured units.

Horizontal Distance Measurements. The degree of accuracy for a horizontal distance measurement is determined from the measured value and its probable error.

Example: if a line were determined to be 493.68 feet long with a probable error of ± 0.08 foot, the degree of accuracy is equal to one part in 493.68 divided by 0.08, or one part in 6171 parts. This is a plus or minus quantity, and is usually written $\pm 1:6171$, or $1/6171$.

Angular Measurements. For angular measurements in a traverse the degree of accuracy is usually expressed as the ratio of the angular closing error to the square root of the number of angles; or:

$$k\sqrt{n}$$

Example: A loop traverse contains 12 angles and has an angular closing error of $00^\circ 02' 30''$. The degree of accuracy would then be determined as follows:

$$k\sqrt{n} = 2'30'' = 150''$$

$$k = \frac{150''}{\sqrt{n}} = \frac{150''}{\sqrt{12}} = 43''.3$$

$$k\sqrt{n} = 43'' = \text{degree of accuracy}$$

in which n is the number of angles affecting the closure.

Traverses. The degree of accuracy for a traverse is usually expressed as a ratio of the linear error of closure to the total length of a traverse.

Example: In a traverse 15476.8 feet long, the linear error of closure is 2.54 feet. The degree of accuracy is then:

$$\frac{2.54}{15476.8} = \frac{1}{6093} \quad \text{or} \quad \frac{1}{\pm 6100}, \pm 1:6100, \text{ or } 1/6100$$

This would indicate that the errors would cause an error of closure of approximately 1 foot in a 6100 foot traverse.

PHOTOGRAMMETRY & SURVEYING

The aerial photo is as valuable to the surveyor as it is to the photogrammetrist or cartographer. The surveyor uses the photos for delineating topography, determining meanders of bodies of - water, terrain studies, computing approximate areas, survey planning, finding visual evidence of property boundaries, making rough measurements to check field measure-

ments, and for orienting his field location to the surrounding terrain.

The type of aerial photo used is the *vertical aerial photograph*⁸ taken with high-precision aerial cameras. The photos are *perspective* rather than *orthographic* views. In a perspective view, there is no uniform scale; therefore, an aerial photograph is not actually a map - maps are orthographic (each point is at right angles to the plane) and have a uniform scale. An aerial photo could never have a perfect uniform scale because of the distortion and error caused by relief displacement, camera lens characteristics, and film and paper distortion.

Other elements affecting the accuracy of the photo are the camera calibration, height of aircraft above the terrain being photographed, the density and accuracy of the ground control, the tip or tilt of the camera at the moment of exposure and the instruments used in making the measurements.

Orthophotos

Orthophotos are *not* aerial photos; rather, they are computer-generated images of aerial photos. There are two distinct differences between orthophotos and aerial photos. First, the orthophotos unlike the aerial photo can be considered *orthographic* (each point on the photo image is at right angles to the plane). Second, the scale of an orthophoto can be considered uniform throughout (that is - on a good orthophoto). Therefore, an orthophoto can be considered a type of map.

Orthophotos are produced by computerized compilers that automatically correlate and transfer images to a drafting film. The basic computer process involves computer scanning, correlation, data storage and retrieval, rectification and plotting.

Contrary to some claims, orthophotos are not totally error-free; there always remains some minor displacement that is inherent in aerial photography. The quality of orthophotography is dependent on *ground control* and the qualifications of the firm (public or private) furnishing the product.

Orthophotos are beneficial to both surveying and mapping. They contain a wealth of information that can be obtained rapidly and at less cost than conventional ground surveying procedures. For example, the meanders of a river can be determined just as accurately as ground survey methods, and at less cost. They are economically practical for mapping purposes such as cadastral map overlay, planning, engineering, land development, etc.

Some commercial literature has contained claims that the orthophoto *accurately displays property boundaries*.

Of course some boundaries evidenced on the orthophoto may be accurate, but it is more accurate to view the orthophoto as displaying *physical evidence of what appears to be property boundaries*; in effect, adverse boundaries.

Ground Control

Good ground control, or the lack of it, controls the quality and accuracy of aerial photography (and orthophotography). If the photos or orthophotos are to be suitable for surveying or mapping, a network of ground control points must be established. This is necessary in order to establish reliable reference points for making the photogrammetric measurements. Of course, the greater the control required the higher the cost.

The basic control must be of a higher degree of accuracy than that required of the resultant survey or mapping projects.

Ground control for an aerial photo project, like that of the field survey, must be referenced to some datum. For example, BLM suggests that control stations established for photogrammetric projects use: (a) the North American Datum of 1927 as the datum for horizontal control, (b) mean sea level as the datum for vertical control, (c) state plane coordinates for photogrammetric plotting, (d) the horizontal control established by the "National Geodetic Survey to form the National Network" as the origin for supplemental control on each photogrammetric project, and (e) the vertical control network established by the National Geodetic Survey as a basis for establishing supplemental vertical control.

Ground control involves locating the monuments that will be used to establish control, and targeting (also called paneling) the monuments, or reference points. Targeting involves the centering of symmetrically designed targets over the reference points. (The symmetrically designed targets must be easily identifiable on the photograph.)

Photoplotting Instruments

The use of optical-mechanical devices for plotting from aerial photographs is called *stereophotogrammetry*. The instrument used is called a *stereoplotter*.

Stereophotogrammetry is the common method used for compiling map data from aerial photographs.

First-order stereoplotters are capable of achieving a high degree of plotting accuracy by resolving much of the displacement of photo images.

Stereoplotters such as the *stereo-compare-graph* are portable, simple to use and relatively inexpensive.

This is typical of stereoplotters used in most small surveying and mapping operations. It consists of a stereoscope (for stereo viewing), measuring device, drawing attachment and a mechanism for aligning the instrument.

Other plotting devices are the reflecting projector, multiplex plotter, stereoplanigraph, radial planimetric plotter, sketchmaster, stereotopography, multi-scope, autograph, etc. (many of today's photogrammetric plotters are similar in appearance, principle and operation - but the names of the instruments vary somewhat between manufacturers.)

Mechanical Phototriangulation

A method successfully used in some cadastral survey projects is *mechanical photo triangulation* whereby a mechanical method of phototriangulation is used to establish positions and elevations by use of an instrument viewing a spatial model.

Photographic Interpretation

To be able to effectively use an aerial photograph, or orthophoto, one must be capable of reading the photo; that is, of recognizing the topographic features of the photos. The skill of being able to define these features is called *photographic interpretation*.

Photographic interpretation is a learned skill requiring study and practice; a skill that the surveyor and cartographer must possess before maximum benefits can be derived from aerial photographs. (One excellent source of information on this element of photogrammetry is the Manual of Photogrammetry published by the American Society of Photogrammetry.)

SURVEY COMPUTATIONS

Before a survey is complete, several computations must be made. One simple computation is made to see if a closed traverse forms a polygon. If the traverse represents a polygon, then the sum of the interior angles must equal:

$$180^\circ (n-2)$$

Where n is the number of sides.

Example: for a six-sided polygon, the sum of the angles should be:

$$180(6-2) = 180(4) = 720^\circ$$

If the deflection angles have been measured correctly, the difference between the sums of the right and left deflection angles should equal 360° .

The error allowable in the sum of the angles usually is taken to be equal to the square root of the number of angles multiplied by the error allowed per angle. (However, the allowable error depends on the type of survey being made and the precision required.)

Example: Suppose that the error permitted in a particular survey is $30''$ per angle. If the traverse has six courses, then the allowable error is

$$30\sqrt{6} = 30(2.45) = 73.5 \text{ sec.}$$

The total error should not exceed the allowable error by more than 1 or 2 minutes (refer to the section on precision & accuracy).

To check the closed traverse in figure 6-36, we add the right deflection angles and subtract the only left deflection from this sum.

	89° 59' 50"	
	75° 25' 10"	
	43° 30' 10"	
	103° 50' 20"	
	126° 14' 00"	
	436° 178' 90"	Sum R.D.A.
-	78° 59' 50"	Sum L.D.A.
=	358° 119' 40"	
or	359° 59' 40"	

If the traverse formed a polygon, the difference should have been 360° ; therefore, a total error of 20 seconds exists in the survey.

If we assume that all of the angles were measured equally well, the error could be distributed at the ends of the shortest side (CD in figure 6-36).

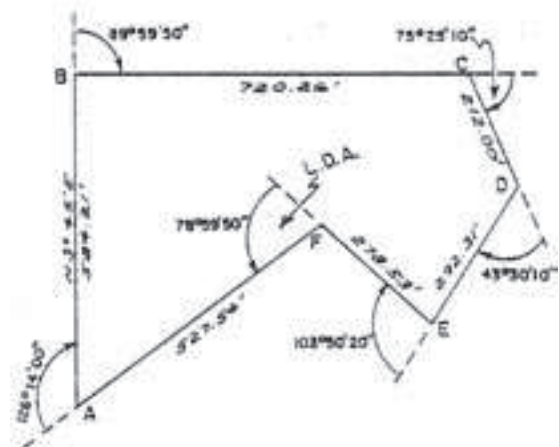


Figure 6-36

If we distribute 20 seconds ($20''$) between the angles at the ends of CD, we would add $10''$ to the angle at C and $10''$ to the angle at D; or $LC = 75^\circ 25' 20''$ and $LD = 43^\circ 30' 20''$.

The total error may be distributed equally among all angles. In this case $20'' \div 6 = 3.33''$ or approximately 3 seconds. To distribute this error we would add the correction to each right deflection angle and subtract it from the left deflection angle; or:

R $89^{\circ}59'53''$
R $75^{\circ}25'13''$
R $43^{\circ}30'13''$
R $103^{\circ}50'23''$
R $78^{\circ}59'47''$
R $126^{\circ}14'03''$

The difference between the sums is equal to:

$$\begin{array}{r} 436^{\circ}178'105'' \\ - \quad 78^{\circ}59'47'' \\ = \quad 358^{\circ}119'58'' \\ \text{or} \quad 359^{\circ}59'58'' \end{array}$$

Latitude and Departure

Every course in a traverse may be located by constructing a right triangle. The course itself becomes the hypotenuse of the right triangle. The legs of the triangle are constructed so that one is parallel to the meridian and the other is perpendicular to the meridian.

In figure 6-7, CD is one course of a survey traverse; AB is the meridian. By drawing a line parallel to the meridian from point C (the beginning of the course) to point E, we have one leg of the triangle. The other leg is a line perpendicular to the meridian from point E to point D. This provides the right triangle CDE. Line CE is the *latitude* of the course CD and line ED is the *departure* of CD.

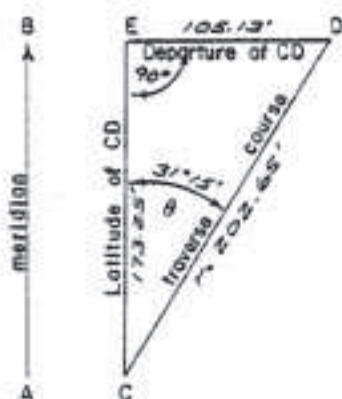


Figure 6-37

To find the latitude (Lat.) and departure (Dep.) from the direction of the course

$$\begin{array}{lcl} \text{Lat} & = & r \cos \theta \\ \text{Dep} & = & r \sin \theta \end{array}$$

where:

$$\begin{array}{lcl} r & = & \text{course length} \\ \theta & = & (\text{the angle which the course} \\ & & \text{makes with the meridian}) \end{array}$$

or –

$$\text{Lat} = 202.65(0.85491) = 173.25'$$

$$\text{Dep} = 202.65(0.51877) = 105.13'$$

Latitudes and departures are either positive or negative. Latitudes are positive when a course has a northerly bearing (See figure 6-38). Negative latitudes denote a southerly bearing. Departures are positive for courses having an easterly bearing and negative for a westerly bearing.

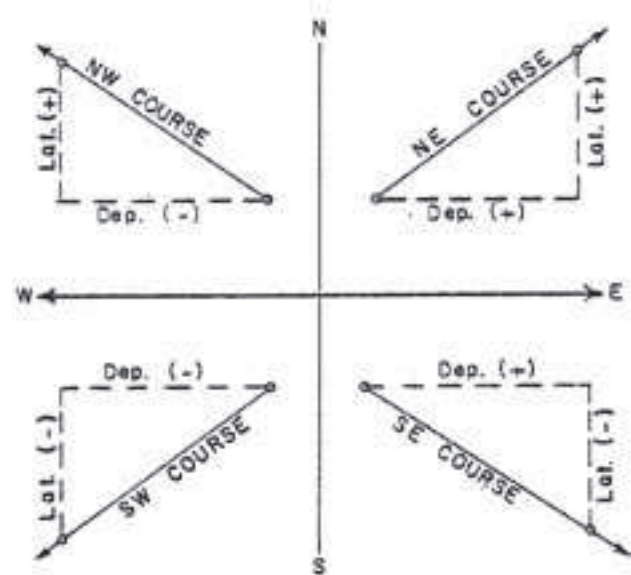


Figure 6-38

Figure 6-39 gives the lengths and bearings of the traverse shown in figure 6-36.

To compute the latitudes, multiply the cosine by the length. For example, to get the latitude of course AB:

$$584.21 \times 0.99786 = 582.96$$

The bearing is NE, so the latitude is positive, or +582.96.

To compute the departures, multiply each sine by the corresponding course length. For example, to compute the departure of course AB:

$$584.21 \times 0.06540 = 38.21$$

$$\text{or } +38.21$$

(refer to figure 6-38 for appropriate signs).

If the traverse in figure 6-36 were a polygon, the sum of the latitudes as well as the sum of the departures should be zero; however, they do not add to zero. There is an error of +0.38 in the sum of the latitudes

COURSE	BEARING	LENGTH	COSINE OF BEARING	SINE OF BEARING	LAT.	DEP.
AB	N3°45'00"E	584.21'	0.99786	0.06540	+582.96	+38.21
BC	S86°15'10"E	720.26'	0.06535	0.99786	-47.07	+718.72
CD	S10°49'50"E	212.00'	0.98219	0.18790	-208.22	+39.83
DE	S32°40'30"W	292.31'	0.84174	0.53988	-246.05	-157.81
EF	N43°29'10"W	278.53'	0.72554	0.68817	+202.08	-191.68
FA	S57°31'00"W	527.54'	0.53705	0.84355	-283.32	-445.01
	Total	2,614.85'			+0.38	+2.26

Figure 6-39

and an error of +2.26 in the sum of the departures. The traverse is not a true polygon and thus does not really start and end at the same point.

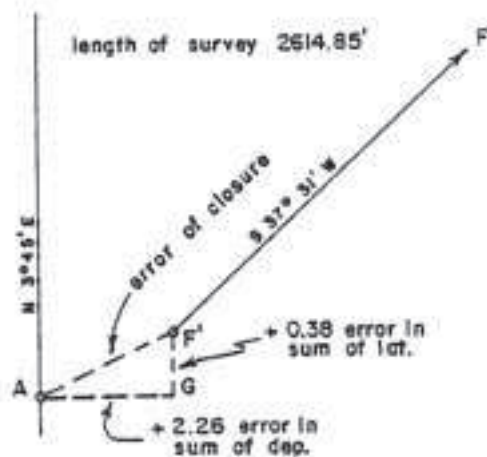


Figure 6-40

The length of the line joining the start of a survey with the last point of the survey is called the *error of closure*. In figure 6-40 F'A is the error of closure (however, this does not mean that the total error actually was made at this point of the survey).

To compute the error of closure (FA), add the square of the error in latitudes to the square of the error in the departures, then find the square root of this sum:

$$\sqrt{(0.38)^2 + (2.26)^2} = \sqrt{0.14 + 5.11} = \sqrt{5.25} = 2.3$$

or, F'A in figure 6-40 is 2.3 feet; the length of the hypotenuse of triangle AF'G. To determine the degree of accuracy of the traverse in figure 6-36, refer to the subsection on *Degree of Accuracy*.

Balancing the Traverse

Often, the error of closure will be greater than that of our example; great enough to be evident on the survey plat or map. It is therefore necessary to balance the survey.

There are several methods of balancing a traverse, but one simple method often used is the *compass rule*. Using this method, the correction factors to be applied to the latitudes and departures can be derived by dividing the total errors in the sum of the latitudes and the sum of the departures by the total length of the survey. Referring again to the traverse of figure 6-36:

$$\frac{0.38}{2614.85} = 0.000145 \text{ (correction factor for Lat.)}$$

and

$$\frac{2.26}{2614.85} = 0.000864 \text{ (correction factor for Dep.)}$$

The table in figure 6-41 shows the unadjusted latitudes and departures from figure 6-39, the corrections and the adjusted latitudes and departures. The correction values are computed by multiplying the length of each course by the correction factors. For example, to compute the latitude correction value for course AB:

$$584.21 \times 0.000145 = 0.08$$

and to compute the departure correction value for course AB:

$$584.21 \times 0.000864 = 0.50$$

Since 0.08 and 0.50 are corrections, they must have signs opposite to the signs of the errors in latitudes and departures. The adjustments are derived by adding the corrections to the latitudes and departures. (Refer to Chapter 9 for adding numbers with unlike signs.)

Probable Distance, Probable Error, Degree of Accuracy Computations

Using the principles and formulas discussed in the section on Survey Precision and Error, the probable distance, probable error and degree of accuracy may be computed as shown in the following examples.

COURSE	LAT.	DEP.	CORRECT. TO LAT.	CORRECT. TO DEP.	ADJUSTED LAT.	ADJUSTED DEP.
AB	+582.96	+38.21	-0.08	-0.50	+582.88	+37.71
BC	-47.07	+718.72	-0.10	-0.62	-47.17	+718.10
CD	-208.22	+39.83	-0.03	-0.18	-208.25	+39.65
DE	-246.05	-157.81	-0.04	-0.25	-246.09	-158.06
EF	+202.08	-191.68	-0.04	-0.24	+202.04	-191.92
FA	-283.32	-445.01	-0.08	-0.46	-283.40	-445.47
	+0.38	+2.26	-0.37	-2.25	+0.01	+0.01

Figure 6-41

Example: Two measurements of the horizontal distance between two points have been made. Using the formula:

$$Em = 0.6745 \sqrt{\frac{\sum v^2}{n(n-1)}} = \frac{0.6745}{\sqrt{n(n-1)}} \sqrt{\sum v^2}$$

Where:

Distance #1 = 573.28
Distance #2 = 573.46
No. of Measurements = $n = 2$
Probable error = Em
:0.6745 (from table 26)
 $n(n-1) = 0.4769$
Sum of the squares of the residuals = $\sum v^2$

Compute the most probable distance and probable error.

	v	v^2
573.28	-0.09	0.0081
573.46	+0.09	0.0081
	$\sum v^2$	= 0.0162

1146.74 sum
573.37 (mean) Most probable distance

$$Em = 0.4769 \sqrt{0.0162}$$

$$Em = \pm 0.0607$$

Dividing the probable error by the most probable distance we have the degree of accuracy:

$$= 0.0607 / 573.37 = 1 / 9440$$

1 / 9440 = degree of accuracy

Example: A Line was measured in three sections. Each section was measured twice and the most probable length and the probable error, E, for each section has been determined by the same method applied in the foregoing example.

Using the formula

$$Es = \sqrt{\sum E^2}$$

Where: The distance of

Section A = 1024.3
B = 1219.8
C = 0993.6

Probable error = Es
of:

$$\sqrt{E_1^2 + E_2^2 + E_3^2 + \dots + E_n^2}$$

Compute the most probable length of the line, it's probable error, and degree of accuracy

	E	E^2
A 1024.3	± 0.14	0.0196
B 1219.8	± 0.22	0.0484
C 993.6	± 0.16	0.0256
3237.7		$\sum E^2 = 0.0936$

3237.7 = Most probable length

$$Es = \sqrt{0.0936} = \pm 0.306$$

And the degree of accuracy

$$= 0.306 / 3237.72 = 1 / 10,590$$

1 / 10,590 = degree of accuracy

Conclusion

The problems and mathematical solutions we have discussed in this chapter are but a few of the many confronting the surveyor. The purpose here was to demonstrate the close relationship to the mathematical problems that often confront the cartographer; and to demonstrate to the cartographer that many cadastral map problems can be solved by survey mathematics.

It would require many more pages to describe the extent of computations that must be performed by the surveyor; computations to: determine meridian (time of culmination, bearing of Polaris at Elongation, solar observations for azimuth, etc.); photogrammetric computations; coordinate (geodetic and plane) computations; computations to correct tape length; etc.

Many are similar to those explained in Chapter 9. Others have little relation to mapping. But, any proficiency acquired in performing survey mathematics will surely prove beneficial to the cartographer if for no other reason than to gain an appreciation of the magnitude of the task facing the land surveyor.

COUNTY SURVEYORS

ORS 204.016(2) requires that a county surveyor be either a registered professional engineer, or a registered professional land surveyor.

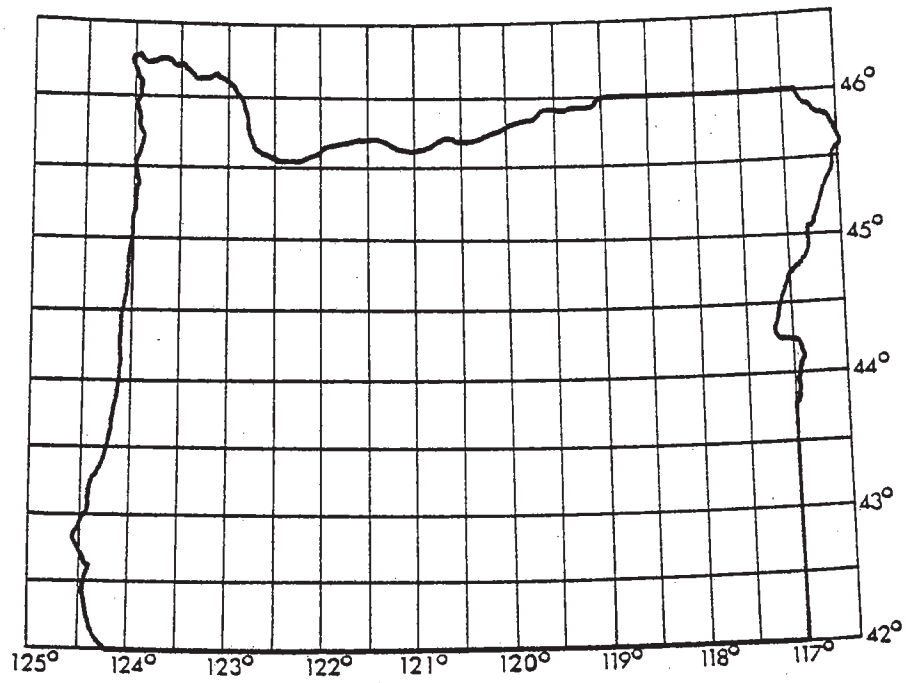
To be registered, he must have the knowledge of mathematics, physical and applied sciences, techniques of survey measurement and the relevant requirements of the law. He is therefore qualified to make value judgments on surveys. If you are confronted with problems relating to a survey being used for mapping purposes, consult your county surveyor.

Surveyors, like cartographers, do not determine legal ownership of real property. The surveyor merely supplies the evidence needed to make that determination.

ORS 672.025 prohibits the practice of land surveying without registration. Never make the mistake of representing yourself as a qualified surveyor unless you are registered as an Oregon professional land surveyor or registered professional engineer.

ORS 209.250 requires registered engineers and registered land surveyors to file field notes and survey maps with the county surveyor. Such information filed with the surveyor is a public record. Registered survey maps are required by ORS 672.025 to have the official seal of the surveyor or engineer.

If the registered surveyor or engineer seal is riot on a survey, the survey should not be used for cadastral map purposes unless recommended by the county surveyor. The courts seldom recognize surveys made by nonqualified individuals. However, Oregon law does not require the filing of state highway surveys with the surveyor. Most governmental agencies authorized to execute surveys do not stamp surveys with surveyor or engineer seals. If the survey is executed by one of those agencies, it may (and should) be used in the cadastral map process.



THE GEODETIC COORDINATES OF OREGON

CHAPTER 7

MAP PROJECTION AND COORDINATES

INTRODUCTION

There is nothing new about coordinates. They have been used for centuries to locate positions on the surface of the earth. They were used by ancient surveyors for planning and surveying cities, such as Rome. They were relied upon by cartographers for construction of navigational charts, and by the navigators who used the charts. The township and range pattern developed by the U.S. public land survey is one type of coordinate system; however, not a true plane rectangular coordinate system of the type described in this chapter.

The idea of using plane coordinates for map control is relatively new to cadastral cartography. The major reason for the slow transformation to coordinate based control is that cartographers, like surveyors, have been reluctant to use coordinates in belief that coordinate systems are highly technical and involve the use of many complicated formulas. The fact is, coordinates are based on some rather simple concepts.

The plane rectangular coordinate system described in this chapter is legally called the *Oregon Coordinate System*.¹ To fully appreciate this system, it will be necessary to describe *map projection systems* and the legal requirements for using the Oregon Coordinate System.

The Oregon Revised Statutes designate what map projection is to be used what *spheroid* is to be used, and what triangulation datum is to be used. The following chronological list of developments will help in understanding the statutory requirements; and it will provide you with a proper perspective of coordinate development.

Significant Dates of State Plane Coordinate Development

1772 (87 years prior to Oregon Statehood) J. H. Lambert, a Swiss surveyor and mathematician, developed the *conic conformal map projection*. Contrary to popular belief, Lambert did not develop the rectangular coordinate system.

1841 Bessel computed the shape of the earth. The U.S.C. and G.S. used Bessel's computations until 1880.

1866 Alexander R. Clarke, a British geodesist, developed more precise measurements of the earth. (Clarke's configuration is called *Clarke's spheroid* by ORS 93.330)

1880 The U.S.C. and G.S. adopted Clarke's spheroid.

1924 The International Geodetic Association adopted the *International Ellipsoid*. This configuration was so mathematically close to Clarke's that the U.S.C. and G.S. decided to retain Clarke's spheroid.

1933 Dr. O. S. Adams, senior mathematician for the U.S.C. and G.S., developed the *state plane coordinate system* (as used by Oregon).

1938 The U.S.C. and G. S. developed the mathematical coordinate tables for Oregon.

1945 The *Oregon Coordinate System* was given legal status.²

1952 The U.S.C. and G.S. published the *Plane Coordinate Projection Tables* for Oregon.

1959 The Oregon Department of Revenue began using the Oregon Coordinate System for base map control.

LEGAL STATUS OF THE OREGON COORDINATE SYSTEM

The Oregon Revised Statutes contain the technical constants that are important to the system; such as the location of the North and South zones, the required map projection, the required geoid, the location of the standard parallels, the origin of coordinates, the use of "X" and "Y" for coordinate identification and the requirements for noting the system on maps and records.

It is important to study the laws before applying coordinates to cadastral maps.

ORS 93.320 "Oregon Coordinate System; Zones. (1) The system of plane coordinates which has been established by the United States Coast and Geodetic Survey for defining and stating the positions of locations of points on the surface of the earth within the State of Oregon is known and designated as the Oregon Coordinate System.

(2) For the purpose of the use of this system the state is divided into a "north zone" and a "south zone."

(3) The area included in the following counties on June 16, 1945, constitutes the north zone: Baker, Benton, Clackamas, Clatsop, Columbia, Gilliam, Grant, Hood River, Jefferson, Lincoln, Linn, Marion, Morrow, Multnomah, Polk, Sherman, Tillamook, Umatilla, Union, Wallowa, Wasco, Washington, Wheeler and Yamhill.

(4) The area included in the following counties on June 16, 1945 constitutes the south zone: Coos,

Crook, Curry, Deschutes, Douglas, Harney, Jackson, Josephine, Klamath, Lake, Lane and Malheur.

(5) The use of the term "Oregon Coordinate System" on any map, report or survey or other document, is limited to coordinates based on the Oregon Coordinate System as defined in ORS 93.330.

The Technical Constants are provided in the following statute.

ORS 93.330 "Definition. (1) For more precisely defining the Oregon Coordinate System, the following definition by the United States Coast and Geodetic Survey is adopted:

(a) The Oregon Coordinate System, north zone, is a Lambert conformal projection of the Clarke Spheroid of 1866, having standard parallels at north latitudes 44 degrees 20 minutes and 46 degrees 00 minutes, along which parallels the scale shall be exact. The origin of coordinates is at the intersection of the meridian 120 degrees 30 minutes west of Greenwich and the parallel 43 degrees 40 minutes north latitude. This origin is given the coordinates: X = 2,000,000 feet and Y = 0 feet.

(b) The Oregon Coordinate System, south zone, is a Lambert conformal projection of the Clarke Spheroid of 1866, having standard parallels at north latitudes 42 degrees 20 minutes and 44 degrees 00 minutes, along which parallels the scale shall be exact. The origin of coordinates is at the intersection of the meridian 120 degrees 30 minutes west of Greenwich and the parallel 41 degrees 40 minutes north latitude. This origin is given the coordinates: X = 2,000,000 feet and Y = 0 feet.

(2) The position of the Oregon Coordinate System shall be marked on the ground by triangulation or traverse stations established in conformity with the standards adopted by the United States Coast and Geodetic Survey for first-order and second-order work whose geodetic positions have been rigidly adjusted on the North American datum of 1927, and whose coordinates have been computed on the system defined in this section. Any such station may be used for establishing a survey connected with the Oregon Coordinate System."

The requirements for noting the Oregon Coordinate System in land descriptions, is clearly defined in ORS 93.340.

ORS 93.340 "Use of terms in land descriptions. (1) As established for use in the north zone, the Oregon Coordinate System shall be named, and in any land description in which it is used it shall be designated the "Oregon Coordinate System, North Zone."

(2) As established for use in the south zone, the Oregon Coordinate System shall be named, and in any land description in which it is used it shall be designated the "Oregon Coordinate System, South Zone."

(3) When any tract of land defined by a single description extends from one into the other of the coordinate zones mentioned in ORS 93.320, the position on its boundaries may be referred to either of those zones, the zone which is used being specifically named in the description."

The "X" and "Y" identification of coordinates is described in the following statute.

ORS 93.350 "Plane Coordinates. The plane coordinates of a point on the earth's surface, used in expression the position or location of such point in the appropriate zone of the Oregon Coordinate System shall consist of two distances, expressed in feet and decimals of a foot. One of these distances, to be known as the "X-coordinate," shall give the position in an east and west direction; the other, to be known as the "Y-coordinate," shall give the position in a north-south direction. These coordinates shall be made to depend upon and conform to the coordinates, on the Oregon Coordinate System, of the triangulation and traverse stations of the Coast and Geodetic Survey within the State of Oregon, as those coordinates have been determined by that survey."

The following statute should be carefully studied before noting "Oregon Coordinate System" on maps and records.

ORS 93.360 "Coordinates exempted from recordation. No coordinate based on the Oregon Coordinate System, purporting to define the position of a point on a land boundary, shall be presented to be recorded in any public land records or deed records unless that point is within one-half mile of a triangulation or traverse station established in conformity with the standards prescribed in ORS 93.330. However, the one-half mile limitation may be modified by an authorized state agency to meet local conditions; or (2) an electronic distance-measuring device is employed to obtain position of the point in conformity with the standards prescribed in ORS 93.330.

The object of ORS 93.360 is to prevent the misrepresentation of points or monuments, as being accurately tied to the Oregon Coordinate System. 93.360 does not prohibit showing coordinate grid ticks and "X" "Y" intersections on cadastral maps.

ORS 93.370 is another precautionary measure. The statute reflects a long established rule that *any survey measurement cannot overcome or outweigh the physical evidence of a monument or corner. A corner, as set on the*

ground, is that corner or monument for which it was established.

ORS 93.370 “If coordinates based on the Oregon Coordinate System are used to describe any tract of land which in the same document is also described by reference to any subdivision, line or corner of the United States public land surveys, the description by coordinates is construed as supplemental to the basic description of that subdivision, line or corner contained in the official plats and field notes of record. In the event of any conflict the description by reference to the subdivision, line or corner of the United States public land survey prevails over the description.”

ORS 93.370 should not be hastily evaluated. First of all, the statute is referring to descriptions, not surveys. It is *not* implying that resurveys or retracement surveys should be ignored. A retracement survey that locates an original corner, as it was placed on the ground, would not be subordinate to original plat distances and bearings even if coordinates were used to describe that corner. This is based on a long standing rule that *the location of a corner as it was placed in the ground by the original surveyor is, for all practical purposes, indisputable.*

The following example should clarify ORS 93.370. A deed calls for the four corners of a parcel of land by coordinates. The deed further describes the land as section 7 of a certain township. By comparing the location of the parcel by coordinates, with the location of section 7 by the U.S. public land survey, it appears as though something other than section 7 is being described. At this point one thing is certain, as per ORS 93.370 the parcel is section 7 and nothing else. If the coordinates were from an U.S. dependent survey and they represented the corners as found by that survey, the coordinates must be used; but the parcel of land they represent will be section 7 and nothing else.

Although the statutes are strict as to how the Oregon Coordinate System is to be used, they only *permit* rather than *require* its use, as evidenced by ORS 93.380.

ORS 93.380 “Purchaser or mortgagee not required to rely on descriptions. Nothing contained in ORS 93.320 requires any purchaser or mortgagee to rely on a description of *which* depends exclusively upon the Oregon Coordinate System.”

MAP PROJECTION

Plane coordinates must be developed on a plane surface.³ The development of a plane surface that will represent features of the earth’s spherical surface is called map *projection*.

The surface of the earth cannot be developed into a plane without some degree of distortion in land shapes, angles and scale; because the only true *plane* on the earth’s surface is at the point of tangency of the plane and spherical surface (position “A” in figure 71).

The distortion resulting from the projection of radials from the curved to the plane surface is evident in figure 71. If the earth were merely a circle, the problem of transformation would be simple; however, the problem is compounded by the fact that the earth is spherical and the distortion exists in every direction at every point of tangency.

The difference between the geometric relationship on the sphere, as compared to that of the plane, is the difference in scale expressed as a ratio. For example, if we were to produce a world globe with identical geometric relationship to the earth’s sphere, the scale factor would be 1.0 (or S.F. 1.0). S.F. 1.0, however, cannot exist when transferring the spherical surface to the plane surface; but, as we shall see, it can be very close to S.F. 1.0.

There are many different types of map projections; each designed for a specific application. There are a number of ways the projections can be categorized; however, they basically fall into three categories

(1) *Conformal* map projections, (2) *equal-area* projections, and (3) *azimuthal* projections. Each category of projection is broken down by the specific method in which the projection has been developed. The following is a list of some better known projections:

1. CONFORMAL PROJECTIONS
 - a. The Universal Transverse Mercator. (a Cylindrical conformal projection)
 - b. Lambert’s Conic.
 - c. Stereographic.
2. EQUAL-AREA PROJECTIONS.
 - a. Alber’s Conic.
 - b. Boone’s Conic.
 - c. Cylindrical.
 - d. Sinusoidal (pseudocylindrical).
 - e. Moilweide’s (pseudocylindrical).
 - f. Eckert’s IV (pseudocylindrical).
 - g. Flat Polar Quartic (pseudocylindrical).
 - h. Lambert’s Azimuthal.
3. AZIMUTHAL PROJECTIONS
 - a. Stereographic (conformal).
 - b. Azimuthal (equidistant).
 - c. Lambert’s Equal Area.
 - d. Orthographic.

It is important to appreciate that no one-map projection can be said to be better than any other. Each has special characteristics that makes it suitable for specific applications.

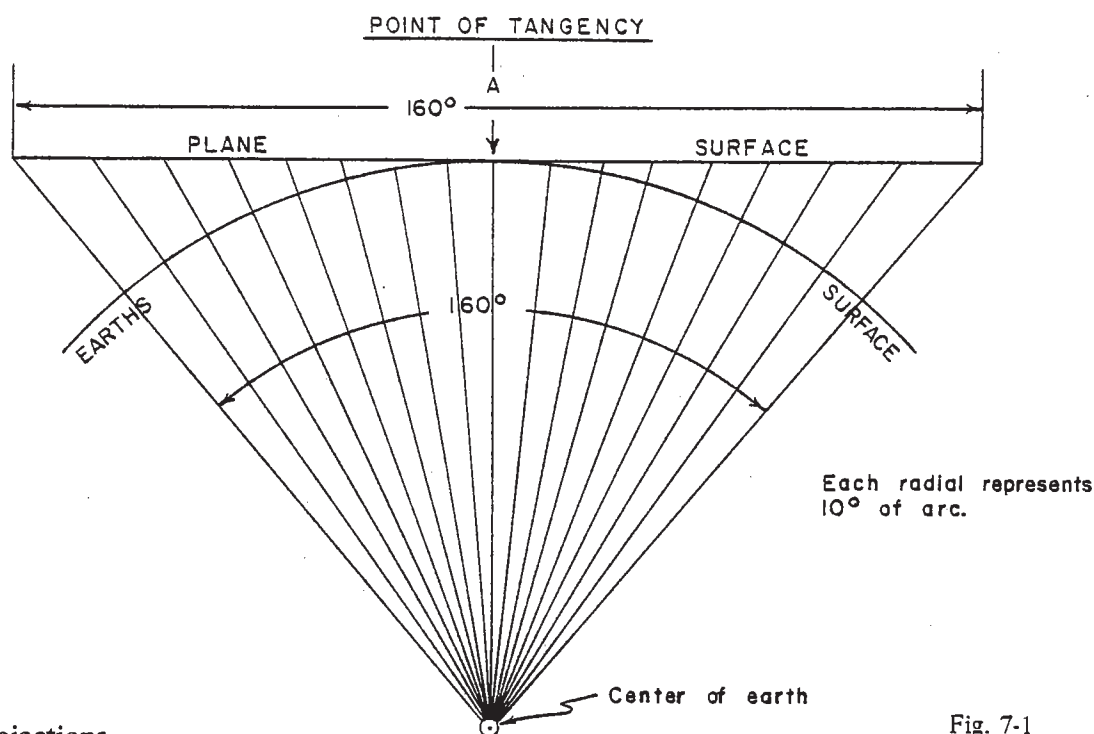


Fig. 7-1

Azimuthal Projections

Conformal Map Projections

In elementary terms, the conformal map projection is a projection that shows small areas in their proper shape. At any position in a conformal projection, the scale along the parallel and meridian is S.F. 1.0. This category is best suited to cadastral cartography. The mechanics of conformal map projections will be clarified later in this chapter.

Equal-Area Map Projections

The equal-area map projections are projections that maintain a constant ratio of areas, but at the expense of true land shapes. Some equal-area projections, however, are near conformal, i.e., *Alber's Conic*. With this type of projection, the scale in a north-south direction usually differs from the scale in an east-west direction. Some equal-area projections are combined with azimuthal projections, i.e. *Lambert's Equal-Area Azimuthal*. Examples of the cartographic use of equal-area projections may be found in polar maps, statistical maps, and maps of political subdivisions (of a country or continent).

Azimuthal Projections

Basically, azimuthal projections show the azimuth or direction from the central point on the projection to other points on the earth's surface. Many are similar in appearance to equal-area projections; some are cat-

egorized as equal-area projections. In an azimuthal projection, the lines radiating from the center of the projection have correct bearings. The azimuthal map projection is ideal for showing polar caps, continents, educational maps and lunar maps.

Other Map Projections

In addition to the conformal, equal-area and azimuthal map projections, there are many special purpose map projections, such as:

1. Cahill's Projection.
2. Goode's Homolosine EqualArea Projection.
3. Gall's Stereographic Projection.
4. Werner's Projection.
5. Miller's Cylindrical Projection.
6. The Gnostic Projection.
7. The Bipolar Conic Projection.
8. Van der Grinten Projection.
9. Goode's Polar Projection.
10. Denoyer's SemiElliptical Projection.
11. Fuller's Polyhedron Projection.
12. Hammer's Projection.
13. Bogg's Eumorphic Projection.

Some of the above map projections are special equal-area projections.

This discussion, thus far, has been to emphasize the broad scope of map projections. However, further details on any but conformal map projections are beyond the scope of this manual. For those interested

in pursuing the subject of map projections, there are many excellent books and treatises on the subject. As earlier stated, the main requirement for plane coordinates is to maintain the spherical relationship on a plane at a scale factor as close as possible to 1.0. The *conformal map projection* meets that requirement. The two conformal map projections that are ideally suited to plane coordinates are *The Universal Transverse Mercator* (abbreviated U.T.M.) and *The Lambert Conformal*.

Universal Transverse Mercator

Although the Lambert Conformal map projection is the base for the Oregon Coordinate System, the Universal Transverse Mercator exists on maps of Oregon, such as the U.S.G.S. quadrangle maps. It is therefore important that the cartographer understand the elements of this map projection.

The Universal Transverse Mercator, or U.T.M., is a *cylindrical conformal projection*. It is the best known of all map projections, and it is the map projection used as the base for state plane coordinates in nineteen states.

Mercator used an imaginary cylinder as the developable base for his projection. The cylinder is used because it is round (to coincide with the earth's sphere), and it has a plane surface.⁴

If the anterior-posterior axis of the earth is parallel with the axis of the cylinder, such a figure 7-2, then we have a *cylindrical projection*.

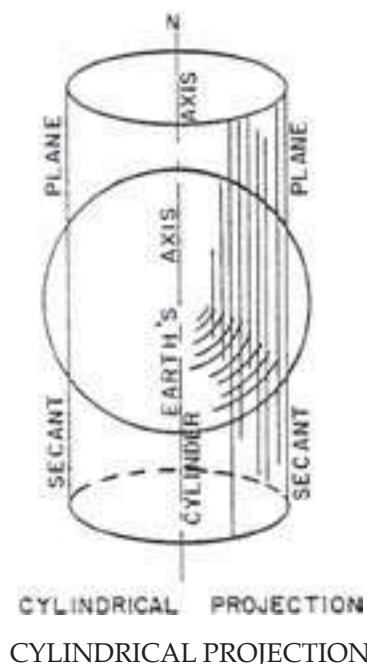
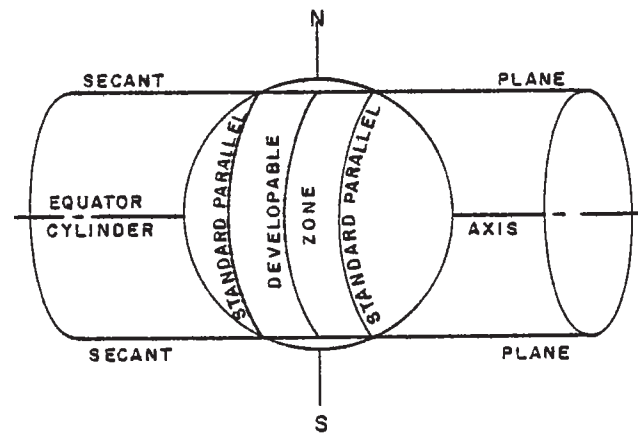


Figure 7-2

If, on the other hand, the anterior-posterior axis of the earth is at right angles to the axis of the cylinder such

as that illustrated in figure 7-3, we have a *transverse cylindrical projection*. The axis of the U.T.M. lies in the plane of the equator; therefore, it is a transverse cylindrical projection.



TRANSVERSE CYLINDRICAL PROJECTION

Figure 7-3

In figures 7-2 and 7-3, the cylinder cuts the earth's sphere rather than lying in *tangent plane*⁵ with the earth's sphere. It is therefore known as a *secant plane*. If the cylinder were in a tangent plane with the earth's sphere, there would only be one standard parallel, which would provide only a small developable zone. On the other hand, the secant plane (exaggerated in figures 7-2 and 7-3) provides two standard parallels with a wider developable zone. *Developable zones will become clearer after reading the section on Lambert's conformal projection.*

The developable zone of the U.T.M. extends in a north-south direction. It is therefore very accurate in that direction, but the scale factor varies in an east-west direction. Therefore, the U.T.M. is best suited for plane coordinates in states that extend mostly in a north-south direction. Suprisingly enough, California is on the Lambert system rather than the U.T.M.

Lambert Conformal

The Lambert conformal projection is used in thirty-one states as a base for state plane coordinates (three states use both the U.T.M. and the Lambert Conformal map projections). In contrast to the Universal Transverse Mercator's cylindrical projection, Lambert developed his projection on a conic plane. Therefore, the technical name for Lambert's projection is the Lambert Conic Conformal Projection (C.C.P.).

The Lambert C.C.P. is true to scale in an east-west direction, but its scale factor varies in a north-south direction. It is therefore best suited to states that extend mostly in an east-west direction, e.g. Oregon. The fol-

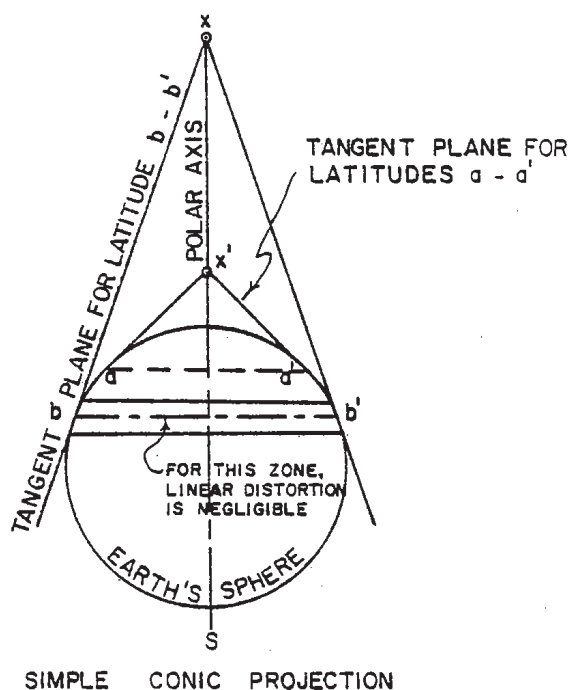


Figure 7-4

lowing is a detailed explanation of the Lambert Conic Conformal Projection.

Lambert's goal was to develop a plane that would conform to the surface of the earth so that rectangular coordinates could be projected on that plane. To develop tile idea, consider the diagram in figure 7-4, wherein the circle represents the earth, and triangles x^1-a-a^1 and $x-b-b^1$ represent two cones projected on a tangent plane to the earth.

If at any point along a parallel of latitude such as aa^1 , tangents are drawn in the various meridian planes. These tangents, or elements, intersect the polar axis of the earth at some point (x^1 to define the cone x^1-a-a^1). In a similar manner, tangents may be drawn from the extremes of any other parallel of latitude such as $b-b^1$ to define a second cone $xb-b^1$. Obviously, in any small region adjacent to these parallels the surface of the earth and that of the corresponding cones are nearly coincident.

In figure 7-5 the cone x^1-a-a^1 was developed. With the point of origin "0", a system of rectangular coordinates can be superimposed over the developed plane.

At point "0" there is no distortion, either linear or angular. The central meridian points to geodetic (true) north; the grid north and geodetic north coinciding at point "0". Along the parallel of latitude aa^1 there is no distortion in linear distances; however, at any point such as "B" there will be angular distortion "0" (theta), since the geodetic meridian converges at the pole (x^1); whereas the coordinate grid lines are parallel. On

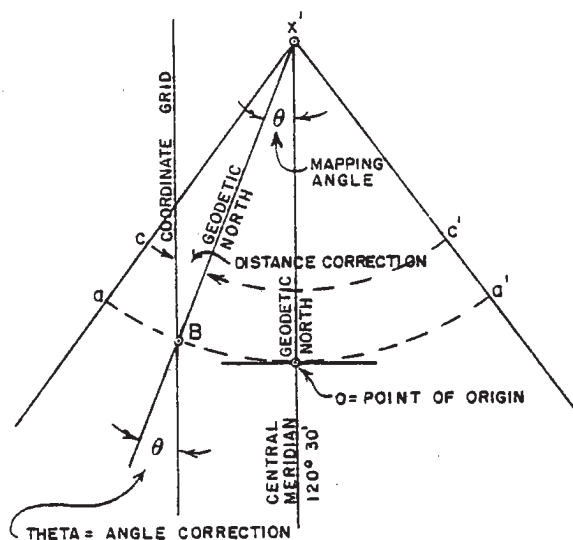


Figure 7-5

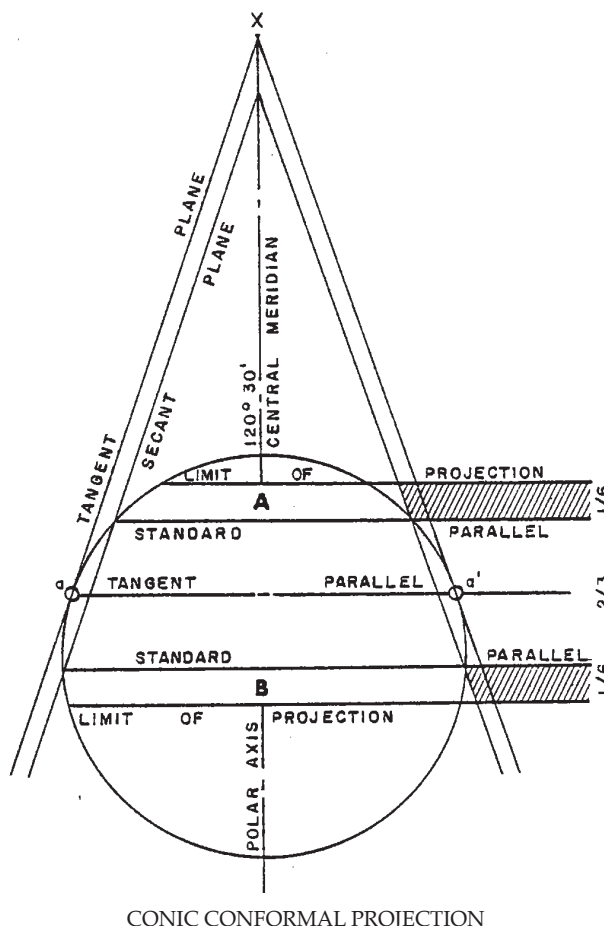


Figure 7-6

any parallel of latitude, such as cc^1 , there will be distortion in angles and correction in distance. These are the basic elements of Lambert's projection.

Thus far, the conic projection has been developed on a tangent plane; therefore, it is not a conformal pro-

jection. As pointed out in the section on the Universal Transverse Mercator, a tangent plane only provides a small developable zone. To provide a developable zone accurate enough for state plane coordinates, the conic projection must be developed on a secant plane; that is, a plane that cuts the earth's sphere at two points as illustrated in figure 7-6. Figure 7-7 illustrates the scale factors of the projection in figure 7-6.

Instead of only one parallel of latitude (such as a-a', in figure 7-4) along which there is no distortion, there will be two standard, parallels within the limits of projection as determined by the two ends of the secant plane where angular and linear errors may be disregarded and the rectangular coordinates may be used without appreciable error. (The same basic principle of secant planes and developable zones also applies to the U.T.M.)

In areas "A" and "B", the scale factor will be greater than true. In the areas between the standard parallels the scale factor will be slightly less than true.

To relate figures 7-6 and 7-7 to the Oregon Coordinate System, examine the map of Oregon in figure 7-8.

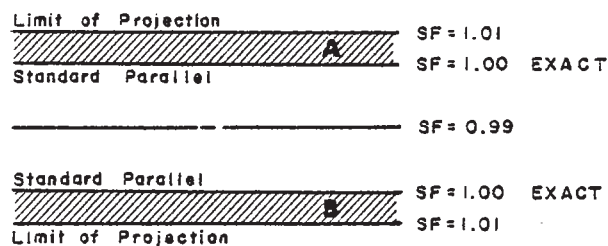


Figure 7-7

Each zone of the Oregon Coordinate System is a separate Lambert Conic Conformal projection. The south zone has standard parallels at north latitudes $42^{\circ}20'$ and $44^{\circ}00'$. The central meridian is at longitude $120^{\circ}30'$. Theoretically, the limits of projection would lie at north parallels $41^{\circ}55'$ and $44^{\circ}25'$; however, the U.S.C. and G.S. tables, for the south zone, begin at north latitude $41^{\circ}40'$ and run to north latitude $45^{\circ}00'$.

The scale factors at the standard parallels are 1.0 (or exact). The scale factors of the north limit of projec-

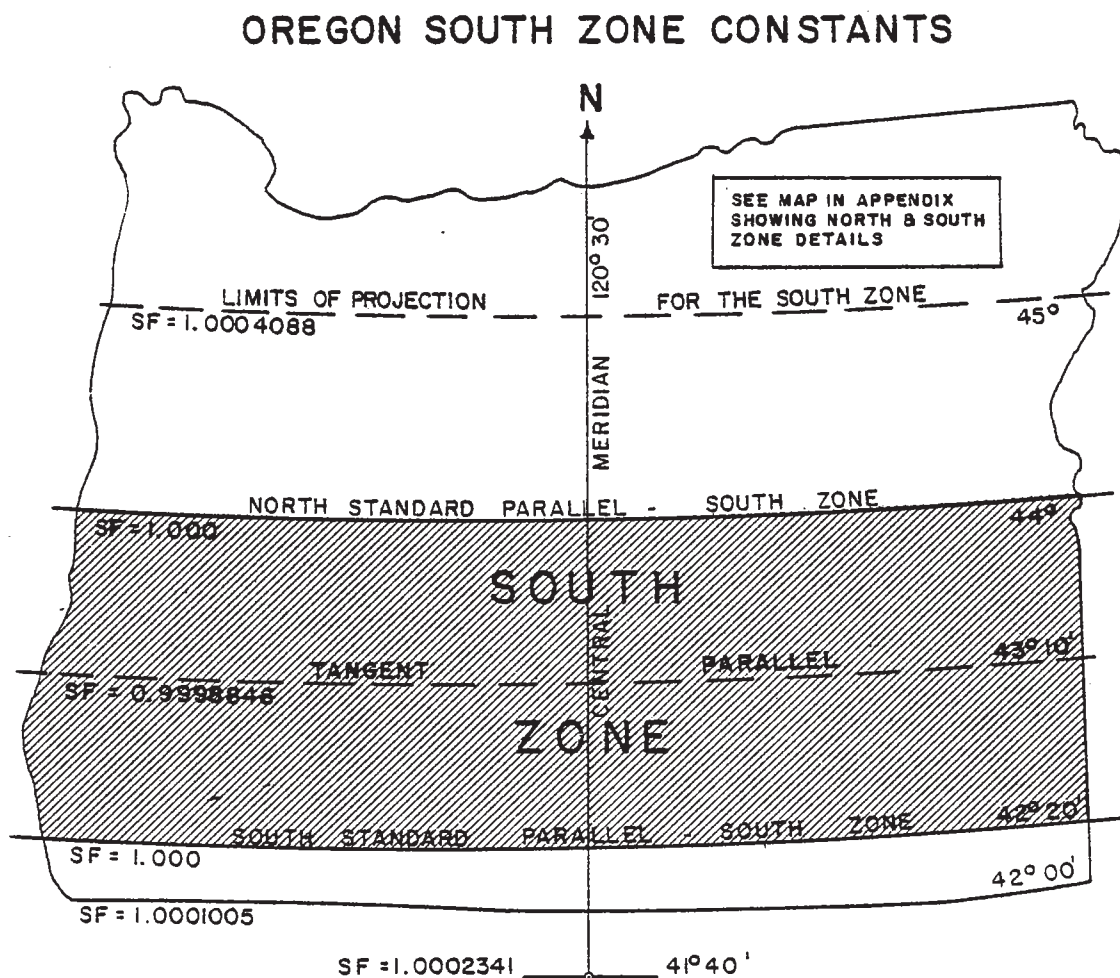


Figure 7-8

POINT OF ORIGIN - SOUTH ZONE

tion is $S.F. = 1.0004088$. The scale factor of any south zone factor may be found in table 17 under the column marked "Scale Expressed as a Ratio."

CLARKE'S SPHEROID

The earth, because of its bulges and flat spots, is not a true sphere. The large deformations from the true sphere are called oblateness.

The true geometric shape of the earth is an ellipsoid. Clarke's mathematical configuration is called Clarke's Spheroid (ORS 93.330). A configuration of the surface of the earth that is everywhere normal to the direction of gravity and coincides with mean sea level is called the geoid.

The methods used to determine the true shape of the earth are complex and beyond the scope of this manual. The important point to remember is that any map projection not based on the true shape will not be accurate.

Clarke's spheroid has withstood more recent computations; however, new satellite measurements will soon furnish more accurate measurements of the ellipsoid. If the new configuration is considerably different from Clark's Spheroid, it may be used when the Oregon Coordinate System is revised in the 1980s.

COORDINATE PRINCIPLES

Rectangular coordinates, as used in higher mathematics and state plane coordinates are *cartesian coordinates*. Cartesian coordinates are two coordinates that locate a point on a coordinate plane. The coordinates of a cartesian coordinate system are measured from

intersecting straight-line axes along lines parallel to the axes.

Figure 7-9 is an illustration of the important elements of cartesian coordinates.

The system of perpendicular straight lines is called the *graticule of the coordinate plane or coordinate grid*.

The horizontal lines of the coordinate grid run parallel to a line called the X-Axis. The vertical lines of the grid run parallel to a line called the Y-Axis. The X-Axis and the Y-Axis are called the *coordinate axes*. The point of intersection of the coordinate axes is called the *point of origin*. In a cartesian coordinate system the point of origin has the coordinates $X=0, Y=0$. As we shall see in the discussion on the Oregon Coordinate System, the point of origin can be assigned other coordinate values.

The pair of values that define a particular point in a coordinate system such as point "A" in figure 7-9 are called *coordinates of that point*. A coordinate is made up of an "X" value called the *abscissa*, and a "Y" value called the *ordinate*. In cartesian and state plane coordinate systems, the abscissa should be shown first; however, this rule is not always adhered to. *Every point* on a coordinate system has only *one set of coordinates*, and each pair of coordinates represent only *one point in the coordinate plane*.

The numbers that follow the X and Y letters of the coordinates are called *constants of that point*. In figure 7-9, point "A" has the constants 3 and 1.5.

The distance between the lines of the coordinate grid, as designated by the numbers along the axes, is called the *numerical grid scale* (abbreviated N.G.S.).

In a cartesian coordinate system the coordinate axes divide the coordinate plane into *quadrants*. In figure 7-9, X and Y coordinates in the first quadrant are *positive* or plus values. X and Y coordinates in

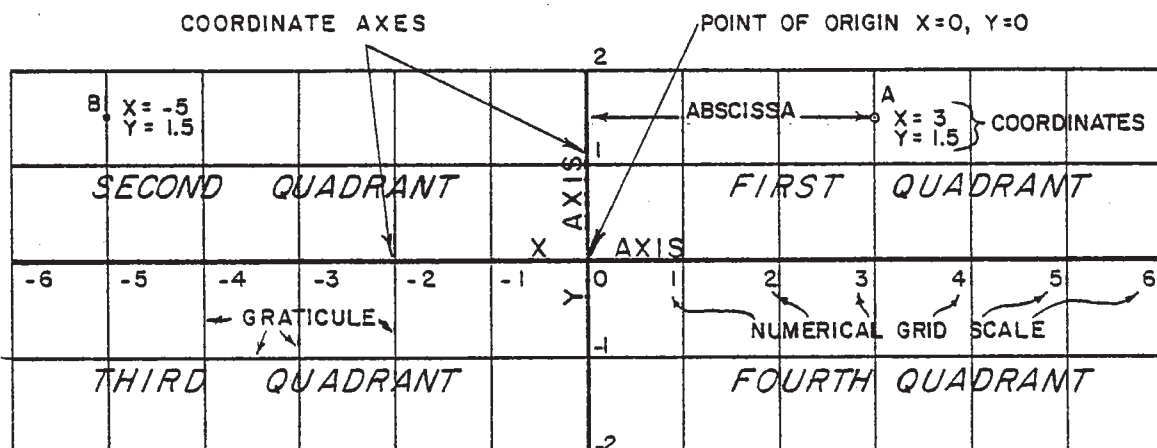


Figure 7-9

the third quadrant are *negative* or minus values. In the second quadrant the X values are *negative* and the Y values are *positive*. In the fourth quadrant the X values are *positive* and the Y values are *negative*. Negative constants are to be preceded by a minus sign (-). Positive constants are not preceded by a sign (as in mathematics).

One of the major differences between the Oregon Coordinate System and regular cartesian coordinate system is that the Oregon Coordinate System has no negative values.

To plot a coordinate point, the abscissa is measured from the y-axis and the ordinate from the x-axis. The intersection of the two measurements is the *coordinate point*.

The beauty of plotting by coordinates is that all measurements are made in vertical and horizontal directions; there is no need to plot lines by bearings. Another positive feature is that measurements are made from the nearest grid lines; therefore, distances can be plotted by only making one measurement in each direction.

THE OREGON COORDINATE SYSTEM

All of the elements of a cartesian coordinate system, except for negative values, exist in the Oregon Coordinate System.

To develop the idea of the Oregon Coordinate System, consider the pair of lines in figure 7-10. The y-axis of the system is called the central meridian. It is the meridian used in both the north and south zones. The central meridian is located at longitude $120^{\circ}30'$.

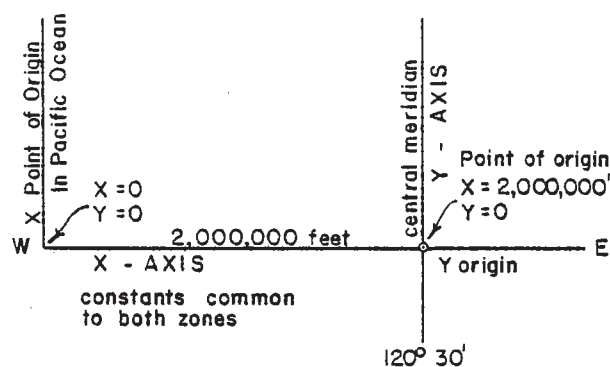


Figure 7-10

To eliminate negative values the x point of origin (zero) is in the Pacific Ocean and each Y point of origin lies south of, and out of the pertinent zone. Therefore, each zone can be said to lie in the NE

(or first) quadrant of a cartesian coordinate system, where all values are positive. All coordinates then are either measured north or east. The coordinate grids, however, are measured east and west of the central meridian, where $x = 2,000,000$ feet.

All northerly coordinate grid lines are grid north and are parallel with the central meridian. The only grid line that runs to geodetic north in the entire system is the central meridian ($120^{\circ}30'$). All horizontal grid lines are parallel with the X-Axis and are at right angles to grid north.

Figure 7-11 represents a coordinate grid with a numerical grid scale of 1,000 feet. This is the N.G.S. for a 1" 100 scale cadastral map. The zone is the North Zone.

The point of origin and the XY axes of the Oregon Coordinate System lie far to the east and south of the map; however, we still need an XY axis. Because all measurements will be made in an easterly direction, a reference axis is established with a reference point of origin at point 0. The coordinates for point 0 are $X = 1,300,000$ and $Y = 566,000$; therefore, point 0 is 700,000 feet west of the central meridian and 566,000 feet north of the point of origin of the zone.

This grid is constructed by measuring grid points at 1,000-foot intervals north and east of point 0, and by drawing a rectangular grid network from these points. To locate a coordinate point on this grid, for example, $X 1,303,175$ and $Y 568,201$, locate the grid intersection nearest to the given coordinates. In this case point A at $X 1,303,000$, $Y 568,000$. Next measure 175 feet grid east along the grid parallel $Y = 568,000$. Then running parallel with the y-axis, measure 201 feet grid north to point B, which is the given coordinate point $X 1,303,175$, $Y 568,201$.

The rule for labeling coordinates is to use the letters X and Y added to the constants, with the X value (or abscissa) written above the Y value (the ordinate) as shown at point B in figure 7-11. The Highway Division of the Oregon State Department of Transportation uses the letters N (for north) and E (for east) to identify the X, Y coordinates. The letter N designates the Y coordinate and the letter E designates the X coordinate. The Highway Division also labels the ordinate before the abscissa, as shown at point C in figure 7-11. The B.P.A. uses the standard XY identification.

Geodetic north can be converted from grid north by using simple trigonometric formulas and the projection tables in the addendum. The tables may also be used to establish geodetic coordinates (latitude and longitude). The procedures for determining theta (θ) and geodetic coordinates may be found in Chapter 9 on Computations.

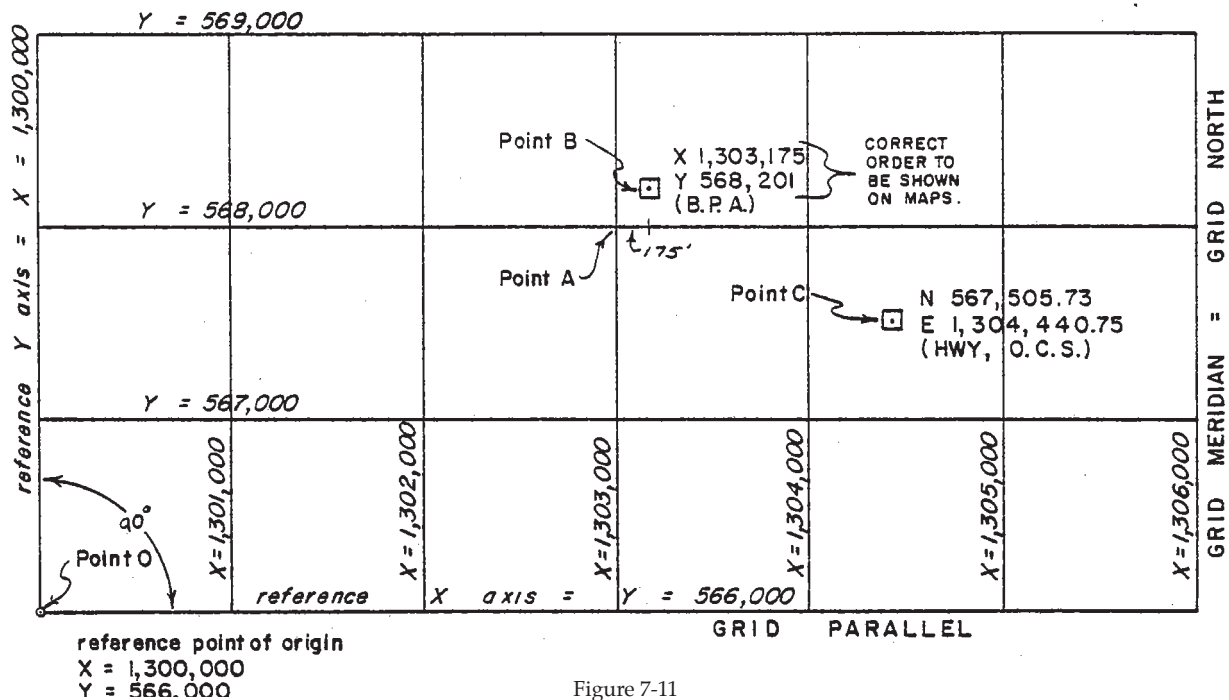


Figure 7-11

When converting grid bearings to geodetic bearings, or geodetic bearings to true bearings, theta must be used carefully. The following diagrams indicate the sign relationships between angle θ and quadrant bearings. The formulas for converting bearings are shown in each quadrant. (Fig. 7-12)

Figure 7-12 applies to quadrant bearings (N $45^{\circ}30'$ E is a quadrant bearing in the NE quadrant). When azimuths are used, all angles are measured clockwise from south and approximate values of the geodetic (true) azimuth are determined by the formulas:

$$\begin{aligned} \text{Grid} - \theta &= \text{Geodetic Az (W of } 120^{\circ}30') \\ \text{Grid} + \theta &= \text{Geodetic Az (E of } 120^{\circ}30') \end{aligned}$$

The above formulas are illustrated in figure 7-13.

The geodetic azimuth of a line is its true azimuth. The difference between grid and geodetic azimuth of any line passing through a single point is nearly constant. It is represented by theta, as shown opposite the longitudes in tables 16 and 18.

The Rectangular Grid

It would be logical to assume that establishment of the Oregon Coordinate System would mean that the grid intersections are located and monumented on the ground. However, there is an infinite number of

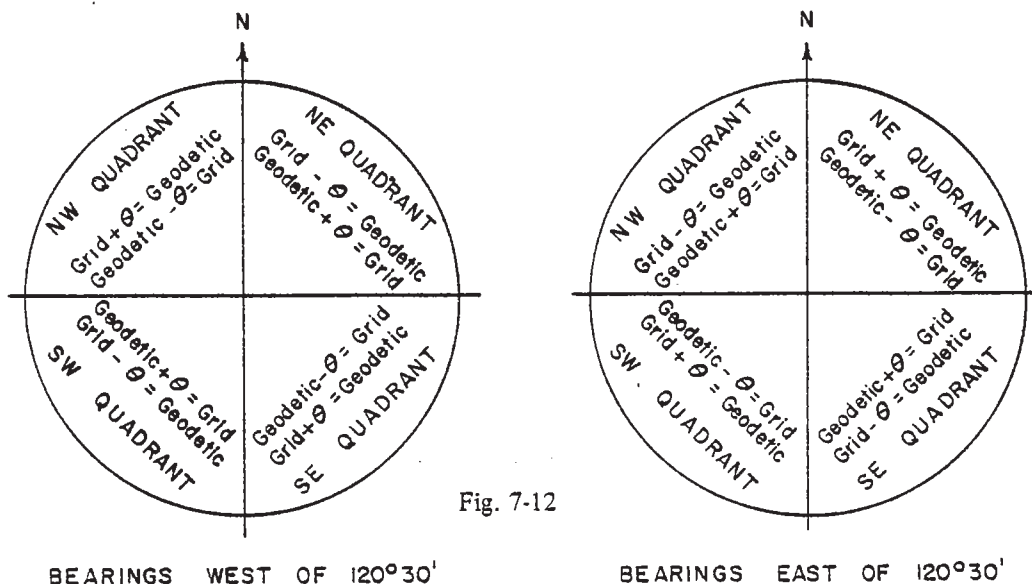


Fig. 7-12

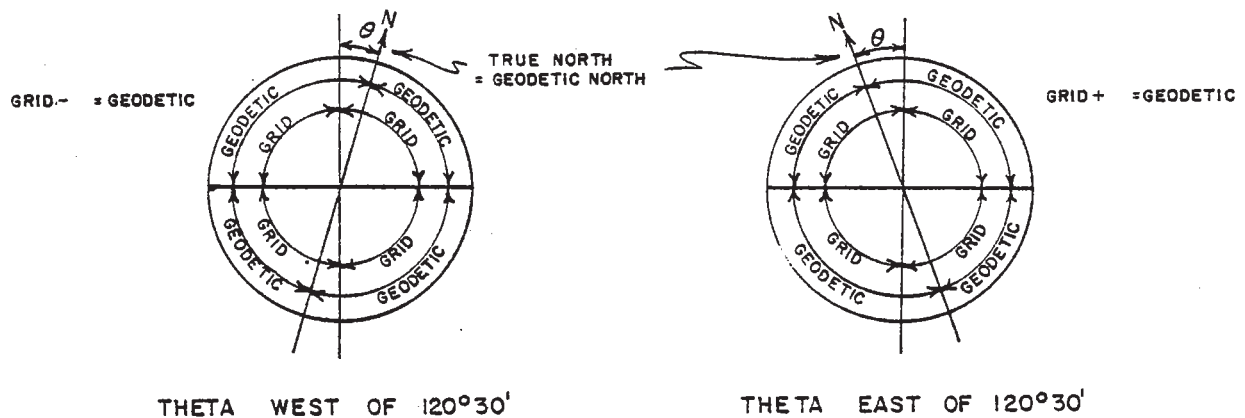


Figure 7-13

N.G.S.'s and an infinite number of grids; therefore, it would be impossible to monument a grid with a numerical grid scale satisfactory for all purposes. Such a project would be financially impossible. Therefore, the grid is not monumented.

Instead of attempting to monument a grid, triangulation networks have been established and monumented. Each triangulation station is tied to the Oregon Coordinate Grid and the geodetic grid. These triangulation stations are used by surveyors and cartographers to tie corners, monuments and lines to the coordinate system.

The U.S.C. & G.S. has established a national system of triangulation which provides stations for nearly every locality; and it allows for expansion of surveys over great distances, while still providing correct azimuths throughout the survey. By checking other triangulation points, the surveyor can avoid closing the survey to the beginning point of the survey. Many triangulation monuments have been set by organizations other than the U.S.C. & G.S., e.g. the Oregon State Department of Transportation, U.S. Army Corp. of Engineers, the U.S.G.S. and U.S. Forest Service.

For applying coordinates to cadastral cartography, see Chapter 11 on "Basic Map Control."

LOCAL COORDINATES

Often surveyors establish coordinate systems that are not oriented to the Oregon Coordinate System. These coordinate systems are called *local coordinate systems*.

Cartographers must always study each survey to determine whether or not the coordinate system is local or on the Oregon Coordinate System.

If a local coordinate system is used, the methods for plotting are the same as with the Oregon Coordinate System; however, it is important to try to establish a tie to the Oregon Coordinate System so that the local coordinates can be converted to that system. Some local coordinates are difficult to plot because the local grid was not projected as a conformal map projection; however, the scale factor is usually so close to 1.00 that the coordinates can be made to fit control.

If difficulty is experienced with a local coordinate system, it is best to plot the survey information by *direction methods* (bearings, angles and distances).

Most surveys made today will be on the Oregon Coordinate System rather than local coordinate systems.

ENDNOTES

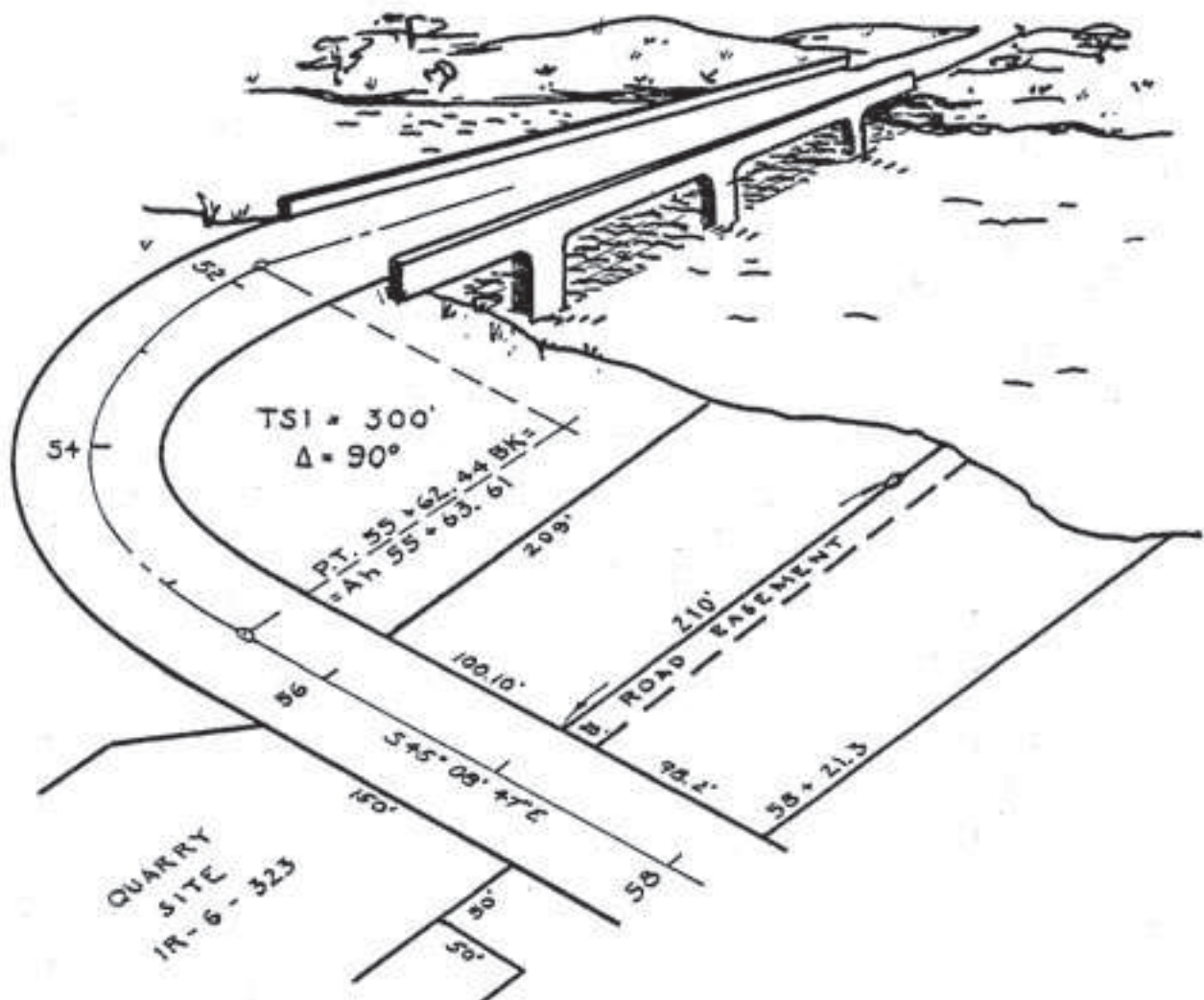
¹ ORS 93.320.

² ORS 93.320 to 93.380.

³ A plane surface is a flat surface.

⁴ We think of a plane surface as being flat, which a cylinder is not. But when unrolled, a cylinder becomes a plane surface.

⁵ The plane surface in figure 7-1 is lying in a tangent plane with the earth's surface.



CHAPTER 8

ROUTE SURVEYS

INTRODUCTION

Route surveys are the surveys of highways, public streets, county roads, government access roads (State forest roads, National forest roads, etc.), electrical transmission lines, railroads, canals, and pipelines.

The advantages of having route survey data for the control of a cadastral map outweigh those of any other map-reference source, or combination of reference sources; e.g., deeds, photos, property surveys, surveys of the public lands of the U.S., quadrangle maps, etc. The route survey facilitates map control by providing a consistent base for analytical bridging; by providing the best obtainable accuracy in map triangulation; by supplying information about abutting surveys, deeds and ownership; and by providing control over large areas (sometimes county-wide).

STEPS USED IN ESTABLISHING A ROUTE

The first step in establishing a route is *area reconnaissance* to select the areas most desirable for the route. If the route is for transportation, the area reconnaissance might be preceded by a study made to determine the load and volume requirements of the route, and to evaluate the traffic requirements.

Reconnaissance today requires walking the ground; examining aerial photos, maps (including cadastral maps) and deeds: and obtaining statistical data on population, drainage, land use, land values, vegetation, weather and other factors that will either influence the router or will be influenced by the route.

When one or more areas have been selected as potentially desirable for the route, another reconnaissance is made to evaluate each possible site for the route. This is known as the *route reconnaissance*. The procedures are generally the same as the area reconnaissance, except the study is more detailed. The process includes a general survey of each site to establish the site topography, determine **the approximate** route alignment and prepare cost estimates.

At this point extensive **studies are made** and public hearings are held to determine the impact of each route on the social, legal, economic, political and natural environmental elements of the proposed routes. It is at this step that public input determines the general location of the route.

After final determination of the route, a *preliminary location survey* is executed. This is made to provide the base for planning and engineering. At this step verti-

cal and horizontal control is established; the traverse of the route is made and route stationing is assigned; profiles are run; topography and elevations are surveyed; and the location survey maps are prepared. For the most part, this will represent the general location of the route.

The next step is to make the *final location survey*. This is done after engineers have evaluated the preliminary survey and refined the location to expedite construction, reduce construction costs, improve the balance of cuts and fills, etc.

The final step is the construction survey made to set line and grade stakes.

The first important documents of the location survey are the surveyor's *field notes*; a record of all survey work done in the field. They are probably the most valuable of any of the route location documents, except the right-of-way deeds. Although they vary somewhat from surveyor to surveyor, most field notes contain the (1) title of the survey, (2) location of the route, (3) date of the survey, (4) name of each member of the survey party, (5) duties of each member of the survey party, (6) project, (7) weather, (8) precision of the survey methods and equipment, (9) monuments found and set, and (10) all measurements taken in the field.

The field notes also include rough sketches to clarify survey data: points tied to, lines and points of measurement, and computations. Figure 8-1 is an example of highway field notes for a section of highway in Curry Co. (except, modified to show how corner tied to survey).

Surveyors seldom bother to plot the sketches to scale. The data is the important factor here.

Often, the surveyor, draftsman or cartographer will omit certain field note data from the route survey drawing. For example, the highway strip map of the "Ferrelo-Wholehead" section might exclude the tie to the section corner of sections 10, 11, 14 and 15, but as figure 8-1 illustrates, the data can be obtained from the field notes.

Field notes are often typed and copied in an advanced form of presentation, but the original notes are retained for reference (either in their original form or on microfilm). The notes of public routes (highways, county roads, and city streets) are public records and are readily available for inspection. They can be viewed in the office of the county surveyor or county road department (for county roads), the city engineer's office, or city public works office (for city streets) and the State Department of Transportation district offices or Salem office (for State highways).

LEFT AND RIGHT PAGES OF FIELD NOTE BOOK

PAGE 104				
Loc. Line Date 11-12-57 Party Thomas				
Project Ferrel - Wholehead K. Shull				
Sta.	Dist.	L	L	
		Left	Right	
Δ 17+84.82			18°13'25"	
	193.12			
Δ 15+91.82		24°50'13"		
	308.82			
Δ 12+83.82			38°04'00"	
	395.82			
Δ 8+87.82			6°53'15"	
	184.21			
Tie			107°3'00"	
	1087.8	See p. 105		SEC. CORNER 10, 11, 15, 17 Ed. 1 1/2" 1. P
Δ 7+02.79			22°50'45"	

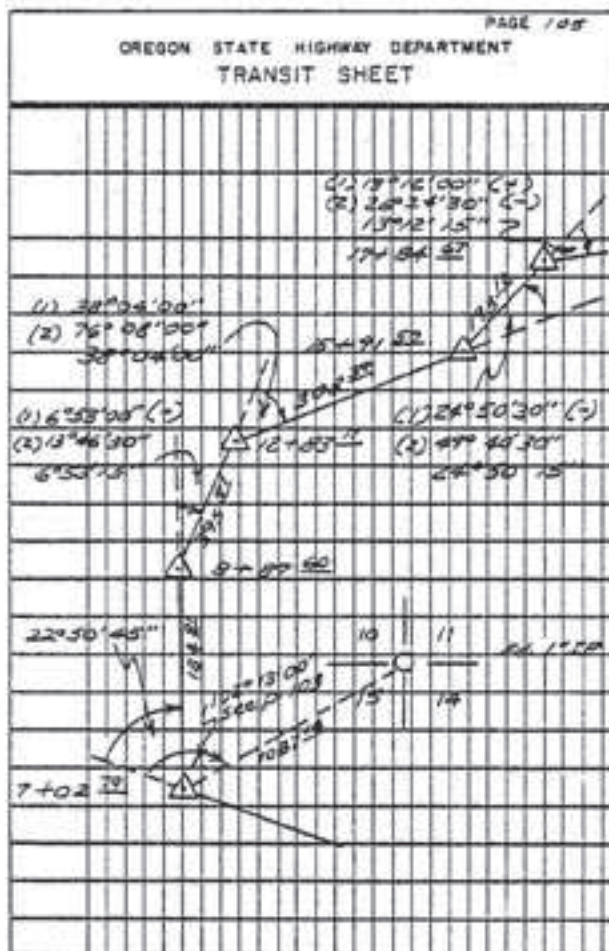


Figure 8-1

The following are the symbols and abbreviations used in field notes:

⊙	= transit point
○	= found corner
∧	= transitman
⌂	= centerline
1/4 s.c.	= quarter section corner
1/4 sec. cor.	= quarter section corner
▲	= triangulation station (sometimes used instead of circle for transit point)
$\frac{2}{11} \frac{1}{12}$	= section corner
Stk.	= stake
Tk.	= tack
T.P.	= turning point
B.M.	= bench mark
→	= crow foot (a mark made)
c.f.	= crow foot (a mark made)
F.S.	= foresight

—	= foresight
B.S.	= backsight
+	= backsight
H.I.	= height of instrument
∧	= height of instrument
Ah	= ahead
Bk	= back
Ts	= semi-tangent (spiral)
T	= semi-tangent (circular curve)
∠ R	= angle turned right
∠ L	= angle turned left
Sta.	= station
Dist.	= distance

When referring to the surveyor's field notebook (or for that matter any official survey document), *never* "mark, erase, cross out or otherwise alter the notes in the book (or document).

Route surveys can be very complex; often requiring extensive mathematical computations especially where curves are involved (in road, highway and railroad surveys). You will note, in this chapter, that the mathematics of the curves has not been avoided; to the contrary, the mathematics and curve geometry has been stressed. This is because the curve is not designed as just a curve; it is a mathematical configuration designed to meet specific requirements. For example, spiral curves are designed to balance centrifugal forces in an automobile by changing the degree of curvature at a constant rate. In order to accurately plot the curves you will eventually have to learn to work the many curve formulae (especially when curve tables are unavailable or when they will not supply the needed values). If you have difficulty with the formulae, review the chapter on cadastral mathematics to ascertain that you are performing the operations in proper order.

HIGHWAY SURVEYS

Highway surveys are of primary importance in establishing base cadastral map control, and in cadastral map maintenance.

When used for map control the highway strip maps provide the locations of section comers, one-quarter corners, donation land claim corners, subdivision corners (lots, blocks, tracts) and many other needed survey corners and monuments. The maps are also an excellent source for state plane coordinate ties. Some drawings include exceptionally accurate ties to road and street intersections, railroad traverses, stream locations, property lines and property corners (see figure 8-2).

This section will provide a simple explanation of survey strip maps; and it includes instructions on plotting highway simple curves, compound simple curves, reverse curves, spiral (talbot) curves and compound spiral curves. Moreover it will supply detail on the mathematics of the highway curves. Most of the text on highway surveys is applicable to route surveys of county roads and city streets.

Highway Strip Maps

The route drawings of the State highways, produced by the Oregon State Highway Division of the Department of Transportation will be referred to as *highway strip maps*.

Figure 8-2 is a small section of the Columbia River highway strip map. It is a good example of the type and quantity of usable cadastral data contained in most route surveys. The shaded area in figure 8-2 represents recent purchases of land for a quarry site;

and the recent purchase of additional right-of-way. Important reference data, in Figure 8-2, is identified by circled numbers, and are as follows:

1. The "1R" numbers are Highway Division file numbers of special drawings of the quarry site. 1R drawings are also used for stockpile sites, roadside rest areas and parks. Copies can be obtained from the Department of Transportation.
2. The wording "relinquished to Gov't." indicates the property has been transferred to the U.S.; however, the wording alone (especially on a drawing) is insufficient to establish current ownership. But it at least provides a starting point for research on the ownership of the property.

The wording on 1R drawings should be examined carefully. Often the State is only a lessee of the site (quarry site, stockpile site, etc.) not the owner in fee (this is especially true of sites in National Forests; and even right-of-ways in the National Forests). Also, the 1R drawings or highway strip maps might contain wording that shows that State acquisition of the site was disapproved.

3. The deed "RX" number 4419 is a Highway Division file number for right-of-way deeds. A copy of the deeds can be obtained from the Highway Division. Often, however, the map will include the county deed recording number.
4. The "630" on the map is engineering station 630+00; sixty-three thousand feet from the beginning point of the survey.
5. The "+47.8" is plus station 632 + 47.8; the station point of the intersection of a property line between Weisse and McCormick and the highway centerline.

The engineering stations and plus stations on the strip maps are usually reliable for cadastral map purposes. When noted in deeds, however, they are often only approximate and should be used with care.

6. The names of property owners of lands abutting the highway. They are probably the grantors of the new 30 foot strip of highway (R.W. 4419 and R.W. 4250). The numbers "B51 P155" and "B39 P402" are the County Recorder's book and page numbers of the deed records for Weisse and McCormick Lumber. Co.
7. The "+19.9" is plus station 629 + 19.9; the intersection of the South line of Section 5 with the SE line of R.W. 4419.

There is a lesson to be had from the Highway Division's policy of recording important detail on their strip maps.

Consider the amount of information obtainable from the small section of strip map in figure 8-2. Anyone familiar with title research would attest to the fact that several hours would be required to obtain that information if it were not obtainable from the strip map - with an excellent possibility that certain data might never be found. Yet it only required 20 minutes drafting time to add the information to the map.

Keep this in mind when you have spent 2 hours to find information, but leave it off the map to save 10 minutes drafting time.

Highway strip maps are usually drawn at a scale of 1"=100' (one inch equals one-hundred feet). Some, however, are prepared at 1"=50'. Early strip maps

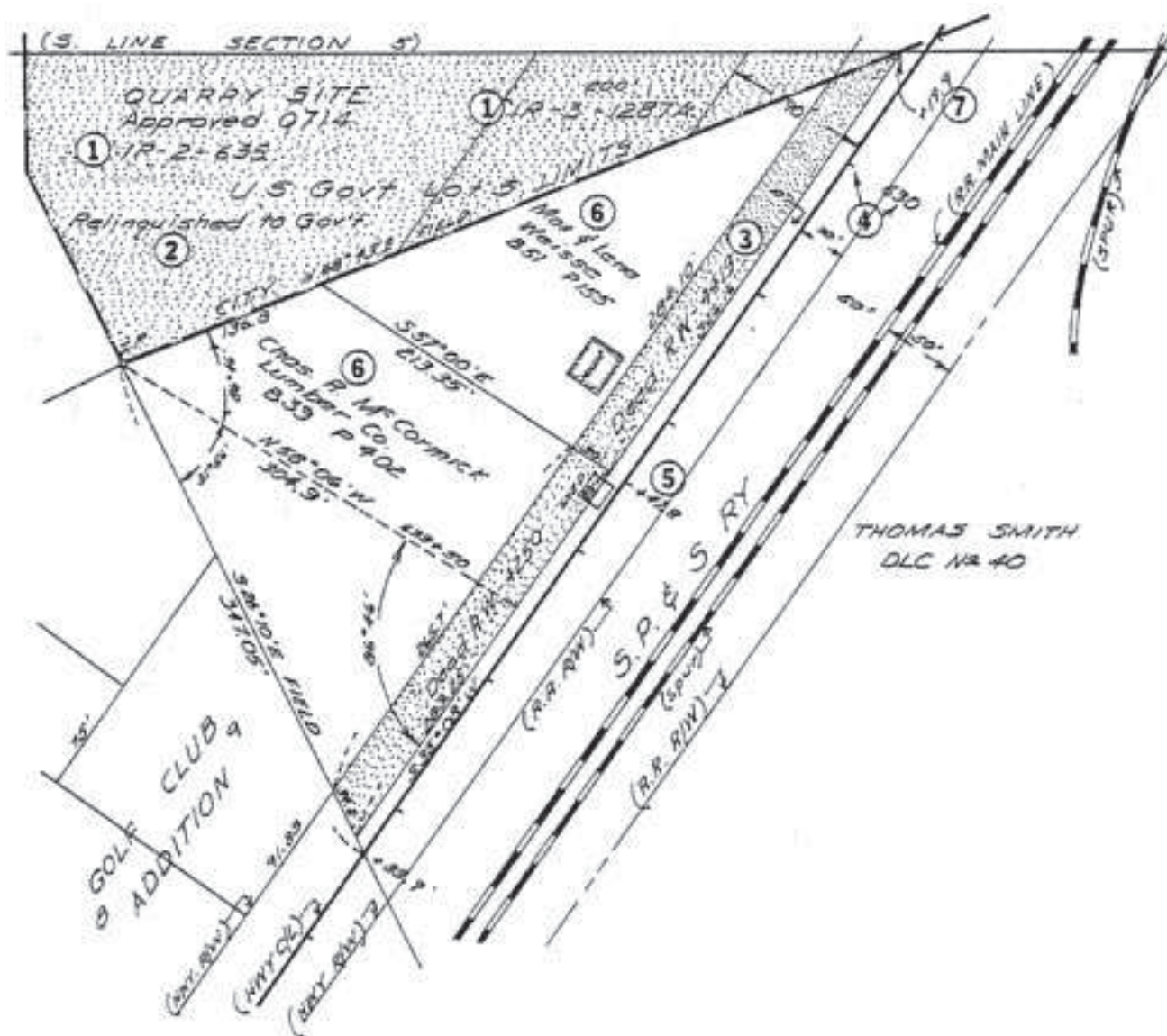


Figure 8-2

were constructed at a scale of 1"=400'. They are still an excellent source for cadastral data.

Highways are continually being realigned and the right-of-ways are constantly being widened. Therefore, it is good practice to always check with the Highway Division, before plotting a section of highway to see if your strip map is up-to-date.

Highway Centerline Stationing

The beginning point of a highway survey project is referred to as *station zero*, or 0+00. Beginning at station zero (see figure 8-3) *engineer stations* are measured at one hundred foot intervals. The first engineering station being 1+00 (one plus zero) or engineering station one. The next engineering station would be 2+00, or engineering station 2. (200 feet from station zero). The next 3+00, and so on. The plus sign (+) can be read as "hundred and". The + actually means that all points are measured from station zero.

If a point or line to be measured falls between an engineer station, it is assigned a plus *station*. (+55.6 in figure 8-3).

This is how a surveyor would assign engineering stations and plus stations to a traverse:

Starting point	= 0+00 (or station 0)
One-hundred feet from station zero	1 +00 (or station 1)
Two-hundred and ninety eight and eight tenths feet from station zero	= 2+98.8
One-thousand three-hundred and eighty-six feet from station zero	= 13+86

Some engineers and cartographers refer to the engineering and plus stations as just *stations*. Surveyors often refer to the stations as *taping stations*.

In figure 8-3 all stations are on a tangent. Therefore, they are called *points-on-tangent*; usually abbreviated P.O.T. Some highway draftsmen label only the plus stations with P.O.T. If any of the stations were on a curve, they would be labeled P.O.C. for *point-on-curve*.

There is really nothing complicated about highway stationing or station computations if you are *thorough and careful in examining the strip maps and making the computations*. There are, however, several pitfalls for the careless cartographer.

Problem Stationing

Figure 8-4 shows seven problem areas in highway stationing. Watch for them.

They can easily destroy hundreds of man-hours of plotting if not treated properly. Each problem is identified by a circled number. They are defined as:

1. Equation stations. Failure to identify these stations or failure to use them properly when making station computations.
2. Equation stations. Incorrect use of the equation station when plotting a traverse towards station zero.
3. Equation stations. Confusing data from other survey projects with the route survey data.
4. Abandoned route (or old route). Confusing old stationing of another route with the route survey data.
5. Computing P.I. to P.I. distances. A common, but serious, error; using P.I. to P.I. stationing to compute all P.I. to P.I. distances.

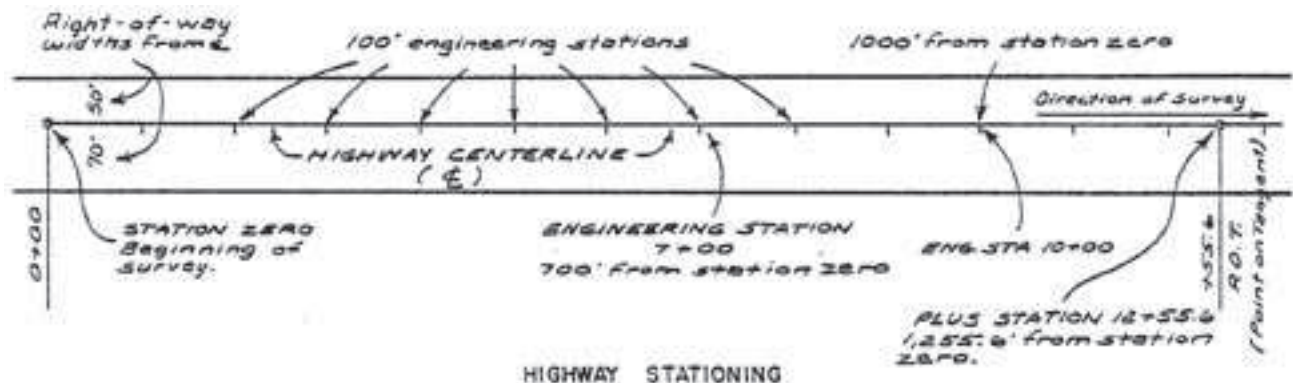


Figure 8-3

6. Property line stationing. Failure to correctly relate property line stationing to the centerline stationing.
7. Stationing involving short distances. Failure to identify or use *all* stationing when making computations.

The seven station computation problems have been costly to cadastral map projects (in tens of thousands of dollars). Problem 1, for example, was responsible for several thousand dollars of remapping one small town; the result of ignoring just four equation stations.

Equation Stations

Equation stations are established at points on a traverse where two or more route traverses meet (L48 + 05.54 = L2 201 + 58.29 of figure 8-4 and E.C. 22 + 02.01 = 28 + 40.10 BK = 29 + 10.2 Ah and END 49 + 96.14 = L3 0+00); or where a mathematical correction has been made to a traverse distance (equation station 28. + 40.10 BK 29 + 10.2 Ah).

Most equation stations are marked, as in figure 8-4, by the word "EQUATIONS"; so - there is little excuse for missing them. EQUATION means: *"the traverse stationing is being interrupted. This station is the new base for computations."*

The prevalent error in making station computations is the failure to identify the equation stations. Consider the computation of distance "N" of figure 8-4 (between P.O.T. 10+01.1 and P.C. 35+30.2). If the cartographer presumptuously assumes the distance N to be the difference between the value of plus station

10+01.1 and plus station 35+30.2, his computation will be:

$$\begin{array}{rclcl} \text{P.C.} & 35 & + & 30.2 & = & 3530.2' \\ \text{P.O.T.} & 10 & + & 01.1 & = & -1001.1 \\ & & & & & \hline \text{Distance N} & & & & = & 2529.1' \end{array}$$

The answer 2529.1 feet is incorrect. Had the cartographer been careful and included the equation station in the computations, the correct answer 2459' would have been the result. The computations would have been:

1. Compute distance N1; that is, the difference between plus station 10 + 01.1 and plus station 28 + 40.10.

$$\begin{array}{rclcl} 28 + 40 \text{ BK} & = & 2840.1 \\ \text{P.O.T. } 10 + 01.1 & = & -1001.1 \\ & & \hline \text{Distance N1} & = & 1839.0 \end{array}$$

NOTE: In equation stations, the letters BK mean "back in the direction of station zero." This identifies the sta-

tion to use to compute the distance to the previous station (towards station zero). The letters Ah mean "ahead in the direction of the survey" (or in the direction of stationing). This identifies the station to be used between this equation station and the next station or equation station of the traverse (from the direction of station zero).

2. Compute distance N2; that is, the difference between plus station 29 + 10.2 Ah and plus station P.C. 35 + 30.2.

$$\begin{array}{rclcl} \text{P.C. } 35 + 30.2 & = & 3530.2' \\ 29 + 10.2 \text{ Ah} & = & -2910.2' \\ & & \hline \text{Distance N2} & = & 620.0' \end{array}$$

3. Add distances N1 and N2.

$$\begin{array}{rclcl} \text{N1} & = & 1839.0' \\ + \text{N2} & = & 620.0' \\ & & \hline \text{N} & = & 2459.0' \end{array}$$

The difference between 2529.1' (the incorrect distance) and 2459.0' (the correct distance) is 70.1'. This is also the difference between the BK and Ah stationing.

$$\begin{array}{l} 29 + 10.2 \text{ Ah} - 28 + 40.1 \text{ BK} = 70.1' \\ 70.1' = \text{the error} \end{array}$$

The value of the difference might only amount to a hundredth of a foot, but the difference must still be considered in station computations. If ignored because the value seems insignificant, major errors will almost certainly occur somewhere along the traverse or somewhere in the analytical bridging process.

Large mapping errors have resulted from interpreting BK and Ah as meaning "back from the direction of plotting and ahead in the direction of plotting." When plotting in the same direction as the survey progressed, that interpretation will work. However, when plotting the traverse *towards station zero*, it can never work. Remember ... everything related to traverse stationing is in reference to the direction that the stationing is progressing.

Another problem associated with equation station computation stems from the careless use of equation station values. In figure 8-4 an abandoned section of highway is shown intersecting the project at approximately station 21 + 00. Usually intersecting stationing (of another route) are identified by a letter and numbers e.g., plus station L2 201 + 58.29 and station L3 0+00 of figure 8-4; L2 and L3 being the identifiers of the traverse. This also occurs where more than one survey line traverses a right-of-way. In the case of the abandoned route intersecting the survey (figure 8-4), its stationing was not so identified at equation 2. Instead, the draftsman merely tied the abandoned highway to the project by equating E.C. plus station 22 + 02.01 to the BK and Ah stations. This is a valuable

tie (possibly the only tie) to the abandoned highway (which should be plotted). But, if the cartographer carelessly uses this stationing to compute distance N1, it will create a 638.09-foot blunder.

$$\begin{array}{rcl} 22 + 02.01 \text{ E.C.} & = & 2202.01' \\ 10 + 01.10 \text{ P.O.T.} & = & -1001.10' \\ \hline \text{Answer} & = & 1200.91' \end{array}$$

The actual distance being 1839 feet - or

$$\begin{array}{rcl} 28 + 40.10 \text{ BK} & = & 2840.10' \\ 10 + 01.10 \text{ P.O.T.} & = & -1001.10' \\ \hline & = & 1839.00' \end{array}$$

Hence, the blunder is:

$$1839.00 - 1200.91 = 638.09'$$

Therefore, watch for stationing with a numerical value significantly different than that of the traverse. In the above example E.C. 22 + 02.01 was considerably lower than the BK and Ah stationing of equation 2; therefore, being subject to question. *If there is a question as to which station to use, a simple scaling of the strip map will usually provide an answer to the problem.*

Computing P.I. to P.I. Values

PRINCIPLE—"Stationing of a traverse is not interrupted by curves or angle points unless the angle

point or point on curve is an equation station." In other words stationing is numbered along the route (the curves and main tangents), not along external survey lines (the semi-tangents).

For every curve there is a point where the main tangents projected along semi-tangents meet. This point is called the *point of intersection* or the P.I. In figure 8-4 plus stations 38 + 30.2 and 43 + 49.64 are P.I. points (detailed in figure 8-5). It is not uncommon for the P.I.'s to be assigned stationing numbers. The inclusion of the P.I. stationing on strip maps is responsible for another major blunder cartographer use of the P.I. stationing to compute P.I. to P.I. distances.

For example, assume you are asked to compute the distance between P.I. stations 38 + 30.2 and 43 + 49.64. The solution seems simple - just find the difference between 38 + 30.2 and 43 + 49.64.

$$\begin{array}{rcl} \text{P.I. } 43 + 49.64 & = & 4,349.64' \\ \text{P.I. } 38 + 30.20 & = & -3,830.20' \\ \hline \text{P.I. - P.I. distance} & = & 519.44' \end{array}$$

If highway stationing were developed along semi-tangents, 519.44' would be the correct distance; however, highway stationing is not developed along external survey lines. Instead, the stationing runs on the route traverse and is developed along the curve as illustrated in figure 8-5. The correct method of computing the P.I. to P.I. distance is as follows.

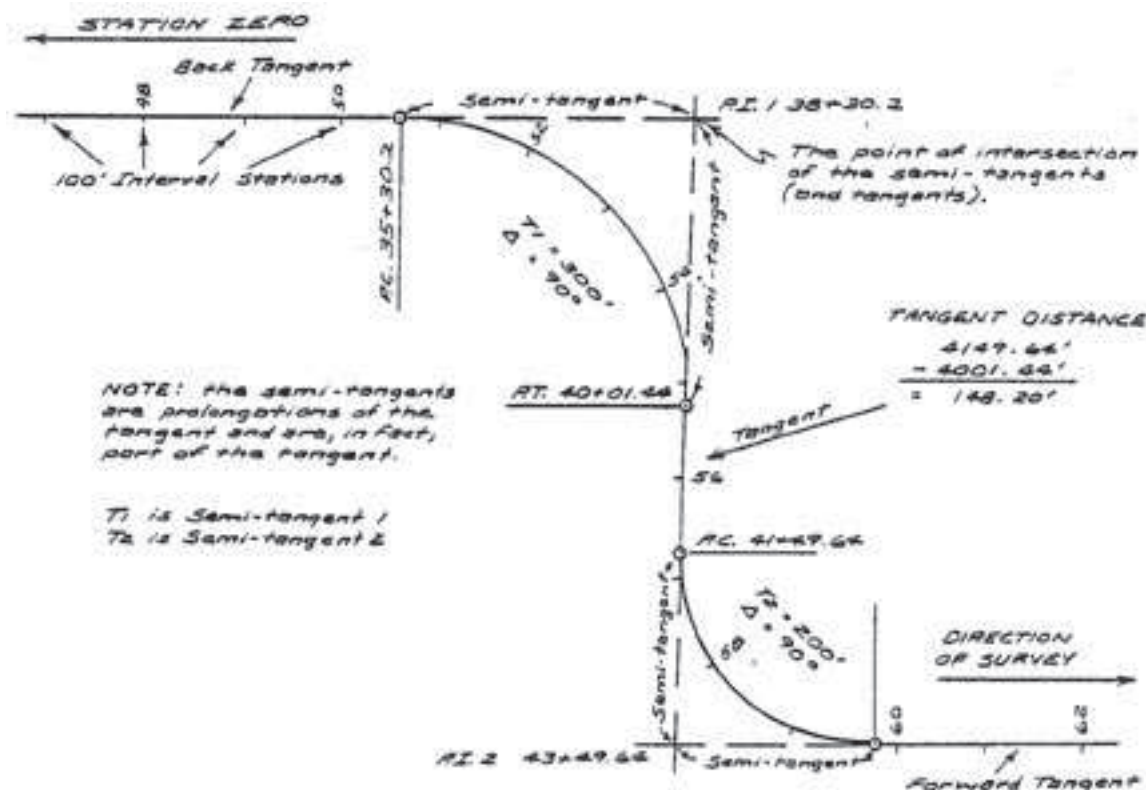


Figure 8-5

1. Compute the distance between P.T. 40 + 01.44 and P.C. 41 + 49.64.

$$\begin{array}{rcl}
 \text{P. C. 41 + 49.64} & = & 4,149.64' \\
 \text{P.T. 40 + 01.44} & = & \underline{- 4,001.44'} \\
 \text{Main Tangent Dist.} & = & 148.20'
 \end{array}$$

2. Add the above distance to the sum of T1 and T2:

$$\begin{array}{rcl}
 \text{T1} & = & 300.00 \\
 \text{T2} & = & \underline{+ 200.00} \\
 & = & 500.00 \\
 \text{P.T. to P.C.} & = & \underline{+ 148.20} \\
 \text{P.I. to P.I.} & = & 648.20 \text{ answer}
 \end{array}$$

The correct answer is therefore 648.20 feet. The value of the error was:

$$\begin{array}{rcl}
 \text{Correct P.I. to P.I. dist.} & = & 648.20 \\
 \text{Incorrect distance} & = & \underline{519.44} \\
 \text{Error in feet} & = & 128.76'
 \end{array}$$

The error would be more than sufficient to destroy the geometry of a cadastral map. Imagine the error that could accumulate, along a six-mile section of highway, by incorrect P.I. to P.I. computing.

Property Line Stationing

All right-of-way stationing is referenced to the centerline traverse; regardless of where the stationing is labeled or regardless of the location of the point of stationing. For example, problem No. 6 of figure 8-4: Is plus station 33 + 51.5 referenced to centerline point "A" (the point where the property line, extended, intersects the centerline traverse)? NOTE: *point A and point B would not actually be shown as circled points on a highway drawing.* The answer is NO! The stationing is referenced to centerline point "B"; the point on the centerline that is at right angles to the point where the property line intersects the right-of-way line. If the stationing had been referenced to point A, it would have been labeled as illustrated at point C.

At this point it is always advisable to check the highway drawing with an engineer scale because in rare instances the highway draftsman will not follow the standard procedures for labeling stations on the property lines.

NOTE: Remember, when you scale someone else's drawing there is always the possibility that the scaled drawing is in error; possibly the draftsman, cartographer or engineer was as confused about the survey data as you. Therefore, scaling should only be used as one step in solving plotting problems.

Stationing—Short Centerline Distances

It is not uncommon for cartographers to overlook short tangent distances between stations that are drawn so close together on the drawing that they pass for one station. For example, in figure 8-4 stations L2 188 + 01.88 and L2 188 + 13.0 are only 11.12' apart on a 1"=400' scale drawing. In this situation a cartographer might easily disregard one or the other station.

Although small values are involved, missing or ignoring these distances can create problems out of proportion to the size of the distance; especially when converting the traverse to coordinates.

Summary—Station Computations

Station computations are simple; in fact - elementary if you are careful in selecting and using the station values of strip maps. There are only two reasons for generating any of the blunders and mistakes we have discussed in this section: brain fade and incompetence.

Remember:

1. Analyze the strip maps carefully; note and mark potential, problem stations.
2. Watch for equation stations. Mark them with yellow or red so they won't be missed. If you are borrowing another agency's strip map or notes, list (don't mark) the equations.
3. Always use the equation in your computations (that is, where applicable). Take care in selecting and using the equation values.
4. Identify intersecting stationing from other surveys or other routes.
5. Stationing runs along the route centerline, therefore running along curve centerlines.
6. Do not use P.I. stationing in your computations - you do not need them.
7. If strip map stationing and values are confusing, or questionable, check distances on the strip map with your engineer's scale; however, take care in just how much reliance you place in scaling.
8. If you have a problem with station values, check to see if the highway draftsman transposed the station figures.
9. Check problems by recomputing curve values (semi-tangent, delta and central angle, curve length, etc.).
10. Check the field books.

11. Check your own computations. Are you using the correct formula or mathematical tables?

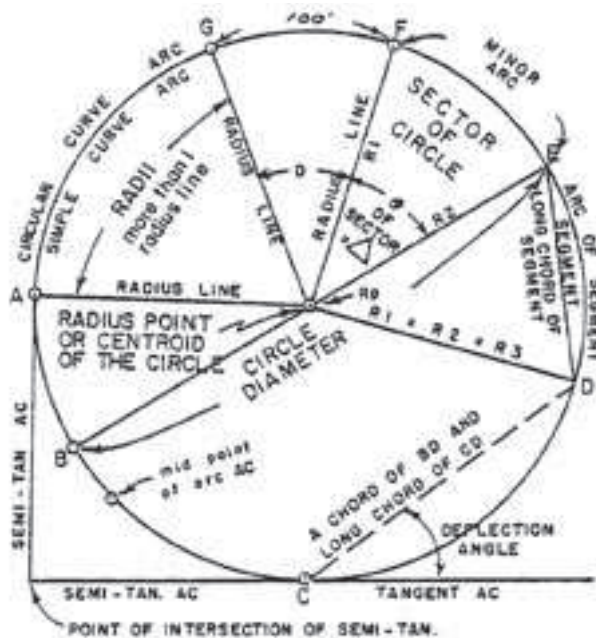


Figure 8-6

Highway Curves

The traverse of a highway consists of straight-line sections (tangents) connected to highway curves. Engineers classify the curves in two basic groups: The circular curve and the spiral. Sub classifications are (1) simple highway curve (or simple curve); (2) compound circular curve; (3) reverse circular curve; (4) transitional curve (one or more spirals compounded with one or more circular curves); and (5) compound transitional curves. One other curve must be considered in highway engineering: the vertical curve. This curve is used as a transitional curve to carry a vehicle through a change in grade. Examples of abrupt un-engineered vertical curves would be a bump or dip in the highway surface. In both cases the transitional areas are insufficient for smooth and safe driving. All of the curves present special problems to the surveyor and highway engineer. Likewise, all (except the vertical curve ³) present special problems to the cartographer, specifically, the problems related to the mathematics of the curves.

The Circular Curve

A circle is a closed curve of an equal radius distance from the center (or *centroid*) of its plane (flat) surface. The circle contains all the characteristics of a circular curve and some of the characteristics of a transitional curve. It will, therefore, be advantageous to learn the elements and definitions of the circle before attempting to tackle the curve formulae.

First, the geometric line (border) of the circle is known as the *arc* of the circle⁴. If the arc is of a semicircle (half a circle) or greater it is a *major arc*; but *if* it is less than a semicircle, it is called a *minor arc*⁵. In figure 8-6 arc EF is a minor arc; arc AGFED is a major arc. Most highway curves involve minor arcs, and in this chapter we will refer to all curve lines as just “arcs”.

The mathematical center (or centroid) of any circle is called the *radius point*. It is one of the important circle characteristics that control EVERY highway curve. Any straight line projected from the radius point to the arc is a *radius line*. Two or more radius lines of a circle are called *radii*. In figure 8-6 ARp, BRp, CRp, DRp, ERp, FRp, and GRp are radii. If the straight line runs from the arc, through the radius point and projected on to the arc it is called the circle's *diameter* (line BRpE of figure 8-6). Any portion of a circle bounded by two radii, that is less than a semicircle, is called a *sector* of a circle (ERpFE of figure 8-6).

A line joining any two points on the arc of a circle is a *chord* of that arc (straight line CD is a chord of arc BCD). A line joining the ends of the arc of a sector of a circle is called the *long chord* of the arc. How many chords can an arc have? The answer lies in the number of points that an arc can have. In mathematics, the arc of a circle has an infinite number of points. Therefore, the arc of the circle also has an infinite number of chords; so many, in fact, that the straight lines of the minute chords transform the arc into a series of short, straight lines. This is why circle arcs are often referred to as not actually curves, but rather as a series of straight lines (which becomes noticeably truer the shorter the chords are drawn)⁶. An understanding of the mathematics of chords will prove beneficial to the cartographer faced with the problem of plotting large scale, small degree curves with very large radii.

The area of the sector of a circle between the chord and arc of the circle is the *segment* of the sector; and therefore a segment of the circle.

Circles with the same radius point are *concentric circles*. Arcs with the same radius point (common in highway right-of-ways) are called *concentric arcs*. The *central angle* of a circle is an angle with its vertex (point) at the radius point and with two radii for sides. In highway engineering the central angle is usually represented by theta (θ); however, the delta sign (Δ) is usually shown because the total central angle is always equal to the delta angle. In figure 8-6, angle ARpB is a central angle. Remember, in the same circle equal central angles will have equal arcs; therefore, in the same circle equal arcs have equal central angles. Likewise, in the same circle equal chords will have equal arcs; and equal arcs will have equal chords. And, in the same circle, or in equal circles,

equal chords are equally distant from the radius point.

A straight line that is at right angles to a radius line at its outer extremity is called a *tangent*. It is at right angles to the radius at the point of contact. If the line is tangent to two circles it is a *common tangent*.

In highway engineering any part of the arc of a circle is referred to as a *circular curve*. It is used as all, or part of every basic highway curve. Where the entire curve is a circular curve it is called a *simple curve*.

The Simple Curve

The simple highway curve is an arc of the sector of a circle. It is always connected at each end by a tangent. The point at which the tangent ends and the arc begins (running in the direction with the traverse) is called the *point of curve*⁷; abbreviated P.C. The tangent to this point is called the *back main tangent* (see figure 8-7). The point at which the curve ends and the next tangent begins is called the *point of tangency*⁸; abbreviated P.T. The next tangent is the *main forward tangent*. If we project the back tangent forward and the forward tangent backward, they will intersect at a point called the *point of intersection*; abbreviated P.I. The back tangent projected forward to the P.I. is called the *back semi-tangent*. The forward tangent projected back to the P.I. is the *forward semi-tangent*. The straight line connecting the ends of the simple curve is the *long chord* of the curve. A straight line, or series of straight lines connecting any points of the arc are *chords of the curve*.

The distance between the P.I. and center of the arc is called the *external distance*. The distance between the center of the arc and the center of the chord is the *middle ordinate*.

The angle turned by the P.C. and P.T. radii is the *central angle*. The deflection angle of the main forward tangent turned from the main back tangent is the *delta angle* (figure 8-8). In all simple curves the value of the delta angle is always equal to the value of the central angle. The angle that the chord turns, from either the back or forward tangents, is referred to as the *deflection angle of the chord* (figure 8-8).

The distances from the P.C. to the P.I. and the P.T. to the P.I. are the *semi-tangent distances*; abbreviated T on strip maps. The semi-tangent distances of the simple curve are always equal.

The sharpness of any simple curve (or circular curve) is defined as the *degree of curve (D)* in highway surveying. This is the practice of most counties; however, some county road surveyors use the radius distance to designate the sharpness of the curve. Either method is acceptable. The definition for the degree of curve is known as the *arc definition*. All formulae in

this section are based on that definition, which is: *the degree of curve of the circular curve is the degree of the central angle subtended by an arc of 100 feet.*⁹

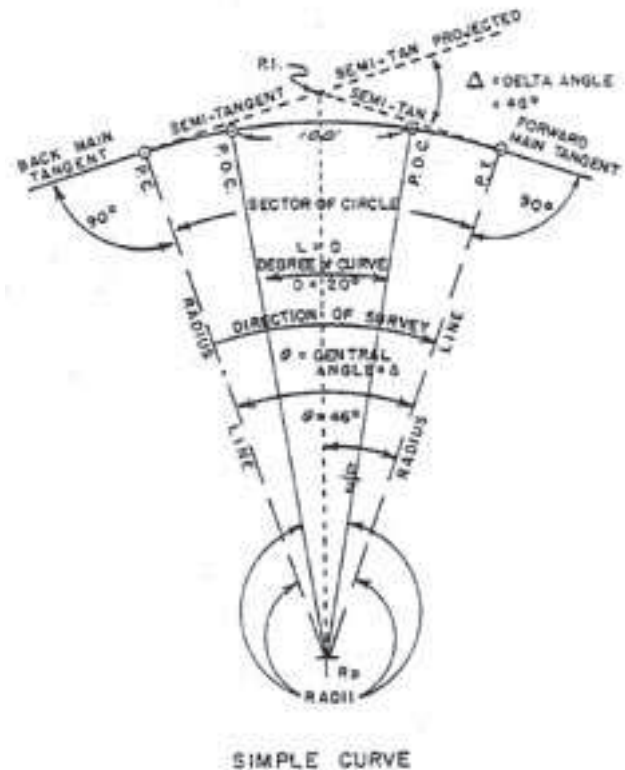


Figure 8-7

For example, in figure 8-7 the arc has two points marked P.O.C. (abbr. for point on curve) that are 100 feet apart (measured along the arc). In this example, the radii connecting the P.O.C.'s have a central angle (D) of 20°. The curve is therefore designated as a 200 curve; or, D = 20°. Mathematically, the arc definition is expressed as:¹⁰

$$D = \frac{5,729.578}{R}$$

therefore, if the radius of the curve was 154.853 feet, the degree of curve would be

$$D = \frac{5,729.578}{R} = 37^\circ$$

We can transpose the formula to use the degree of curve to find 'the radius'¹¹. Thus,

$$R = \frac{5,729.578}{D}$$

If the degree of curve is 00°30', the radius would be:

$$R = \frac{5,729.578}{00^\circ 30'} \text{ or } \frac{5,729.578}{0.5}$$

$$R = 11,459.156 \text{ feet}$$

To find the long chord of the simple curve use the formula:

$$LC = 2R \sin \frac{1}{2} \Delta$$

Using figure 8-8 as an example, the long chord of the 8° curve was computed as:

$$LC = (2 \times 716.20) \left(\frac{\sin 45^\circ 29'}{2} \right)$$

$$LC = 1,432.40 (\sin 22^\circ 44' 30'')$$

From a table of natural sines and cosines

$$\sin 22^\circ 44' 30'' = 0.38657683$$

therefore,

$$LC = (1,432.40)(0.38658) = 553.74'$$

The bearing of the long chord in figure 8-8 is computed by adding the value of the deflection angle to the bearing of the main tangent. The deflection angle would be:¹²

$$\frac{\Delta}{2} = 22^\circ 44' 30''$$

Add $\Delta/2$ to the bearing of the back main tangent:

$$\begin{array}{r} \text{N } 01^\circ 25' 00'' \text{ E} \\ + \quad 22^\circ 44' 30'' \\ \hline \text{N } 23^\circ 69' 30'' \text{ E} \end{array}$$

or, N 24°09'30" E = LC bearing.

This can be checked by using the deflection angle of the long chord from the forward main tangent.

$$\begin{array}{r} \text{N } 46^\circ 53' 60'' \text{ E} \\ - \quad 22^\circ 44' 30'' \\ \hline \text{N } 24^\circ 09' 30'' \text{ E} \end{array}$$

P.C. to P.T. points should be plotted via the P.I.; however, the long chord can be used to check the P.T. location.

The semi-tangent distance of a simple curve can be derived from the formula—

$$T = R \tan \frac{1}{2} \Delta$$

To compute the semi-tangent distance of the 8° curve of figure 8-8:

$$T = 716.20' \tan 22^\circ 44' 30''$$

or

$$T = (716.20)(.41916) = 300.20$$

Therefore, the distance from the P.C. to the P.I. is 300.20 feet and the distance from the P.I. to the P.T. is 300.20 feet.

The length of the arc (L) is computed using the equation:

$$\frac{L}{2\pi R} = \frac{\Delta}{360} \text{ or } L = \frac{2\pi R}{360} \Delta$$

For the example curve (figure 8-8) this would be: (show 45°29' as a decimal)

$$L = \frac{(2 \times 3.14) (716.20)}{360} \times 45.48;$$

$$L = \frac{4,497.74}{360} \times 45.48;$$

$$L = 568.21'$$

If the degree of curve is known, it is faster and more accurate to use:

$$L = \frac{100}{D} \Delta$$

In the above example L would be

$$L = \frac{100}{8} \times 45.48 = 568.50$$

$$L = \frac{4.548}{8} \times 568.50$$

Highway strip maps usually contain sufficient curve data for plotting; the curve formulae may therefore seem nonessential. But there is good rationale for learning the geometry and mathematics of curves. First, the highway data is not always correct; therefore, it becomes necessary to compute certain values to check the highway strip map. Second, it is common for deeds to describe property boundaries along only part of a curve. When this is the case, the formulae can be used to supply the values needed for accurate plotting. For example, suppose a deed defined a property corner as being: "N 1°25' E to the point of curve of an 8° curve right; thence 307.68 feet along the curve." We could roughly scale this point and possibly be close enough; but the sharper a curve gets, or the longer the distance on the curve, the greater the inaccuracy resulting from scaling along the arc. Therefore, in this example we can use the values given by the deed and the curve formula to establish the chord of the 307.68' arc.

To find our answer, we can use the curve length formula to find the central angle (Δ) of a 307.68' arc along an 8° curve.

$$L = \frac{100}{D} \Delta_1$$

transposing (because L & D are known)

$$\frac{LD}{100} = \Delta_1$$

or

$$\frac{307.68 * 8}{100} = 24.61$$

hence $\Delta_1 = 24^\circ 36' 36''$

Then we can use Δ_1 to find the chord of a 307.68' arc. We simply treat that arc as the total simple curve and compute $\Delta/2$ (the chord deflection angle) and

$$LC = 2R \sin \frac{1}{2} \Delta_1$$

the long chord. Therefore—

$$\frac{\Delta_1}{2} = 12^\circ 18' 18'' \text{ and}$$

$$LC = 2R \sin \frac{1}{2} \Delta_1 = 1432.40 (0.213116)$$

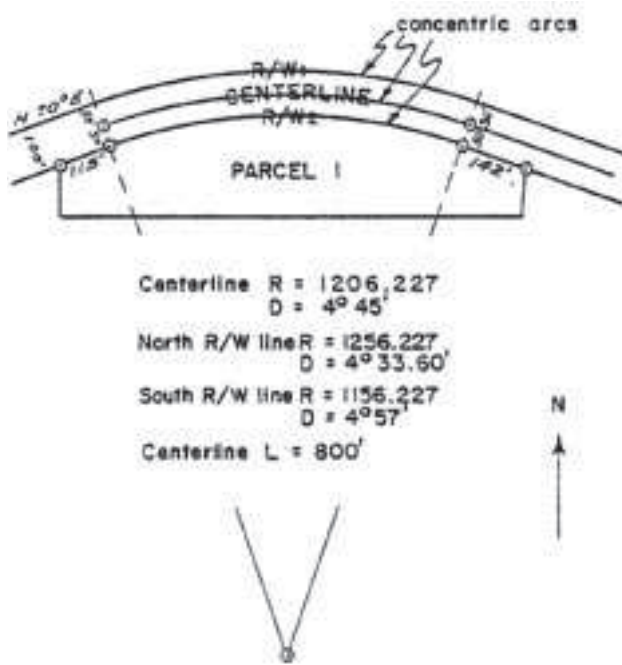


Figure 8-9

hence, the long chord distance is:

$$LC = 305.27'$$

The bearing of that chord would be:

$$\begin{array}{r} \text{N } 01^\circ 25' 00'' \text{ E} \\ - \quad 12^\circ 18' 18'' \\ \hline \text{N } 13^\circ 43' 18'' \text{ E} \end{array}$$

The other solution to that problem would be to compute the semi-tangent distance and delta angle of a 307.68' 8° curve. Or,

$$\begin{aligned} T &= R \tan \frac{1}{2} \Delta_1 = \\ &= (716.20) (\tan 12^\circ 18' 18'') \\ &= (716.20) (0.21813) = 156.22' \\ T &= 156.22' \end{aligned}$$

The bearing of the forward semi-tangent of the 307.68' arc would be:

$$\begin{array}{r} \text{N } 01^\circ 25' 00'' \text{ E} \\ \Delta_1 = \quad 24^\circ 36' 36'' \\ \hline \text{bearing } \text{N } 26^\circ 01' 36'' \text{ E} \end{array}$$

Subsequently, with a few simple calculations we can accurately pinpoint the termination of the 307.68' arc.

If the centerline traverse of a highway is 8°, concentric right-of-way lines cannot be 8°. If the right-of-way lines are concentric they must have the same point of symmetry as the centerline - the radius of the centerline arc. Hence, the radius distances of each right-of-way line are different from the radius of the centerline, and therefore the degree of curve of each line is different.

The centerline curve of the right-of-way in figure 8-9 is 4.75°. However, the north right-of-way line (R/W1) has a radius 50 feet longer than the centerline radius; therefore, the degree of curve is less than that of the centerline arc. The south right-of-way (R/W2) has a radius of 50 feet shorter than the centerline radius; therefore, the degree of curve of the south right-of-way is greater than the other two lines. This fact must be kept in mind when using curve formulae to compute right-of-way line values.

The underlying fee in most county roads is in the owners abutting the roads. This, however, is seldom true of State highways where the fee in the right-of-way is purchased by the State. In this case ownership, and subsequently deeds, run to the right-of-way line. Many deeds contain language that is supposed to relate to the right-of-way line, but in fact is based on centerline traverse values; i.e., in figure 8-9 parcel 1 runs to the south line of the state highway (fee in the 100 foot right-of-way is in the State). The party writing the deed apparently assumed the centerline values to pertain to the South R/W line as well because he wrote his description as:

"... to the south line of the Coast highway; thence N 70° E along sd. south line 115 feet to a 4°45' curve right; thence along the right-of-way curve 800 feet to the end of the curve; thence ..."

The fact is, the south right-of-way line curve was 4°57' and the length of that curve was 767.68 feet.

This is not a serious error because the intent is clear; but the description is incorrect. In other similar cases the wording has put a technical cloud on the title and has created serious cadastral mapping problems because the cartographer failed to relate the deed description to the highway centerline data.

Plotting the Route

Before any curves are plotted, the route tangents from P.I. to P.I. should be plotted and adjusted. This is accomplished by first locating the P.I. points by the N and E coordinates. If the strip map does not show P.I. coordinate values, they should be computed. Refer to Chapter 7 (Map Projection and Coordinates) and Chapter 9 (Map Computations) for information on coordinates and coordinate computations.

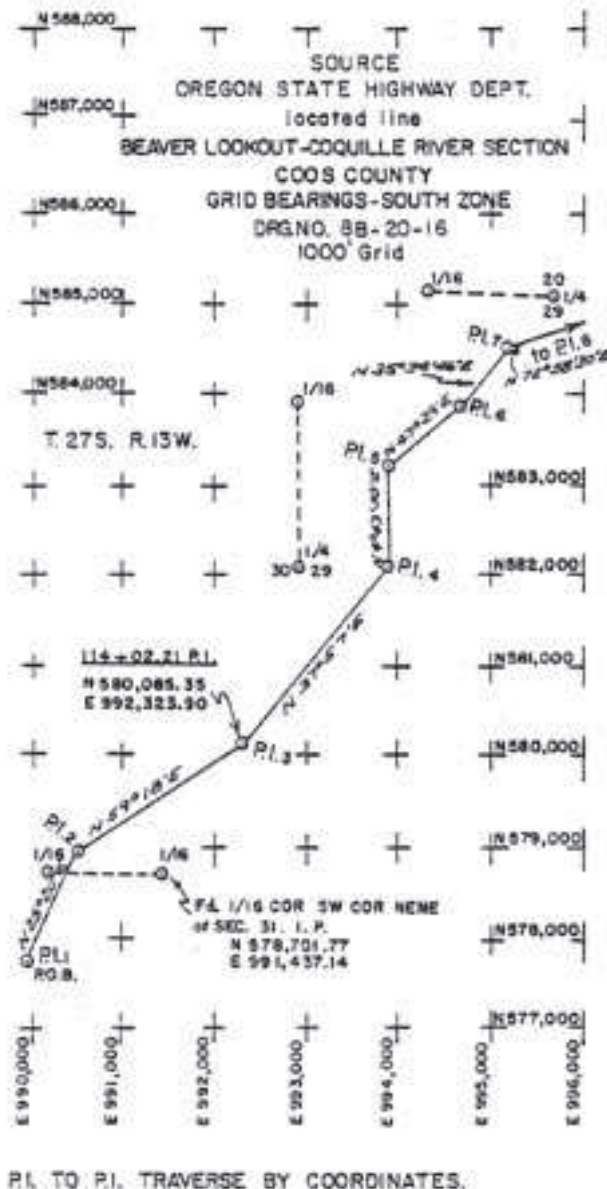


Figure 8-10

Figure 8-10 illustrates a P.I. to P.I. traverse plotted by coordinates. First, a grid must be plotted and checked on the control map (see Chapter on Basic Map Control); in this example the grid is 1,000 feet. The grid values are based on the grid of the highway strip map. To locate a point, such as P.I.3, measure the north (N) coordinate value from the nearest grid line. For P.I.3 this would be 85.35 feet north of grid line N 580,000. Then measure the east (E) coordinate value from the nearest east grid line. For P.I.3 this would be 323.90 feet east of E 992,000. The grid values for P.I.1 to P.I.8 (off the illustration) are:

P.I.1 80 + 97.55 P.O.B.	N.577,789.56
	E.989,915-12
P.I.2 92 + 82.68	N.577,789.56
	E.990,485.10
P.I.3 114 + 02.21	N.580,085.35
	E.992,323.90
P.I.4 139 + 42.10	N.582,094.91
	E.993,891.12
P.I.5 150 + 62.10	N.583,222.01
	E.993,985.93
P.I.7 168 + 33.33	N.584,550.87
	E.995,180.54
P.I.8 181 + 48.21 (Not in Fig. 8-10)	N.584,953.98
	E.996,497.00

Figure 8-10 shows four 1/16 section corners, and two 1/4 corners that were found and tied to the route, by coordinates, on the highway strip map. Not shown in figure 8-10, but shown on the strip map, were 3 additional ties to property corners. This is the type of information that must be used to check the alignment of the traverse. Other alignment checks are intersections with major transmission line easements (such as BPA lines), railroads, county roads, triangulation stations and other highway routes.

The bearings on the strip map were based on the South Zone of the Oregon Coordinate System. By orienting your drafting machine to the grid, the traverse bearings can be used to check the points plotted by coordinates. When noted on the cadastral map, the bearings should be accompanied by the note "(O.C.S. GRID)". See Chapter 2.

If the traverse does not tie to supporting data and control, check the traverse computations; check the

coordinate computations; check your computations; but most of all *check the accuracy of your plotting* (this is where the problem usually originates). Finally, re-check the plotting of your grid points and review the supporting data for errors.

Plotting The Simple Curve

Once you are satisfied with the highway alignment, the curves can be plotted. The procedure for plotting a simple curve begins with the location of the P.I. points; The remaining steps are described as:

1. From the P.I., measure along the back semi-tangent, the T distance, to the P.C. (point of curve);

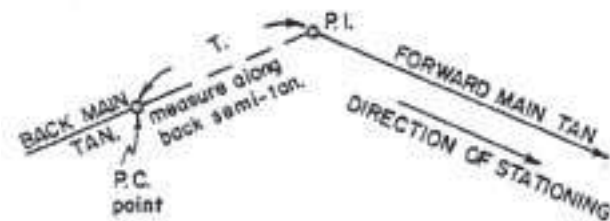


Figure 8-11

2. From the P.I., measure along the forward semi-tangent, the T distance, to the P.T. (point of tangency).

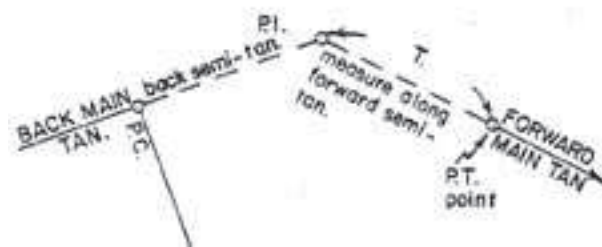


Figure 8-12

If you want to check the P.C. and P.T. locations, use the long chord distance and deflection angle. If the long chord fails to tie the ends of the curve together, check your measurements from the P.I.; check the delta angle of the curve; and Finally, check all curve computations and data - possibly the strip map is in error.

3. Locate the radius point (R). The radius point is at right angles to the P.C. and P.T. Simply turn a 90° angle right from the point of curve (P.C.) and draw a line from the P.C. to the radius point. If the point is located accurately it will be at right angles to both ends of the curve (figure 8-13).

You can also locate the radius point with a drafting compass by setting the compass pencil point the radius distance from the compass needle point; positioning the needle point at the P.C. and drawing an arc that will swing through the general location of the radius point. Position the needle point at P.T. and draw an arc that intersects

the arc located from the P.C. The intersection of the two arcs is the radius point (figure 8-13).

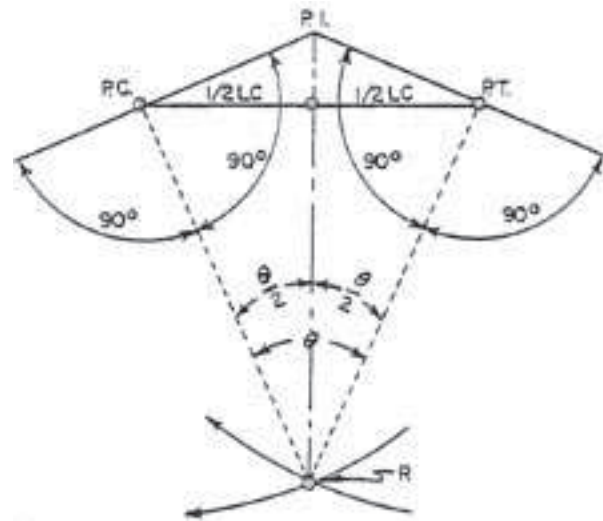


Figure 8-13

If the radius point is correct, the line from the P.I. to the radius point will bisect (divide into two equal parts) the long chord (LC).

4. Leave the compass set at the radius value and position the drafting compass needle point on the radius point. With the compass pencil point swing the centerline arc from P.C. to P.T. (figure 8-14).
5. If the curve has concentric right-of-way lines (that is, having the same radius point and being parallel) leave the compass needle point at R; set the pencil point at R W1 (figure 8-14) and swing the arc; then set the pencil point at R W2 and swing the outside arc.

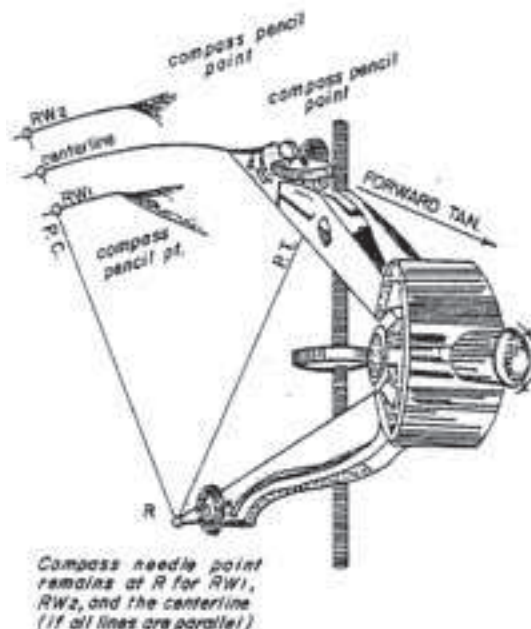


Figure 8-14

After the curve right-of-way lines are plotted, the main tangent right-of-way lines can be plotted.

It is always advisable to circle the end points of the curve on the centerline traverse and the right-of-way line (as in figure 8-14). This will mark the exact points where the curve ends and the tangents begin.

Always supply sufficient curve data to tile cadastral map to reconstruct the curve. This will prove beneficial to map maintenance and it will show that the curve was constructed from official survey data. Remember, today you will have little trouble locating the strip map information, but in the future the source data may be difficult to find.

Plotting Large Radius Curves

Every cartographer eventually encounters a curve with a radius too large to be constructed with the drafting compass, beam compass or highway curve template. The curve must be plotted, but without the aid of the usual drafting equipment. The fact is, in this situation the cartographer is at the mercy of curve geometry and mathematics. For example, consider the curve of figure 8-15.

The curve, alone, will extend over 4.6 feet across the drafting table. The radius point lies two feet off the table; no matter, however, because the cartographer's largest beam compass is only 24 inches. The largest highway curve template is only 14 inches long - too short to plot the entire 48' arc.

From the discussion on chords, the arc of any simple curve has an infinite number of points that can be connected by secant lines. Therefore, any number of chords can be used to intersect any length of arc. In this example the chords can be used to establish intermediate points on the curve that will allow use of the highway curve template. If the template is 14 inches long, points on the curve (P.O.Cs) 12 inches

apart should do the trick (in scale this will be 1,200 feet). The scale, size of drafting, table, and capabilities of the drafting equipment usually govern the procedures and might allow for a different solution to a problem. However, the following step by step procedures will work for *every* simple curve.

1. Plot the main tangents, P.C., P.T. and P.I.

2. Compute the long chord.

$$LC = 2R \sin \frac{1}{2} \Delta$$

$$LC = (14323-94) 0.38657683$$

$$LC = 5537.3048$$

3. Compute the bearing of the long chord

$$N \quad 67^{\circ}00'00'' \quad E \text{ (back main tan)}$$

$$22^{\circ}44'30'' \quad (\Delta/2)$$

$$N \quad 89^{\circ}44'30'' \quad E \text{ bearing of L.C.}$$

4. Plot the long chord to check P.C. and P.T. locations. *Always advisable when plotting a large curve.*

5. Compute the middle ordinate (M in figure 8-16) using the formula:

$$M = R (1 \cos \frac{1}{2} \Delta)$$

or

$$M = R \text{ vers } \frac{1}{2} \Delta$$

NOTE.- "Vers" is an abbreviation for "versed-sine" meaning "1 minus the cosine of an angle." Therefore to find "vers ; $\frac{1}{2} \Delta$ " find the cosine of $22^{\circ}44'30''$ and subtract it from 1 (or $1 - 0.92225721$).

$$M = (7161.972) .07774279$$

$$M = 556-7916 \text{ or, } 556.79 \text{ ft.}$$

7. On a line from the P.I. to the midpoint of the long chord, scale 556.79 from the long chord towards the P.I. The point you have established is the midpoint of the simple curve arc.

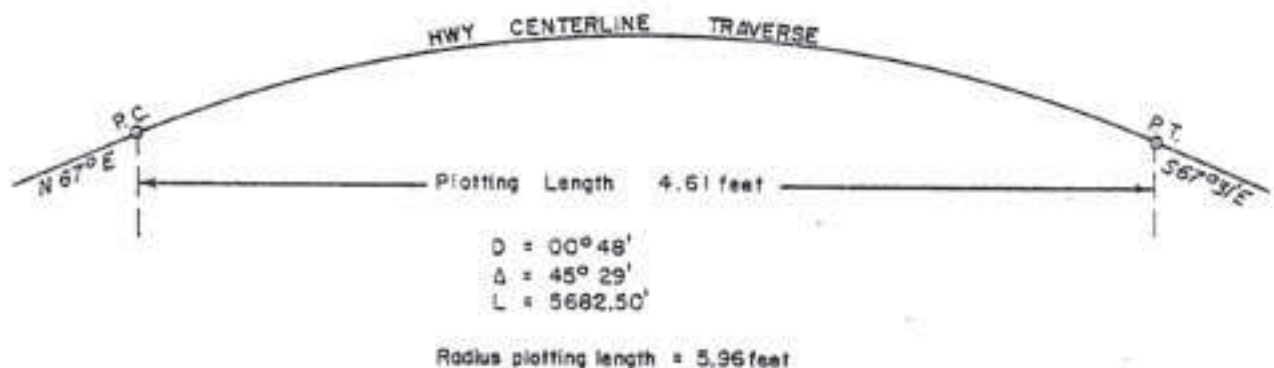


Figure 8-15

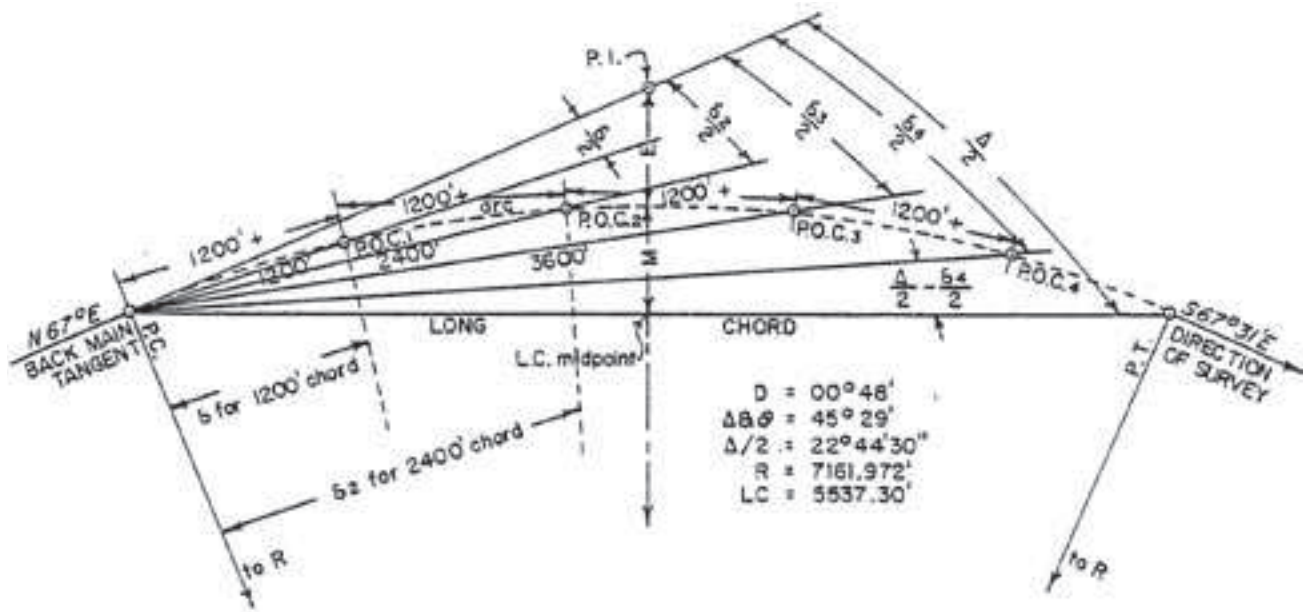


Figure 8-16

To check that point you can use the formula

$$E = R \operatorname{exsec} \frac{1}{2} \Delta$$

to compute the external distance (E in figure 8-16).

NOTE: "exsec" is an abbreviation for "exsecant" meaning "secant of the angle minus 1"; in trigonometry this is expressed as:

$$\operatorname{exsecant} A = \operatorname{exsec} A = \sec A - 1$$

The formula for any chord of a simple curve is:

$$C (\text{any chord}) = 2R \sin \frac{1}{2} \delta$$

NOTE- In this formula, " δ " is the Greek script symbol for Delta. Whereas the Greek symbol Δ represents the Delta angle of the entire simple curve, the script symbol δ represents the Delta angle of any part of the curve; i.e., for the first 1200' chord in figure 8-16.

8. To use the chord formula it will be necessary to establish δ . Transposing the above formula:

$$\frac{C}{2R} = \sin \frac{1}{2} \delta$$

or

$$\frac{1200}{14323.94} = \sin \frac{1}{2} \delta$$

subsequently

$$\sin \frac{\delta}{2} = .083775$$

From a table of natural sines and cosines, .083775 is the sine of $4^{\circ}48'20''$.

hence, the deflection angle is

$$\frac{\delta}{2} = 4^{\circ}48'20''$$

9. Use the deflection angle to find the bearing of, the first chord.

$$\begin{array}{rcl} \text{N } 67^{\circ}00'00'' \text{ E (back main tan)} & & \\ \underline{4^{\circ}48'20'' (\delta/2)} & & \\ \text{N } 71^{\circ}48'20'' \text{ E chord 1 bearing} & & \end{array}$$

this is the bearing from the P.C. to P.O.C.1 in figure 8-16.

10. Plot the 1200 ft. chord on the bearing N $71^{\circ}48'20''$ E.
11. The next chord, P.C. to P.O.C.2 can be 2400' (24" on the drawing). Compute the deflection angle and bearing of the second chord.

$$\frac{2400''}{14323.94} = \frac{1}{2} \delta_2 = .167551$$

$$.167551 = 9^{\circ}38'44'' = \frac{\delta_2}{2}$$

$$\begin{array}{rcl} \text{N } 67^{\circ}00'00'' \text{ E (back main tan)} & & \\ \underline{9^{\circ}38'44'' (\delta/2)} & & \\ \text{N } 76^{\circ}38'44'' \text{ E chord 1 bearing} & & \end{array}$$

12. Plot the 2400 ft. chord on the bearing N $76^{\circ}38'44''$ E from P.C. to P.O.C.2.

At- P.O.C-2 we should be 2410.59.' (measured on the arc) from the P.C; 24.11" on the drawing. The length of the arc of this segment is found using the formula:

$$L = \frac{100}{D} \delta$$

13. If we make our third chord 3600' (or 36" on the drawing) the curve template will still connect the P.O.C.s. Using 3600', compute the deflection angle and bearing of the third chord.
14. Plot the 3600 ft. chord from P.C. to P.O.C.3.
15. The last chord can be 4800 feet. Compute the deflection angle and bearing of chord P.C. -P.O.C.4.
16. Plot chord P.C. - P.O.C.4.
17. If you desire more points, the 15 steps can be used, but working from P.T. towards P.C. The only difference in your computations will be that of basing the chord bearings on the forward tangent instead of the back tangent.
18. Use the highway curve template to draw the simple curve between the P.O.C.s.

Curve Right-of-Way Line Variations

Figure 8-14 illustrates a simple curve with parallel, concentric right-of-way lines (RW1 and RW2) that are at the same distance from the traverse as the tangent right-of-way lines. This is representative of most highway simple curves on relatively flat terrain. When the terrain requires wide cuts and fills, right-of-way lines are adjusted to include the necessary land to construct the highway, figures 8-17 to 8-20 typify the resulting right-of-way variations.

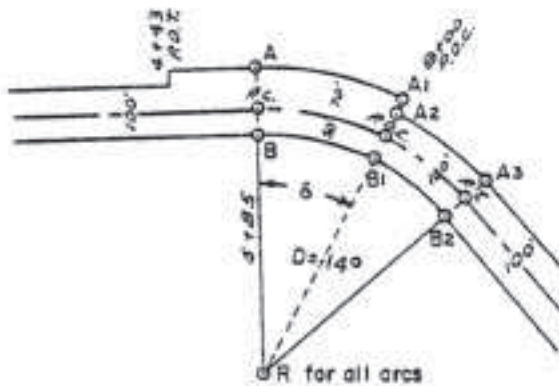


Figure 8-17

The example of figure 8-17 presents the problem of locating point A1 on the radius line through P.O.C. station 8 (8+00). The solution to the problem is to locate centerline engineer station 8 and draw a radius line through station 8, A2 and to A1; 70 feet from the traverse to the right-of-way line. To do this it is necessary to compute δ (figure 8-17). Use the formula:

$$\delta = \frac{s}{R}$$

where: δ = central angle of P.C. to P.O.C. 8 + 00 in radians¹⁴

s = the length of arc P.C. to P.O.C. 8 + 00 (215 feet)

R = the radius (409.26' from table 14 in the: appendix).

therefore

$$\delta = \frac{s}{R} = \frac{215}{409.26'} = .525338$$

$$\text{or } \delta = .53 \text{ radians}$$

From conversion table 1 in the appendix - to convert radians to degrees, multiply by the factor 57.29578

hence

$$\delta = 57.29578 (.53) = 30.366763$$

$$\text{or } \delta = 30.37^\circ = 30^\circ 22'$$

From P.C. station 5 + 85 turn a central angle of $30^\circ 22'$ and draw a line from the radius point to the outside right-of-way. At the centerline this will be P.O.C. station 8; at 50 feet from the centerline, point A2; and at 70 feet from the centerline, point A1.

Another method of establishing P.O.C. engineering station 8 would be by chord and deflection angle of P.C. to station 8.

The curve in figure 8-18 is easy if you remember that each of the simple curves, 1, 2 and 3, are concentric (have the same radius point).

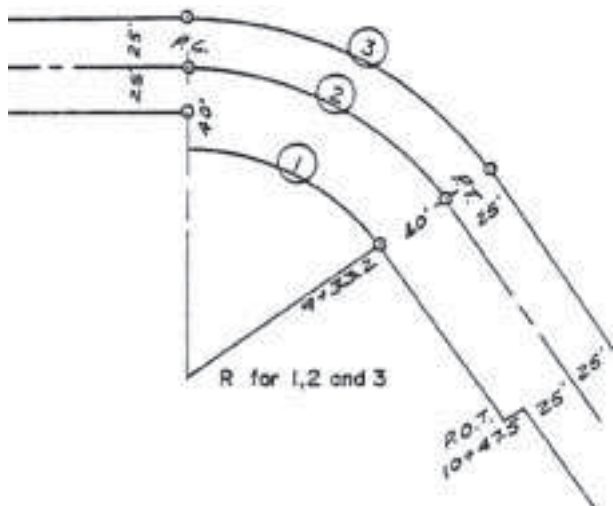


Figure 8-18

Right-of-way lines do not always run parallel to the center line traverse; the right-of-way in figure 8-19 is a typical example. In many cases highways divide

land ownership in such a manner as to create odd-shaped parcels that are isolated from the main parcel of land (parcel 2 in figure 8-19). Often these are totally useless to the grantor of the right-of-way; therefore, they are purchased by the state and included as part of the route right-of-way.

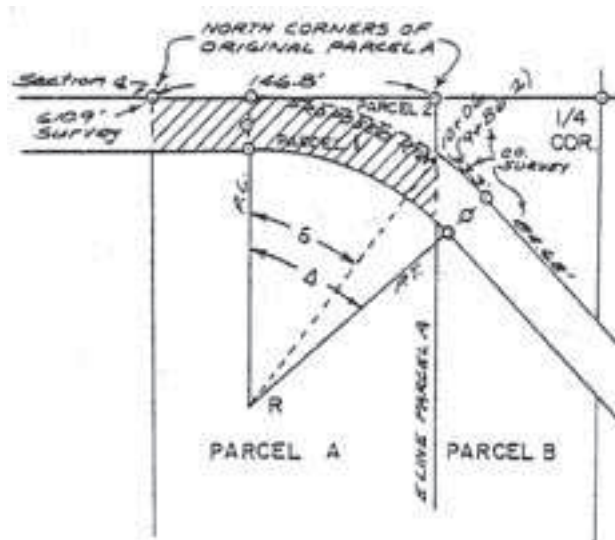


Figure 8-19

The right-of-way in figure 8-19 can create mapping problems. For example, the strip map indicates a tie to the east line of parcel A at station 10 + 06. However, a recent private survey of parcel B and other reliable survey data, makes it impossible to close on plus station 10 + 06. Instead, the line falls at station 9 + 86.2 (by survey). The first step toward solving this problem is to check the P.I. to P.I. plotting and ties. Then it is advisable to check the cadastral surveys. If everything checks and closes, except the strip map property-line stationing, it is best to ignore that stationing. It is not uncommon for property line stationing to be approximated because not all abutting properties are tied to in the route survey process. Route surveys are expensive; the cost of high order survey ties to each intersected property line would be prohibitive. You will, therefore, find that route station ties in the right-of-way deeds are also only approximate. For example, the following is that part of a right-of-way deed description that refers to the stationing:

" . . . from approximately Highway Engineers' Station 4 + 00 on said connection to the easterly right-of-way boundary of the relocated Oregon Coast Highway approximately opposite relocated Highway Engineers' Station 1359 + 80, and lying in. . . "

The right-of-way in figure 8-20 is typical of highways paralleling railroad right-of-ways. In such cases the State only purchases an easement to part of the railroad right-of-way. The same is true of highway-railway intersections; the railroad company usually retains fee in the intersection land.

The tie to the railroad route survey is noted at the equation station. You will note that both the highway and railroad engineer stations are in hundredths; therefore, there is an excellent possibility that the tie to the railroad is reliable. Moreover, it could be an important reference point for analytical bridging.

The P.O.C. in figure 8-20 can be tied to the P.C. (or P.T.) by using the procedures for the curve of figure 8-17.

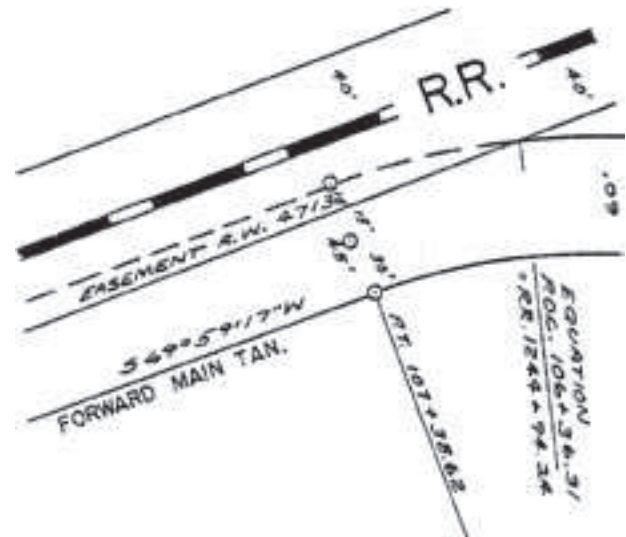


Figure 8-20

Compound Circular Curves

Compound circular curves are actually a series of two or more abutting simple curves turning in the same direction. If one of the abutting curves turns in the opposite direction it is a reverse circular curve.

All of the circular curve principles and simple curve formulae apply to the compound circular curve. The elements applying strictly to the compound curves are as follows:

Compound circular curves have common points of tangent; there are no main tangents between one end of the first simple curve part and the beginning end of the next simple curve part of the compound circular curve (see figure 8-21). In a compound circular curve with two simple curve arcs there will be two radius points, two P.I. points, six semi-tangents, three delta angles, two long chords, two central angles and two main tangents as illustrated in figure 8-22.

In figure 8-22, the radius line R_1 P.C.C. is common to both simple curves at R_2 to P.C.C. Subsequently, once the P.C.C. (point of compound curve) and one radius point is located, the other radius point can be established (on either line P.C.C. R_1 or on a prolongation of line P.C.C. R_2).

When plotting a traverse the P.I.s of the compound curve can be used for P.I. to P.I. plotting; however,

better control can be obtained by using the vertex (V) of the total compound curve for either V to V or P.I. to V traverse plotting. This is especially important when computing for coordinate plotting. In figure 8-22 T_4 is the distance from P.C. to V and t_4 is the distance from P.I.1 to V. The formula for T_4 is:

$$T_4 = t_4 + T_1$$

and the formula for t_4 is:

$$t_4 = \sin \Delta_2 \frac{T_1 + T_2}{\sin \Delta}$$

T_1 and T_2 , the semi-tangents of each simple curve part of the compound curve, will usually be given on the strip map; however, if not given use the formula

$$T_1 = R_2 \tan \frac{\Delta_1}{2}$$

for the first curve; and

$$T_2 = R_2 \tan \frac{\Delta_2}{2}$$

for the second curve.

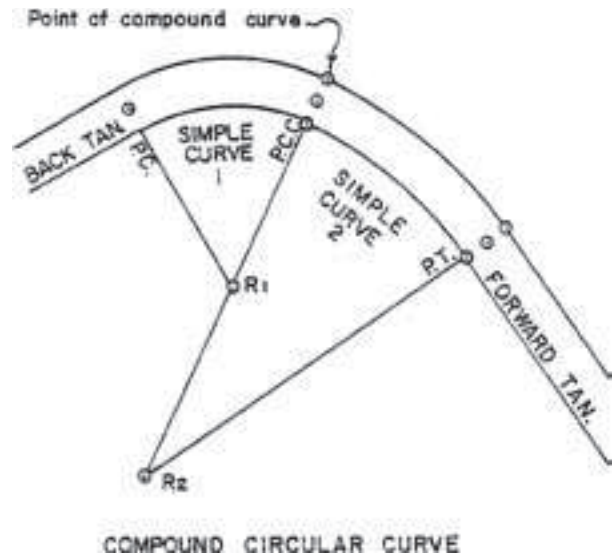


Figure 8-21

Where:

T_1	=	474.65'
Δ_2	=	50°
$\sin 50^\circ$	=	.766444
T_2	=	194.31'
$\sin 95^\circ$	=	.996169
Δ_1	=	45°
$\sin 45^\circ$	=	.707107

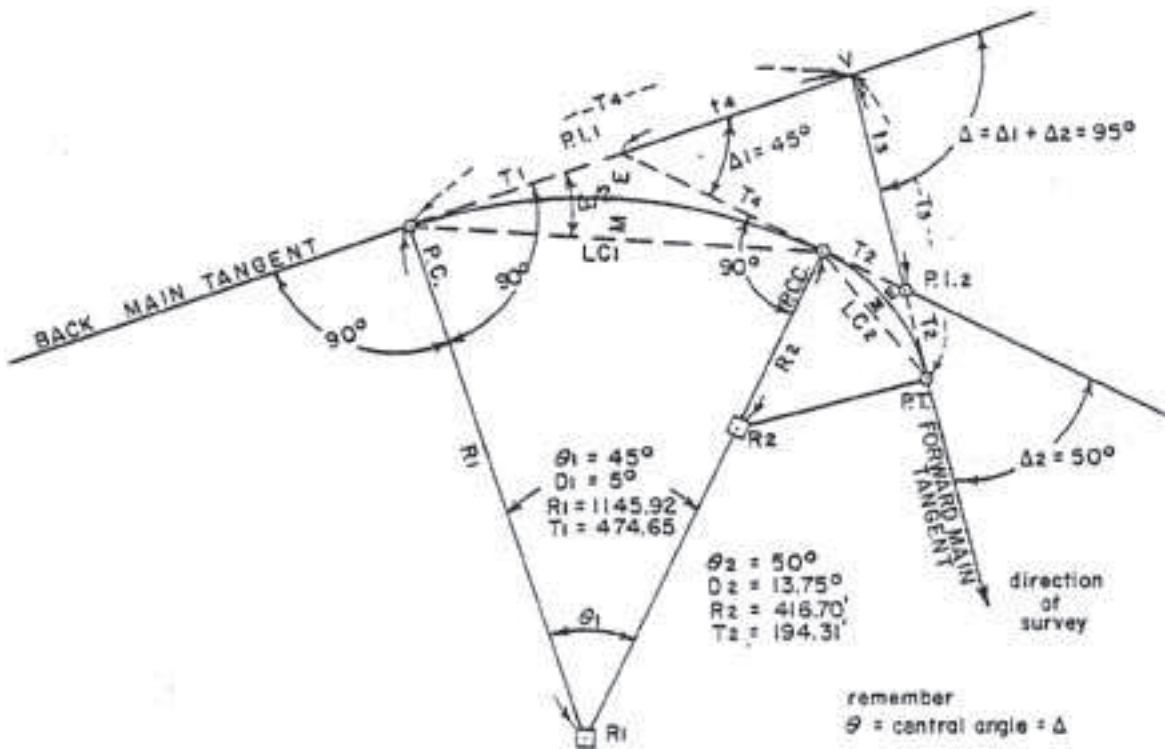


Figure 8-22

T₄ would be computed as:

$$t_4 = .766444 \frac{474.65 + 194.31}{.996169}$$

and

$$T_4 = t_4 + T_1 = 989.34'$$

therefore, T₃ is computed using the formula

$$T_3 = t_3 + T_2$$

and

$$t_3 = \sin \Delta_1 \frac{T_1 + T_2}{\sin \Delta}$$

hence

$$t_3 = .707107 \frac{668.96}{.996169} = 474.84'$$

and

$$T_3 = 474 + 194.31 = 669.15'$$

So, the P.C. to V distance is 989.34 feet and the V to P.T. distance is 669.15'. Once V has been plotted, locate the P.C. and P.T., P.I.1, and P.I.2, P.C.C., R₁, and R₂ points and plot the curve arc as explained for simple curves. Also, the concentric right-of-way lines would be plotted as explained in the subsection on simple curves.

Reverse Circular Curves

The curve in fig. 8-23 is a type of circular curve called a *reverse circular curve*.¹⁵ It is nothing more than two abutting simple curves each turning in the opposite direction from the other. Therefore, all of the circular curve elements and principles and simple curve rules and formulae apply to the reverse circular curve.

The main element of the reverse circular curve is that there are no main (forward or back) tangents between the curves. As figure 8-23 demonstrates, the end of the first simple curve is the beginning of the second reverse simple curve; the point common to each simple curve element being the point of *reverse curve* (abbrev. P.R.C.). The other element unique to the simple curve is that the first radius line of the second simple reverse curve is a prolongation of the last radius line of the first simple reverse curve; each line being 180° from the other. The reverse circular curve has two elements of the compound curve. First, the simple curves abut. Second, the forward semi-tangent of the first curve is on the same bearing as the back semi-tangent of the second curve; each being a prolongation of the other.

The reverse circular curve is plotted as two simple curves. After the traverse and P.I.s are located, establish the P.C., P.R.C., P.T. and radius points. The arc of each curve is plotted exactly as explained for simple curves.

Concentric right-of-way lines are plotted using the same procedure as simple curve right-of-ways.

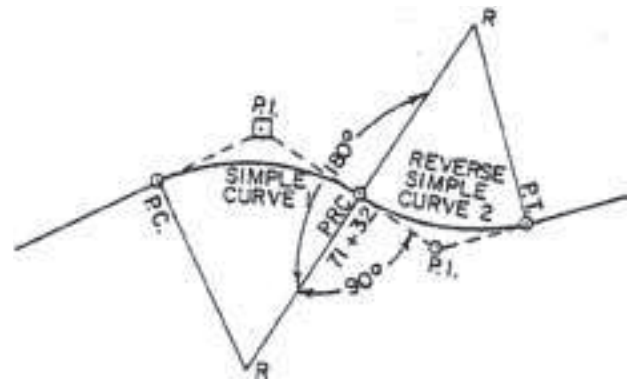


Figure 8-23

Simple Curves in Reverse

For a **curve to be a reverse circular curve**, the simple curves must abut. If adjacent simple curves are turning in reverse directions from each other, but a main tangent lies between the curves (no matter how small the distance between the curves), they are not a reverse circular curve. The curves are merely adjacent simple curves in reverse. For example, the curve in figure 8-24 appears to be a reverse simple curve.

However, the curve stationing and labeling show that there is a 7.8 foot main tangent between the curves; they are therefore, two simple curves in reverse.

The Standard Highway Spiral

Early Oregon highways were designed with the theory that tangents should always be connected by simple curves. This practice was in contradiction to the theory of centrifugal force. In effect, a car entering a sharp radius simple curve at a constant reasonable speed (say 50 mph) could not maintain that speed and remain centered in the proper lane of traffic because centrifugal force would tend to make the rotating vehicle move away from the center of rotation (the radius of the curve). The centrifugal force relationship to the radius of the curve (the key relationship in the design of any curve) is:

$$R = \frac{Mv^2}{F} \text{ or } F = \frac{Mv^2}{R}$$

Where M is the mass of the vehicle, v is velocity in mph and R is the radius. Some engineers rely on the formula

$$R = 0.258 v^2$$

to compute the necessary radius of the simple curve. In this formula 0.258 is a constant based on maximum super-elevation, tire friction and the pull of gravity. Regardless of design, much of the safety of the simple curve is still dependent on the driver to balance the centrifugal force. This is done by, gradually accelerating (increasing velocity) in a forward direction, and reduc-

On a high-speed highway the lanes of travel would have to be exceptionally wide to provide enough room for a driver to maneuver a simple curve; super-elevation has its limits as does the driver's ability to balance the centrifugal force. To make a curve safe, a transitional curve must be placed between the tangent and the circular curve. This provides the distance and slowly decreasing radius curve that is necessary to balance centrifugal forces. In highway engineering this type of curve is known as a transitional *curve* or spiral curve.

The curve of figure 8-25 is the type of spiral most often used in the highway engineering. It has one central simple curve that connects two spirals; each spiral being equal in length, equal in the increase in degree of curve per station on the spiral (a), and equal in central angles of the spiral (s).

$T\Delta$, in figure 8-25, is the total *central angle of the curve* (from P.S. to P.T.); or:

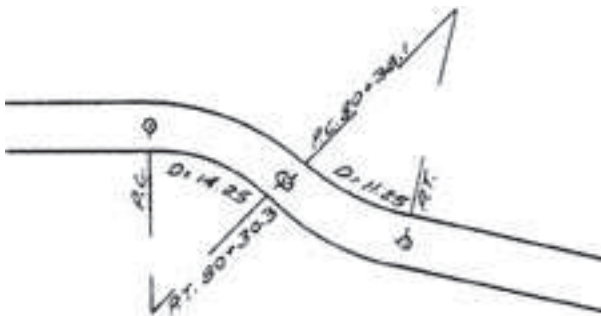
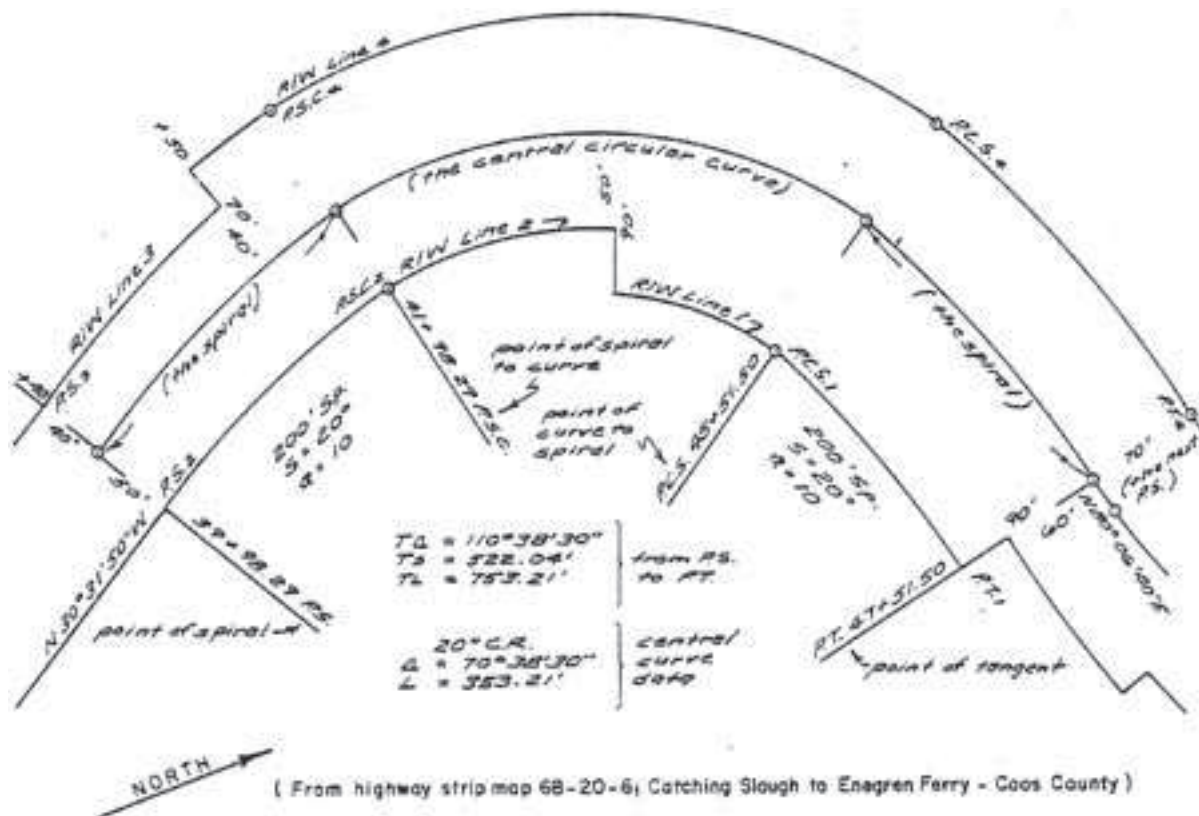


Figure 8-24



EXAMPLE OF EQUAL - SPIRAL SPIRAL CURVE

Figure 8-25

$$\begin{array}{rcl}
 N & 30^{\circ}31'50'' & W \text{ BACK MAIN TAN.} \\
 N & 80^{\circ}06'40'' & E \text{ FORWARD MAIN TAN.} \\
 \hline
 & 110^{\circ}37'90'' & \\
 & \text{or} & \Delta = 110^{\circ}38'30''
 \end{array}$$

TS is the semi-tangent distance of the total highway spiral (spiral, central curve and spiral). TL is the total length of the curve from P.S. to the P.T.; or

$$\begin{array}{rcl}
 \text{P.T.} & 47 & + & 51.50 & = & 4751.50 \\
 \text{P.S.} & 39 & + & 98.29 & = & -3998.29 \\
 \hline
 & = & \text{TL in feet} & = & 753.21'
 \end{array}$$

200 Sp is the length of the spiral (200 feet from P.S. to P.S.C. and 200 feet from P.C.S. to P.T.).

The "a" in figure 8-25 represents the increase in degree of curve per station on the spiral = D/L ; or

where $D =$ degree of curve (20°)
 $L =$ length of spiral ($200'$)

$$a = \frac{100D}{L} = \frac{(100)(20)}{200} = \frac{2000}{200}$$

hence, $a = 100$

Cartographers often avoid plotting spiral curves because they think of the curves as being highly technical; involving complex rules and mathematical formula. They will resort to crude methods to avoid spiral curve plotting, such as drawing the map to the same scale as the strip map so the curve can be traced from the strip map (even though the map should have been at a different scale); measuring, in intervals, the arc points from the semi-tangent on the strip maps (effective - but not scientific, accurate or efficient); using an overhead projector to transfer the curve to the map; using a pantograph to transfer the curve to the map; and using a flexible curve template to transfer the curve to the map. They are *drafting* methods, not *cartographic* methods, placing too much reliance on the curve as plotted on the highway strip map. If the highway draftsman plotted the curve incorrectly, the plot error is transferred to the cadastral map.

The fact is, most spirals and spiral curve formulae are simple. The complex formula can be avoided by using the Oregon State Highway Division Standard *Highway Spiral Tables*. The tables of figure 8-26 are from the highway spiral book. Table IV shows the functions of the standard highway spiral where $S = 15^{\circ}56'$ to $S = 20^{\circ}48'$. This table lists factors that, when multiplied by the lengths of the spiral, produce the values of C, Y, X, U, V, p, and q. Table V, figure 8-27, supplies those values for spiral lengths (in ten-foot intervals) of 10 to 450' for $a = 10$. These values are also provided for $a = 0.1$ to $a = 0.5$ (the most common) in table 27 of the appendix to this text.

Figure 8-28 is a guide to the curve value designations and locations. In figure 8-28 the P.S.C. to P.C.S., is a simple curve; therefore, all of the simple curve elements defined in figures 8-7, 8-8 and 8-16 apply to the spiral central curve; except, the simple central curve does not start or end on the main tangents, and the semi-tangent of the central curve is not a prolongation of the main tangents.

If the length of a spiral is not a multiple of ten feet, table IV should be used. Therefore, the spiral values of a 205-foot spiral, where $s = 20^{\circ}00'$, could be determined from the table of functions (table IV of the highway spiral book). The computations of the spiral and curve values would be:

TABLE IV $\times$ Length	=	Curve Values
$0.994595 \times 205'$	=	C 203.89'
$0.987884 \times 205'$	=	Y 202.52'
$0.115346 \times 205'$	=	X 23.64'
$0.670972 \times 205'$	=	U 137.55'
$0.337251 \times 205'$	=	V 69.14'
$0.028963 \times 205'$	=	p 5.94'
$0.497976 \times 205'$	=	q 102.08'

The length of the spiral of the curve in figure 8-25 is a multiple of ten, and $a = 10$. Therefore, the spiral curve values can be derived from table V.

D	=	$20^{\circ}00'$
S	=	$20^{\circ}00'$
q	=	99.60
p	=	5.79
Y	=	197.58'
X	=	23.07'
C	=	198.92'
U	=	134.19'
V	=	67.45'

The values are used to locate the corresponding points of the curve of figure 8-28.

The formula for the spiral curve elements are:

- *Central angle of the whole spiral*

$$S^{\circ} = \frac{DL}{200} = \frac{aL^2}{20,000} = \frac{D^2}{2a}$$

- *Semi-Tangent*

$$TS = q + (R + p) \tan \frac{\Delta}{2}$$

- *Radius*

$$R = \frac{5729.5779513}{D} \text{ or,}$$

$$R = \frac{5729.5779513L}{200 S^{\circ}} \text{ or,}$$

$$R = \frac{28.647889757L}{S^{\circ}} \text{ or,}$$

- Ordinate of the P.S.C.

$$\frac{X}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-1)!(4n-1)(-1)^{n+1}} \right) \text{ or,}$$

in an expanded form for values to $n = 8$ ("n" is not equal to 0) and $\theta = S$ in radians:

$$X = L \left(\frac{\theta}{3} - \frac{\theta^3}{42} + \frac{\theta^5}{1320} - \frac{\theta^7}{75,600} + \frac{\theta^9}{6,894,720} - \frac{\theta^{11}}{918,086,400} + \frac{\theta^{13}}{168,129,561,600} - \frac{\theta^{15}}{40,537,905,408,000} \dots \right)$$

- The Y distance (from the P.S. to a point on the tangent opposite the P.S.C)

$$\frac{Y}{L} = \sum \left(\frac{\theta^{2n-2}}{(2n-2)!(4n-3)(-1)^{n+1}} \right) \text{ or,}$$

in an expanded form for values to $n = 8$ and $\theta = S$ in radians:

$$Y = L \left(1 - \frac{\theta}{10} + \frac{\theta^4}{216} - \frac{\theta^6}{9360} + \frac{\theta^8}{685,440} - \frac{\theta^{10}}{76,204,800} + \frac{\theta^{12}}{11,975,040,000} - \frac{\theta^{14}}{2,528,170,444,800} \dots \right)$$

- Degree of central curve

$$a = \frac{100D}{L}, \quad D = \frac{aL}{100}$$

- The angle between the tangent at the P.S. and the chord from the P.S. to any point on the spiral or the deflection angle to any point on the spiral (i);

$$i = \frac{1}{3} s - n \text{ or } \tan i = \frac{X}{Y}$$

- I; the angle from any point on the spiral between the tangent at the point and the chord to the P.S.

$$I = S - i$$

- p; the offset from the main tangent to the point where the tangent to the circular curve (produced backward or forward) becomes parallel to the main tangent.

$$P = X - R \text{ vers } S = X - \frac{28.647889757 L}{S^\circ} \text{ vers } S$$

- q; the distance along the main tangent from the P.S. or P.T. to a point where the tangent to the circular curve becomes parallel to the twin tangent.

$$Q = Y - R \sin S = Y - \frac{28.647889757 L}{S^\circ} \sin S$$

- U; the distance on the tangent from the P.S. to the intersection with a tangent through the P.S.C, the longer spiral tangent.

$$U = Y - X \cot S$$

- V; the distance on the tangent through the P.S.C from the P.S.C to the intersection with the tangent through the P.S.; the shorter spiral tangent.

$$V = \frac{X}{\sin S} = X \csc S$$

RADIANS Mensuration Formulae

$$1^\circ = 0.01745 \quad 32925 \quad 19943 \text{ radians}$$

$$1^\circ = 60'; \quad 1^\circ = 3600'';$$

$$1 \text{ radian} = 57^\circ 17' 44'' \quad 80625;$$

$$\pi \text{ radians} = 180^\circ;$$

$$\pi \div 180^\circ = \text{radians in } 1^\circ;$$

$$180^\circ - \pi = \text{degrees in one radian};$$

$$\frac{1}{\sqrt{\pi}} = 0.56418958$$

$$\frac{3}{\sqrt{\pi}} = 1.46459189$$

$$\frac{3}{\sqrt{\pi^2}} = 2.14502940$$

To - convert radians to degrees multiply the radians by:

$$57.29578$$

To convert degrees to radians multiply degrees by:

$$0.0174533$$

To convert minutes to radians multiply by:

$$2.90888 \times 10^{-4}$$

TABLE IV. FUNCTIONS OF THE STANDARD HIGHWAY SPIRAL.

S	i	C/L	Y/L	X/L	U/L	V/L	p/L	q/L	S
15°56'	5°18'27"	0.996567	0.992294	0.092185	0.669387	0.335808	0.023110	0.498714	15°56'
15°57'	5°18'47"	0.996560	0.992278	0.092281	0.669393	0.335813	0.023134	0.498711	15°57'
15°58'	5°19'07"	0.996553	0.992262	0.092376	0.669399	0.335819	0.023158	0.498709	15°58'
15°59'	5°19'27"	0.996546	0.992246	0.092472	0.669405	0.335824	0.023182	0.498706	15°59'
16°00'	5°19'47"	0.996538	0.992230	0.092567	0.669410	0.335829	0.023206	0.498703	16°00'
16°06'	5°21'47"	0.996495	0.992133	0.093139	0.669445	0.335861	0.023351	0.498687	16°06'
16°12'	5°23'47"	0.996451	0.992035	0.093711	0.669480	0.335892	0.023495	0.498671	16°12'
16°18'	5°25'47"	0.996408	0.991937	0.094283	0.669515	0.335924	0.023639	0.498654	16°18'
16°24'	5°27'46"	0.996363	0.991838	0.094854	0.669550	0.335956	0.023783	0.498638	16°24'
16°30'	5°29'46"	0.996319	0.991739	0.095426	0.669586	0.335989	0.023927	0.498621	16°30'
16°36'	5°31'46"	0.996274	0.991639	0.095997	0.669622	0.336021	0.024071	0.498604	16°36'
16°42'	5°33'46"	0.996229	0.991538	0.096569	0.669658	0.336054	0.024216	0.498587	16°42'
16°48'	5°35'45"	0.996184	0.991437	0.097140	0.669694	0.336087	0.024360	0.498571	16°48'
16°54'	5°37'45"	0.996139	0.991335	0.097711	0.669730	0.336120	0.024504	0.498554	16°54'
17°00'	5°39'45"	0.996093	0.991232	0.098282	0.669767	0.336154	0.024648	0.498536	17°00'
17°06'	5°41'44"	0.996047	0.991129	0.098853	0.669804	0.336187	0.024792	0.498519	17°06'
17°12'	5°43'44"	0.996000	0.991026	0.099423	0.669841	0.336221	0.024936	0.498502	17°12'
17°18'	5°45'44"	0.995954	0.990921	0.099994	0.669878	0.336255	0.025080	0.498484	17°18'
17°24'	5°47'44"	0.995907	0.990817	0.100564	0.669916	0.336289	0.025224	0.498467	17°24'
17°30'	5°49'43"	0.995860	0.990711	0.101134	0.669954	0.336324	0.025368	0.498449	17°30'
17°36'	5°51'43"	0.995813	0.990605	0.101705	0.669992	0.336358	0.025512	0.498432	17°36'
17°42'	5°53'43"	0.995765	0.990499	0.102275	0.670030	0.336393	0.025656	0.498414	17°42'
17°48'	5°55'42"	0.995717	0.990392	0.102844	0.670069	0.336428	0.025800	0.498396	17°48'
17°54'	5°57'42"	0.995669	0.990284	0.103414	0.670107	0.336463	0.025944	0.498378	17°54'
18°00'	5°59'42"	0.995620	0.990175	0.103984	0.670146	0.336499	0.026088	0.498360	18°00'
18°06'	6°01'42"	0.995572	0.990066	0.104553	0.670185	0.336534	0.026232	0.498341	18°06'
18°12'	6°03'41"	0.995523	0.989957	0.105123	0.670225	0.336570	0.026376	0.498323	18°12'
18°18'	6°05'41"	0.995473	0.989847	0.105692	0.670264	0.336606	0.026519	0.498305	18°18'
18°24'	6°07'41"	0.995424	0.989736	0.106261	0.670304	0.336642	0.026663	0.498286	18°24'
18°30'	6°09'40"	0.995374	0.989625	0.106830	0.670344	0.336679	0.026807	0.498267	18°30'
18°36'	6°11'40"	0.995324	0.989513	0.107399	0.670384	0.336716	0.026951	0.498249	18°36'
18°42'	6°13'40"	0.995274	0.989400	0.107967	0.670425	0.336752	0.027095	0.498230	18°42'
18°48'	6°15'39"	0.995223	0.989287	0.108536	0.670466	0.336790	0.027239	0.498211	18°48'
18°54'	6°17'39"	0.995172	0.989173	0.109104	0.670507	0.336827	0.027382	0.498192	18°54'
19°00'	6°19'39"	0.995121	0.989059	0.109672	0.670548	0.336864	0.027526	0.498173	19°00'
19°06'	6°21'38"	0.995070	0.988944	0.110240	0.670589	0.336902	0.027670	0.498154	19°06'
19°12'	6°23'38"	0.995018	0.988829	0.110808	0.670631	0.336940	0.027814	0.498134	19°12'
19°18'	6°25'38"	0.994966	0.988713	0.111376	0.670673	0.336978	0.027957	0.498115	19°18'
19°24'	6°27'37"	0.994914	0.988596	0.111944	0.670715	0.337016	0.028101	0.498095	19°24'
19°30'	6°29'37"	0.994861	0.988479	0.112511	0.670757	0.337055	0.028245	0.498076	19°30'
19°36'	6°31'37"	0.994809	0.988361	0.113079	0.670800	0.337094	0.028388	0.498056	19°36'
19°42'	6°33'36"	0.994756	0.988243	0.113646	0.670842	0.337133	0.028532	0.498036	19°42'
19°48'	6°35'36"	0.994702	0.988124	0.114213	0.670885	0.337172	0.028675	0.498016	19°48'
19°54'	6°37'36"	0.994649	0.988004	0.114780	0.670929	0.337211	0.028819	0.497996	19°54'
20°00'	6°39'35"	0.994595	0.987884	0.115346	0.670972	0.337251	0.028963	0.497976	20°00'
20°06'	6°41'35"	0.994541	0.987763	0.115913	0.671016	0.337290	0.029106	0.497956	20°06'
20°12'	6°43'34"	0.994487	0.987642	0.116480	0.671060	0.337330	0.029250	0.497936	20°12'
20°18'	6°45'34"	0.994432	0.987520	0.117046	0.671104	0.337371	0.029393	0.497915	20°18'
20°24'	6°47'34"	0.994377	0.987397	0.117612	0.671148	0.337411	0.029537	0.497895	20°24'
20°30'	6°49'33"	0.994322	0.987274	0.118178	0.671193	0.337452	0.029680	0.497874	20°30'
20°36'	6°51'33"	0.994267	0.987150	0.118744	0.671237	0.337492	0.029824	0.497853	20°36'
20°42'	6°53'32"	0.994211	0.987026	0.119310	0.671282	0.337533	0.029967	0.497832	20°42'
20°48'	6°55'32"	0.994155	0.986901	0.119875	0.671328	0.337575	0.030110	0.497812	20°48'

Figure 8-26

- C ; the chord from the P.S. to the P.S.C.

$$C = \sqrt{X^2 + Y^2}$$

- E_s ; the external of the whole curve; the distance from the P.I. to the center of the arc of the central curve.

$$E_s = p + (R + p) \operatorname{exsec} \frac{\Delta}{2}$$

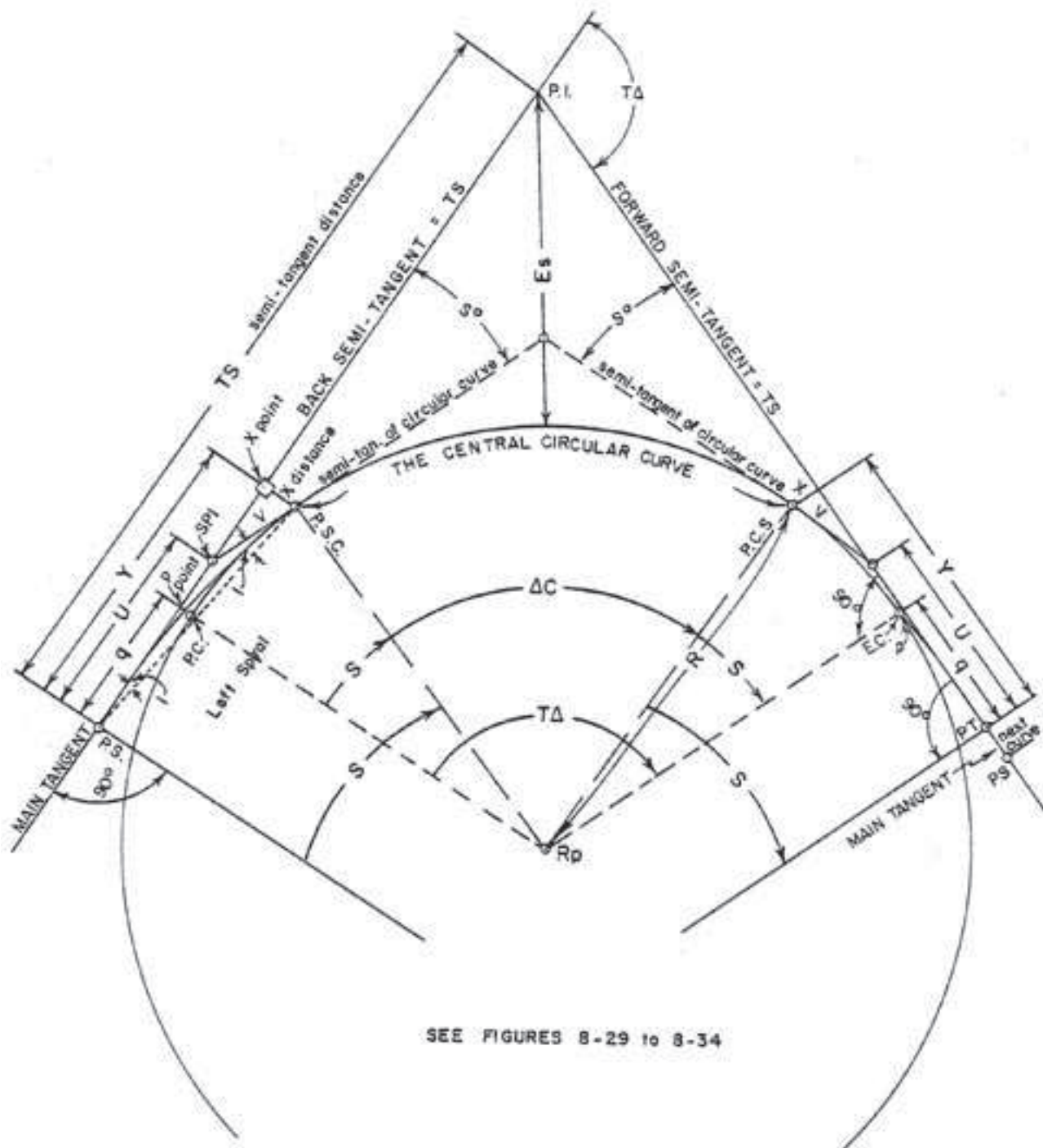
NOTE: The foregoing formulas for p , q , U and V will not give consistent answers when Δ is less than $3^\circ 00'$ because the highway spiral tables do not have enough significant figures. (See Chapter 9).

TABLE V, THE STANDARD HIGHWAY SPIRAL

$a = 10.0$

L	D	S	q	p	Y	X	C	U	V
10	1°00'	0°03.00'	5.00	0.00	10.00	0.00	10.00	6.67	3.33
20	2°00'	0°12.00'	10.00	0.01	20.00	0.02	20.00	13.33	6.67
30	3°00'	0°27.00'	15.00	0.02	30.00	0.08	30.00	20.00	10.00
40	4°00'	0°48.00'	20.00	0.05	40.00	0.19	40.00	26.67	13.33
50	5°00'	1°15.00'	25.00	0.09	50.00	0.36	50.00	33.33	16.67
60	6°00'	1°48.00'	30.00	0.16	59.99	0.63	60.00	40.00	20.00
70	7°00'	2°27.00'	35.00	0.25	69.99	1.00	69.99	46.67	23.34
80	8°00'	3°12.00'	40.00	0.37	79.98	1.49	79.99	53.34	26.67
90	9°00'	4°03.00'	44.99	0.53	89.96	2.12	89.98	60.02	30.01
100	10°00'	5°00.00'	49.99	0.73	99.92	2.91	99.97	66.69	33.36
110	11°00'	6°03.00'	54.98	0.97	109.88	3.87	109.95	73.38	36.71
120	12°00'	7°12.00'	59.97	1.26	119.81	5.02	119.92	80.07	40.06
130	13°00'	8°27.00'	64.95	1.60	129.72	6.38	129.87	86.77	43.42
140	14°00'	9°48.00'	69.93	1.99	139.59	7.97	139.82	93.48	46.80
150	15°00'	11°15.00'	74.90	2.45	149.42	9.79	149.74	100.20	50.16
160	16°00'	12°48.00'	79.87	2.97	159.20	11.87	159.65	106.95	53.59
170	17°00'	14°27.00'	84.82	3.56	168.92	14.23	169.52	113.71	57.01
180	18°00'	16°12.00'	89.76	4.23	178.57	16.87	179.36	120.51	60.46
190	19°00'	18°03.00'	94.69	4.97	188.12	19.81	189.16	127.33	63.94
200	20°00'	20°00.00'	99.60	5.79	197.58	23.07	198.92	134.19	67.45
210	21°00'	22°03.00'	104.48	6.70	206.91	26.66	208.62	141.10	71.00
220	22°00'	24°12.00'	109.35	7.69	216.11	30.58	218.26	148.06	74.60
230	23°00'	26°27.00'	114.19	8.78	225.15	34.86	227.83	155.08	78.26
240	24°00'	28°48.00'	119.00	9.96	234.01	39.49	237.32	162.17	81.96
250	25°00'	31°15.00'	123.77	11.24	242.66	44.49	246.71	169.34	85.77
260	26°00'	33°48.00'	128.51	12.62	251.10	49.87	256.00	176.60	89.65
270	27°00'	36°27.00'	133.20	14.11	259.28	55.62	265.17	183.97	93.62
280	28°00'	39°12.00'	137.84	15.70	267.17	61.75	274.22	191.46	97.70
290	29°00'	42°03.00'	142.44	17.40	274.76	68.26	283.12	199.09	101.92
300	30°00'	45°00.00'	146.97	19.21	282.02	75.15	291.86	206.87	106.27
310	31°00'	48°03.00'	151.44	21.13	288.90	82.40	300.42	214.83	110.79
320	32°00'	51°12.00'	155.83	23.16	295.37	90.02	308.79	223.00	115.51
330	33°00'	54°27.00'	160.16	25.31	301.42	97.98	316.94	231.40	120.43
340	34°00'	57°48.00'	164.39	27.57	306.99	106.28	324.87	240.06	125.60
350	35°00'	61°15.00'	168.54	29.94	312.06	114.90	332.54	249.03	131.06
360	36°00'	64°48.00'	172.59	32.42	316.60	123.81	339.95	258.34	136.83
370	37°00'	68°27.00'	176.54	35.01	320.57	132.99	347.06	268.05	142.96
380	38°00'	72°12.00'	180.38	37.72	323.94	142.40	353.85	278.22	149.56
390	39°00'	76°03.00'	184.09	40.52	326.67	152.02	360.31	288.91	156.64
400	40°00'	80°00.00'	187.68	43.43	328.75	161.80	366.41	300.22	164.29
410	41°00'	84°03.00'	191.14	46.44	330.14	171.70	372.12	312.24	172.63
420	42°00'	88°12.00'	194.46	49.54	330.81	181.67	377.42	325.10	181.76
430	43°00'	92°27.00'	197.63	52.73	330.76	191.67	382.28	338.96	191.85
440	44°00'	96°48.00'	200.65	56.00	329.95	201.64	386.69	354.00	203.07
450	45°00'	101°15.00'	203.51	59.35	328.39	211.51	390.61	370.46	215.65

Figure 8-27



SEE FIGURES 8-29 to 8-34

EQUAL-SPIRAL SPIRAL CURVE ELEMENTS

Figure 8-28

The formulae will be valuable for the rare problems where spiral values are such that the spiral tables cannot be used; however, never use the formulae when spiral curve values can be derived from the tables.

Most spirals are between $a = 0.1$ and $a = 0.5$; therefore, the values of D , S , q , p , Y , X , C , U , and V (when $a = 0.1$ to $a = 0.5$ and $L = 10$ to $L = 1000$) can be obtained from table 27 in the appendix. The radii, in feet, of curves from 0.5 degrees to 100 degrees (V_2 degree intervals defined in degrees and minutes and decimals of degrees) can be obtained from table 14 in the appendix.

Plotting The Standard Highway Spiral

The spiral curve of figure 8-25 is the subject of the following discussion. Remember the first rule in plotting any type of curve: *always locate the P.I. of the curve before plotting any curve points or lines*. The second rule is: *locate the external points of the curve, always measuring from the AL, before plotting the curve lines or internal points*.

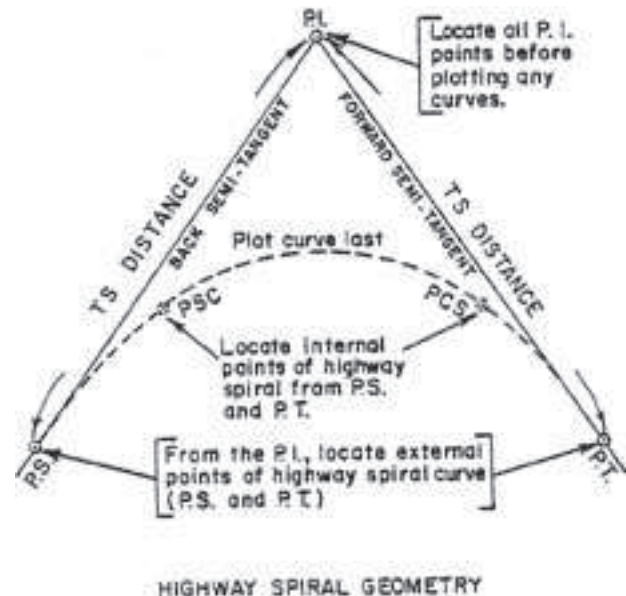


Figure 8-29

Step 1— Locate the point of intersection of the main tangents (the P.I.). This is the same procedure as described for the P.I. of a circular simple curve.

Step 2— From the P.I. locate the P.S. (the point of tangency to spiral) using TS distance.

Step 3— From the P.I. locate the P.T. (the point of spiral to tangency) using TS distance. Avoid using the P.I. stationing to determine TS.

Step 4— From the P.S., and on the semi-tangent (the main tangent extended to the P.I.), measure the Y distance to the X point. (For this example $Y = 197.58'$ from table V figure 8-27.) See figure 8-30.

The P.S.C. is the point where the spiral part of the total curve intersects the central curve. It is *not* the point where the central curve is tangent to the main tangent.



Figure 8-30

Step 5 - From the x-point on the semi-tangent measure (to the right and on a line perpendicular to the main tangent) the X distance to the P.S.C. (23.07' from table V in figure 8-27).

Step 6 - To check the location of the P.S.C., measure the U distance (134.19' from table V) from the P.S. and along the semi-tangent to the S.P.I. From the S.P.I. (figure 8-31) turn an angle of 200 (equal to the central angle of the spiral). This will be the line running from S.P.I. to the P.S.C. Measure the V distance (67.45') from S.P.I. to the P.S.C. (Fig. 8-31).

Step 7 - Locate the P.C.S. Using the same procedures as used to locate and check the P.S.C. Measurements, however, are from the P.T. and on the semi-tangent between the P.I. and P.T.

The P.C.S. is the point where the central curve intersects the spiral.



Figure 8-31

Step 8 - From the P.S., and on the semi-tangent, measure the q distance (99.6' from Table V) to the p point. (See figure 8-32.) This is a point on the semi-tangent that is at right-angles to the radius point of the central curve at $R + p$ feet from the radius point. Refer to figure 8-28 for the R_p relationship to the highway spiral.

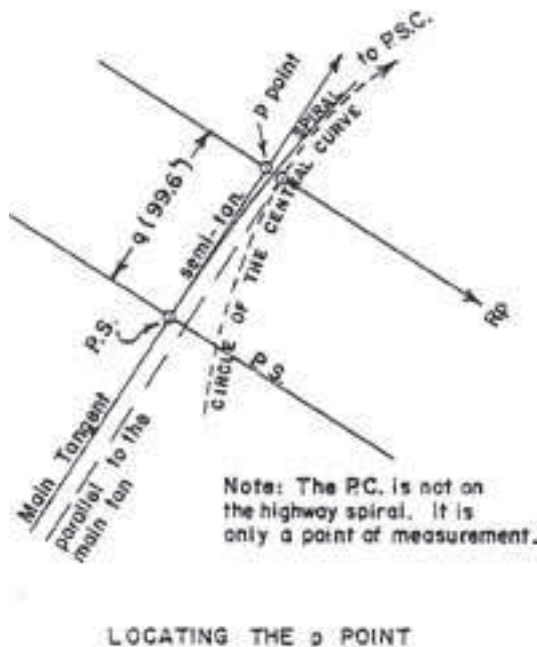


Figure 8-32

Step 9 - From the p point on the semi-tangent, and at right angles to the semi-tangent, measure the p distance (5.79'). This point is on the arc of the central curve where the circle is tangent to a line running 5.79' from, and parallel to, the semi-tangent. See figure 8-33.

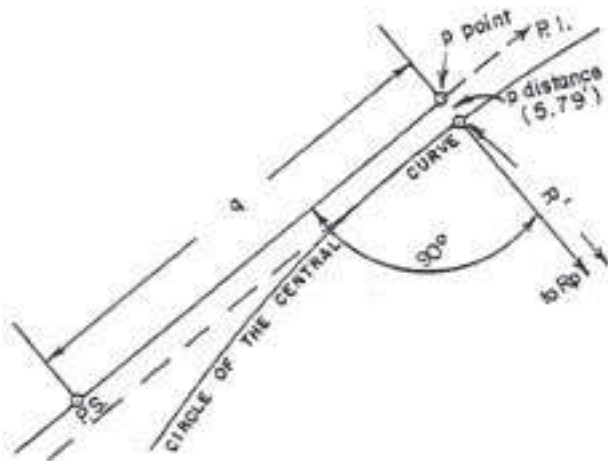


Figure 8-33

Step 10 - From the p point, and on a line at right angles to the semi-tangent, measure $R + p$ (the radius distance plus the p distance) on a radius line to R_p (the radius point). In this example, $R + p = 286.48' + 5.79' = 292.27'$.

Step 11 - Using R_p as the point of symmetry of the central curve, use a pencil compass to swing an arc from the P.S.C. to the P.C.S.

Step 12 - If the spiral is short (up to 2 inches) on the cadastral map, it can be plotted with a french curve, engineer's curve, ships curve or railroad curve. This will not, however, be a precise method for plotting longer spirals.

To plot long spirals (300', 400', 2000', etc.) it is necessary to locate points on the spiral that can be connected by a curve template. This can be accomplished by dividing the spiral into convenient length segments; determining the X and Y values of each segment; and using the X and Y values to plot the P.O.S. (point-on-spiral) of each segment.

In actual practice it would be unnecessary to use the following procedures for a 200 foot spiral; however, to retain continuity with the preceding steps we will use the 200-foot, spiral of figure 8-25.

Step 12a - Divide the spiral into convenient length spiral segments. For this example we divided the 200' spiral into segments of 50' intervals (50', 100', 150', 200').

Step 12b - Using the standard highway spiral table (table V of the Highway Division book Of tables or table V in figure 8-27) find the values of $L = 50$, $L = 100$, $L = 150$ and $L = 200$ where $a = 10$.

For this problem, the X and Y values are:

P.S. to P.O.S.1 40 + 48.29 (figure 8-34)

$X_1 = 0.36$ and $Y_1 = 50'$

P.S. to P.O.S.2 40 + 98.29'

$X_2 = 2.91'$ and $Y_2 = 99.92'$

P.S. to P.O.S.3 41 + 48.29

$X_3 = 9.79'$ and $Y_3 = 149.42'$

P.S. to P.S.C.

$X = 23.07'$ and $Y = 197.58'$ (located in steps 4 and 5)

The P.O.S. points could also be located using the U , V , and S values where the spiral segments are those portions of the standard highway spiral $a = 10$ between P.S. and the P.S.C.: namely,

P.O.S.1 40 + 48.29 ($L = 50$)

$U_1 = 33.33'$; $V_1 = 16.67'$; $S_1 = 1015$,

P.O.S.2 40 + 98.29 ($L = 100$)

$U_2 = 66.69'$; $V_2 = 33.36'$; $S_2 = 5$

P.O.S.3 41 + 48.29 ($L = 150$)

$U_3 = 100.20'$; $V_3 = 50.16'$; $S_3 = 11015'$

P.S.C. 41 + 98.29 ($L = 200'$)

$U = 134.19'$; $V = 67.45'$; $S = 200$

Step 12c - Using U_1 , V_1 , and S_1 , locate P.O.S.₁. In this case it will be 33.33' from the P.S., along the semi-tangent; thence turn a $1^\circ 15'$ angle right 16.67' to the P.O.S.₁ 40 + 48.29.

Step 12d - Using U_2 , V_2 , and S_2 , locate P.O.S.₂. This point is 66.69 feet from the P.S., along the semi-tangent; thence on a 5° angle right a distance of 33.36 feet to P.O.S.₂ 40 + 98.29.

Step 12e - Using U_3 , V_3 and S_3 , locate P.O.S.₃ (engineer station 41 + 48.29 in figure 8-34). It is 100.20' from the P.S., thence on a $11^\circ 15'$ angle right a distance of 50.16' to station P.O.S.₃ 41 + 48.29.

The X and Y values can be used to check the deflection angle values; or the deflection angle values can be used to check the X and Y values.

Step 13 - Plot the spirals using a ship's curve or engineer's curve to connect spiral points.

Spiral Segments

It may be necessary to determine the chord and the U and V distances for the segment of a spiral. The following are the special procedures recommended by the State Highway Division.

Given:

200' spiral segment as shown in figure 8-35 $a = 1.0$, connecting a 3° curve to a 5° curve.

Problem:

Find S, U, C and V distances for that spiral segment.

The given spiral segment is that part of the Standard Highway Spiral, $a = 1.0$, between the P.O.S. at $L=300'$ and the P.O.S. at $L=500'$. In the solution of the given problem S, U, V, X, and Y are values for $L=500'$; S_1 , U_1 , V_1 , X_1 , and Y_1 are values for $L=300'$ and S_2 , U_2 , C_2 and V_2 are the values to be found for the given spiral segment.

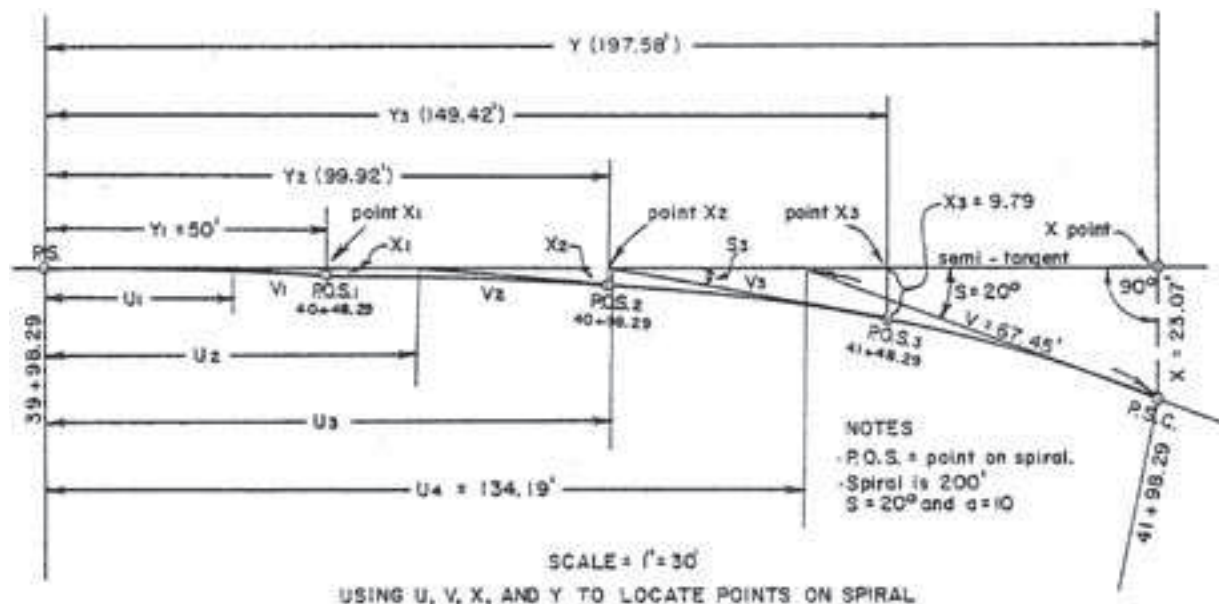


Figure 8-34

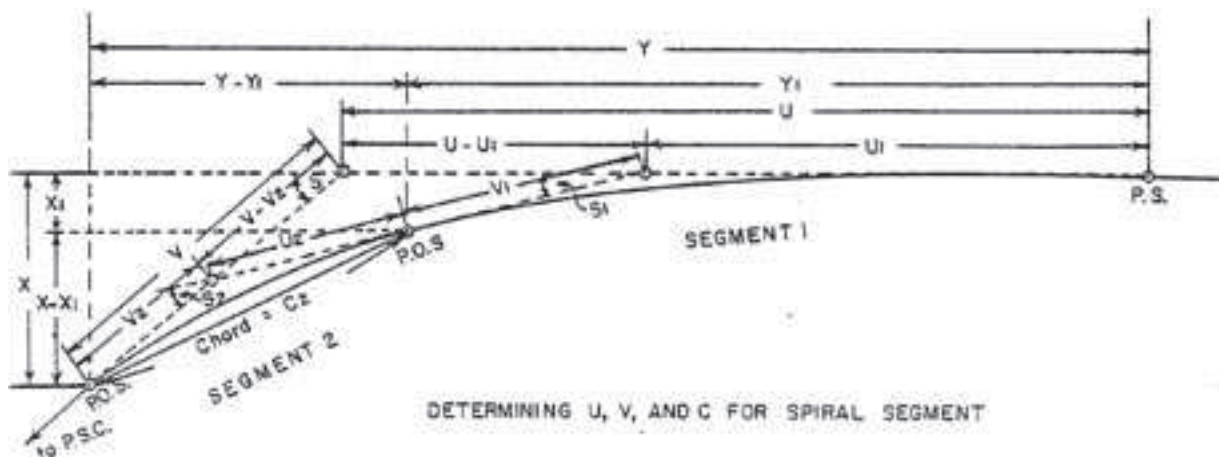


Figure 8-35

From the Highway Division Spiral table V for $a = 1.0$;

$$\begin{aligned} L &= 500', S = 12030', U = 334.17', \\ V &= 167.43'; 1', X = 36.24' \text{ and } Y = 497.63' \\ L &= 300'' S_1 = 4030'' U = 200.06' \\ V_1 &= 100.06', X_1 = 7.85 \text{ and } Y_1 = 299.81' \end{aligned}$$

The solution to this problem was provided through the courtesy of the Oregon State Highway Division.

$$S - 2 = SS_1$$

$$U_2 = \frac{(U - U_1) \sin S}{\sin S_2} - V_1$$

$$U_2 = V \frac{(U - U_1) \sin S_1}{\sin S_2}$$

$$C_2 = \sqrt{(X - X_1)^2 + (Y - Y_1)^2}$$

Solution:

$$S_2 = 12^\circ 30' - 4^\circ 30' = 8^\circ 00'$$

$$U_2 = \frac{(334.17 - 200.06) \sin 12^\circ 30'}{\sin 8^\circ 00'} - 100.06$$

$$U_2 = 108.506' \text{ or } U_2 = 108.51'$$

$$V_2 = 167.43 \frac{(334.17 - 200.06) \sin 4^\circ 30'}{\sin 8^\circ 00'}$$

$$V_2 = 91.83'$$

$$C_2 = \sqrt{(36.24 - 7.85)^2 + (497.63 - 299.81)^2}$$

$$C_2 = 199.847' \text{ or } C_2 = 199.85'$$

Spirals of Unequal Length

Most highway spirals are of the type we have discussed; two equal length spirals abutting a central simple curve (e.g., as shown in figure 8-28). There are, however, other spiral curve variations; i.e., central curves with spirals of unequal length, compound spiral-central curves with spirals of different length and circular central curves of different radii, and spiral and curves with a spiral at only one end of the circular curve.

Next to the equal length spirals in frequency of occurrence in highway surveys is the spiral curve with spirals of unequal length (figure 8-36).

In figure 8-36 we have a spiral curve with the degree of the central curve being the same as the right-hand spiral. From P.S.C. to P.T. this curve is the same as the

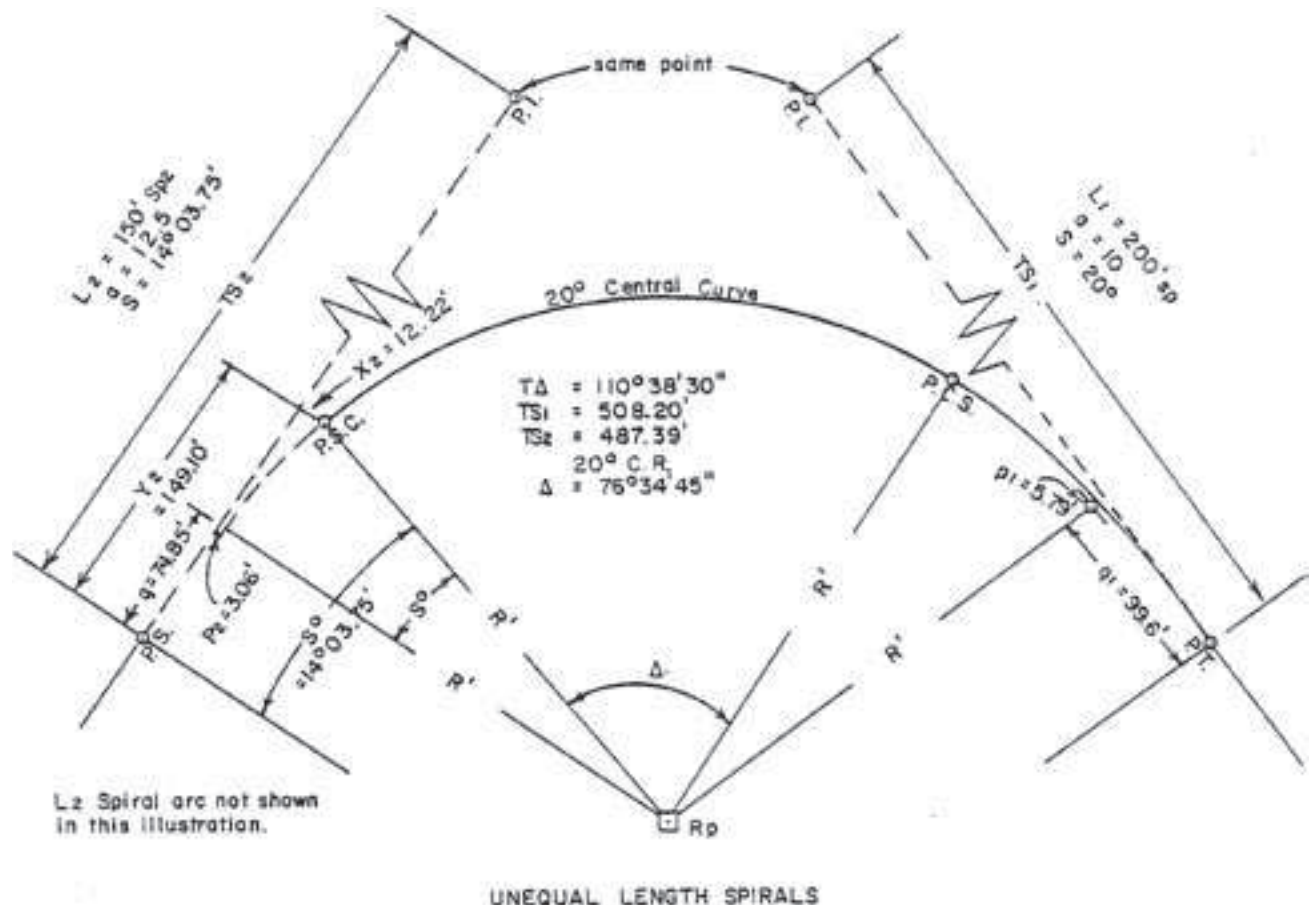


Figure 8-36

curve of figure 8-25. The left hand spiral, however, is only 150' long and $a = 12.5'$.

To plot the curve of figure 8-36, locate the P.I. using TS_2 for the back semi-tangent and TS_1 for the forward semi-tangent. If TS_1 and TS_2 are not provided on the highway strip map, they can be computed using the formulae:

$$TS_1 = q_1 + (R + p_2) \tan \frac{\Delta}{2} - (p_1 - p_2) \cot \Delta$$

and

$$TS_2 = q_2 + (R + p_2) \tan \frac{\Delta}{2} + \frac{(P_1 - P_2) \cot \Delta}{\sin \Delta}$$

The rule for the equations being TS_1 (and subsequently LS_1) is always the longer spiral. Likewise, q_1 and p_1 are values for LS_1 and q_2 and p_2 are values for LS_2 .

Spiral L_1 is plotted exactly as the 200' spiral of figure 8-25 using the same $a = 10$ values for X , Y , p , and q . Remember, however, the semi-tangent (TS_1) will be a different length than the semi-tangent of the spiral curve in figure 8-25.

L_2 , the shorter, can be plotted using the same steps as described for the curve of figure 8-25. The values for LS_1 and LS_2 are:

LS1	LS2
$D_1 = 20^\circ 00'$	$D_2 = 18^\circ 45'$
$S_1 = 20^\circ 00.00'$	$S_2 = 14^\circ 03.75'$
$q_1 = 99.60'$	$Q_2 = 74.85'$
$p_1 = 5.79'$	$P_2 = 3.06'$
$Y_1 = 197.58'$	$Y_2 = 149.10'$
$X_1 = 197.58'$	$X_2 = 12.22'$
$C_1 = 198.92'$	$C_2 = 198.92'$
$U_1 = 134.19'$	$U_2 = 100.32'$
$V_1 = 67.45'$	$V_2 = 50.29'$

Spiral Curve With Only One Spiral

Figure 8-37 illustrates a Standard Highway Spiral with the spiral part at only one end of the total curve; in this case - the left end. The right-hand end of the curve goes from a circular curve to tangent (at P.T.). There is no P.C.S.

To plot the curve, locate the P.I. using the values of TS_1 and TS_2 . These semi-tangent distances are computed with the formulae:

$$TS_1 = \frac{(R + p_2) - (R \cos \Delta)}{\sin \Delta}$$

and

$$TS_2 = \frac{(R - (R + p) \cos \Delta)}{\sin \Delta} + q$$

when Δ is less than 90° . When Δ is over 90° the cos function will have a negative value.

The spiral and curve are plotted by the methods used for the curve of figure 8-25, except the right-hand of the arc of the circular curve will terminate at P.T. instead of P.C.S.

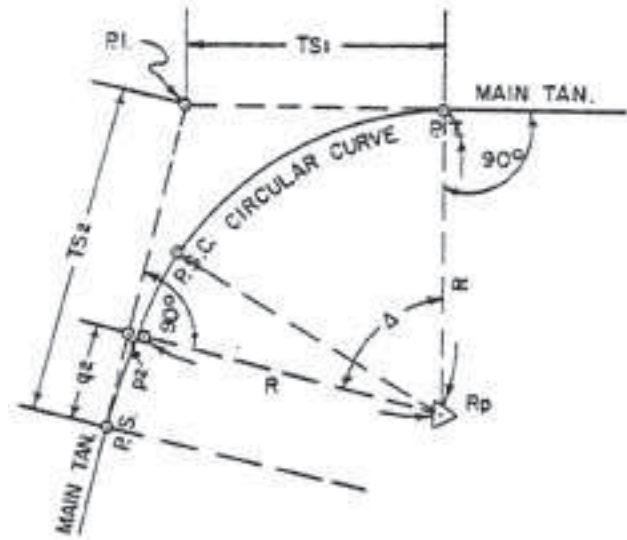


Figure 8-37

Compound Spirals

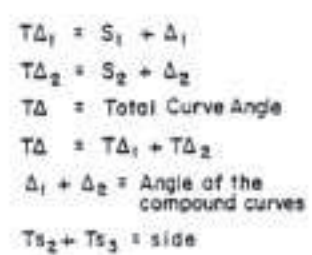
Compound highway spirals are rare when compared to the frequency of occurrence of the basic spiral of figure 8-25 and 8-28. Therefore, cartographers seldom become proficient at computing and plotting this type of curve. That, and the fact that there are many complex variations of compound curve, makes it a cartographer's nightmare.

The simplest variation of the compound spiral is the spiral-to-compound circular curves - to spiral curve as illustrated in figures 8-38 A and B.

To provide another approach to solving for curve values, we will use the curve sub-triangles and trigonometry to provide the lengths of sides and base of the whole curve (TS_5 , TS_6 and LC). Figure 8-38B illustrates the five main triangles of the problem curve. The solution is as follows:

Step 1 - From the values supplied by the strip map, compute the semi-tangents TS_1 through TS_4 . Use the formulae:

$$TS_1 = \frac{R_1 - (R_1 + p_1 \cos T\Delta_1)}{\sin T\Delta_1} + q_1$$



$$TS_2 = \frac{R_1 + p_1 - (R_1 \cos T\Delta_1)}{\sin T\Delta_1}$$

$$TS_3 = \frac{R_2 + p_2 - (R_2 \cos T\Delta_2)}{\sin T\Delta_2}$$

$$TS_4 = \frac{R_2 - (R_2 + p_2 \cos T\Delta_2) + q_2}{\sin T\Delta_2}$$

let us assume the values to be:

$$TS_1 = 320.19'$$

$$TS_2 = 225.61'$$

$$TS_3 = 318.23' \text{ and}$$

$$TS_4 = 318.00'$$

Step 2- To find the missing sections of TS_5 (n_1 and TS_6 (n_2), use the formulae:

(where: $T\Delta = 76^\circ 28'$; $T\Delta_1 = 47^\circ 18'$; $T_2 = 29^\circ 10'$; and $n_3 = TS_2 + TS_3$)'

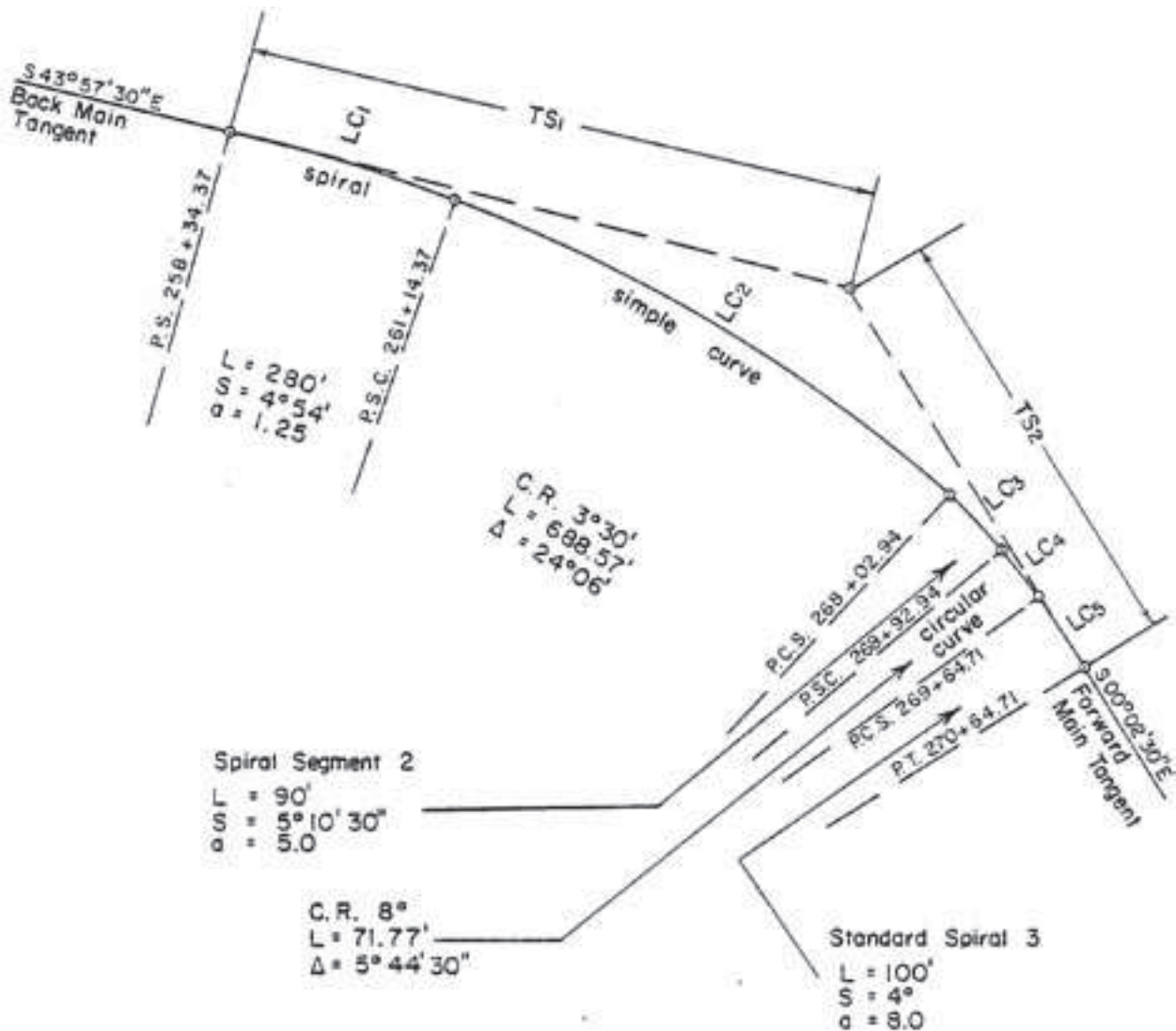
$$\frac{n_3}{\sin T\Delta} = \frac{n_1}{\sin T\Delta_1}$$

$$\frac{543.84'}{\sin 76^\circ 28'} = \frac{n_1}{\sin 29^\circ 10'}$$

$$\frac{543.84'}{.97223} = \frac{n_1}{.48735} = 272.61'$$

and

$$\frac{n_3}{\sin T\Delta} = \frac{n_2}{\sin T\Delta_1}$$



PROBLEM THREE-SPIRAL HIGHWAY CURVE

Figure 8-39

$$\frac{543.84'}{\sin 76^\circ 28'} = \frac{n_2}{\sin 47^\circ 18'}$$

$$\frac{543.84'}{.97223} = \frac{n_2}{.73491} = 411.09'$$

hence: $n_1 = 272.61$ and
 $n_2 = 411.09$

subsequently, $TS_5 = 272.61' + 320.19' (592.70')$ and $TS_6 = 411.09' + 318.00' (729.09')^{17}$. This is sufficient to complete traverse computations; however, to check the P.S. - P.T. location we can compute the value of L.C. (or C in figure 8-38B). Treat the problem by converting the curve triangle into a Pythagorean triangle (adding the external triangle) and solving for x, y, b, and c.

Step 3 - Solve for y. ($\beta_1 = \Delta$)

$$y = (TS_5) \sin \alpha_1$$

$$\alpha_1 = 180^\circ (90^\circ + \beta_1) = 13^\circ 32'$$

$$y = 592.70 \times .23401 = 138.70'$$

From this we can establish the value of b (of figure 8-38B) as $867.79 (TS_6 + Y)$.

Step 4 - Solve for X.

$$X = \sqrt{TS_6^2 - y^2} = 576.24'$$

Step 5 - Solve for C.

$$C = \sqrt{X^2 + b^2} = 1041.69'$$

Hence, the sides of the main curve triangle are:

$$TS_5 = 592.70'$$

$$TS_6 = 867.79 - 138.70'$$

$$C = 1041.69 = LC$$

If necessary, the trigonometric solution can extend to any sub-triangle of the highway curve, e.g., triangle P.S. P.C.C., P.T., P.S. P.I.1 P.C.C. or P.C.C. P.I.2 P.T., etc.

After the curve triangle is plotted, the arcs of the curves and spiral can be plotted by methods already described in this chapter.

The discussion on spiral curves, to this point in the Chapter, has centered on the spiral that starts on the highway centerline traverse and ends on the centerline traverse. There is, however, a highway curve that contains only a *segment* of a standard spiral; the beginning of the spiral being offset from the centerline traverse. It is a special compound highway curve known as the *three-spiral curve*. The curve, illustrated in figure 8-39, contains two full highway spirals, two circular (simple) curves and one spiral segment.

The spiral segment is a factor that makes the three-spiral curve a special problem requiring a different approach to curve solving; the deflection angle approach. To stress the importance of deflection angles we will substitute some simple computations with the longer deflection angle computations (e.g., computing S angles that could be easily derived from the spiral tables). After you have mastered the three-spiral curve, the tables can be used to obtain the values of S, U, V, I, i and Y.

Solution of the Three-Spiral Curve¹⁸

The traverse and curve data of the subject curve is supplied in figure 8-39. The values necessary to traverse coordinate computation (TS_1 and TS_2) are missing. Likewise, the bearings and distance of the long chords were omitted from the highway strip map. The objective, then, is to solve for the sides of the curve triangle.

Remember, although this curve contains an incomplete spiral, the definition of the standard highway spiral applies to the spiral segment as well as the end spirals; that is, *a curve whose degree varies directly as its length, beginning at zero at the P.S. and reaching a degree of curve equal to the circular curve at the P.S.C.*

Figure 8-40 is the front end of the curve of figure 8-39. Figure 8-41 is that part of the curve of 8-39 that contains the spiral segment. The drawings of figures 8-40 and 8-41 have been exaggerated to clarify the special elements of this curve. Take special note of the spiral segment in figure 8-41, specifically the $3^\circ 30'$ curve produced forward. On the standard two-spiral highway curve the arc of the circular curve would fall *inside* the spiral; whereas, in this case it falls *outside* the spiral. The figure also shows the omitted part of the spiral. The solution to the three-spiral curve will begin by finding the long chords of each spiral, each curve and the spiral segment.

Step 1 - Find the bearing of the long chord of the first spiral (LC_1). To compute the bearing we must find the value of i (the deflection angle of the back semi-tangent to the long chord). Use the formula:

$$i = 10ad^2$$

Where: $a = 100 D/L = 1.25$
 $d = \text{length in } 100' \text{ stations}$
 $L = 280'$
 $S = 4^\circ 54'$

Spiral deflect. = $1/3 S$

Back Semi-tan. = $S 43^\circ 57' 30'' E$

$$i = 10ad^2 = 98 \text{ minutes} = 1^\circ 38'$$

No. 2: Total deflection angle for a spiral equals $1/3$ the S angle from the zero end and forward; $2/3$ the S angle from the P.S.C. back.



THE FRONT END OF THE THREE-SPIRAL CURVE
(Exaggerated Scale)

Figure 8-40

Check: If $S = 4^{\circ}54'$ then $1/3 S = 1^{\circ}38'$

Hence, the bearing of LC_1 is

$$\begin{array}{rcl} S & 43^{\circ}57'30'' & \text{E} \quad \text{Back Main Tan.} \\ - & 1^{\circ}38'00'' & \quad \quad (i) \\ \hline = & S & 42^{\circ}19'30'' \quad \text{E} \quad LC_1 \text{ bearing} \end{array}$$

(Had this curve turned to the left it would have been added to the main tangent bearing. See Chapter 4.)

Step 2 - Find the length of LC_1 .

$$LC_1 = \sqrt{X^2 + Y^2}$$

Where: $X = 7.98 \therefore x^2 = 63.6446$

$$Y = 279.80 \therefore y^2 = 78285.42$$

$$LC_1 = \sqrt{X^2 + Y^2} = 279.91'$$

To check the value of LC_1 use Table IV of the *Standard Highway Spiral* book where $S = 4^{\circ}54'$.

$$C/L = LC = 0.999675 \times 280 = 279.91'$$

Step 3 - Find the bearing of the long chord of the first simple curve.

From step 1 we established the value of $S (=4^{\circ}54')$. This is the deflection angle of the line tangent to the simple curve at P.S.C. and the back main tangent. With S we can derive the bearing of the line tangent to the 3.5 degree curve at the P.S.C.

$$\begin{array}{rcl} S & 43^{\circ}57'30'' & \text{E} \quad \text{Back Main Tan.} \\ - & 4^{\circ}54'00'' & \quad \quad S \text{ (or } i \text{ at the P.S.C.)} \\ \hline S & 39^{\circ}03'30'' & \text{E} \end{array}$$

The deflection angle can also be computed as:

$$i = .3 DL$$

Here, the deflection angle i is equal to the product of .3 of a minute, the degree of curve, and the length of the spiral; or,

$$i = .3(3.5 \times 280) = 294' = 4^{\circ}54'$$

The back deflection angle would be:

$$\begin{array}{rcl} \text{Deflection of line tan to P.S.C.} & = & 4^{\circ}54' \\ - & \text{Spiral deflection} & = 1^{\circ}38' \\ \hline = & \text{Back spiral deflection} & = 3^{\circ}16' \\ & (\text{or } 2/3 S = 2/3 4^{\circ}54' = 3^{\circ}16') & \end{array}$$

From this we can check the bearing, of the line tangent at P.S.C.

$$\begin{array}{rcl} S & 42^{\circ}19'30'' & \text{E} \quad \text{Bearing of LC} \\ - & 3^{\circ}16'00'' & \quad \quad \text{Back deflection } \angle \\ \hline S & 39^{\circ}03'30'' & \text{E} \end{array}$$

We can now establish the rule: *A spiral curve and a circular curve which coincide at any point (such as the P.S.C.) deviate from each other at the same rate as the spiral does from the tangent at the P.S.*

The total deflection of the circular curve is equal to one-half of the central angle, or:

$$\begin{array}{l} \text{Deflection angle between line} \\ \text{tangent at P.S.C. and } LC_2 \end{array} = \Delta^2/2$$

$$\text{or } \frac{\Delta^2}{2} = \frac{24^{\circ}06'}{2} = 12^{\circ}03'$$

This is equal to the product of .3 of a minute, the degree of curve and the length of the curve: or,

$$3 (3.5 \times 688.57) = 723' = 12^{\circ}03'$$

The bearing of LC_2 would, therefore, be:

$$\begin{array}{rcl} S & 39^{\circ}03'30'' & \text{E} \quad \text{Bearing of line tan to P.S.C.} \\ - & 12^{\circ}03'00'' & \quad \quad \text{Circular curve deflection } \angle \\ \hline S & 27^{\circ}00'30'' & \text{E} \quad \text{Bearing of LC} \end{array}$$

Step 4 - Find the length of LC_2 . Use the formula:

$$LC_2 = 2R \sin \Delta/2$$

From figure 8-39 $C.R. = 3^{\circ}30'$. From table 14 (in the appendix) a 3.5-degree curve has a radius of 1637.022 feet. The delta angle of the curve (Δ) is $24^{\circ}06'$.

Hence (where $\sin 12^{\circ}03' = .20876521$)

$$LC = 3274.04 \sin 12^{\circ}03' = 683.51'$$

Step 5 - Find the bearing of LC_3 (the long chord of the spiral segment).

A spiral segment is used to connect a circular curve of any degree to a circular curve¹⁹ of another degree by using a portion of a spiral having a curvature intermediate between the two circular curves.



Figure 8-41

Therefore, in this case the spiral segment between a 3°30' curve and an 8° curve is used; omitting the first segment of the spiral from 0° (infinite radius) to 3°30'. See figure 8-41.

In this problem the deflection angle is computed as done for an intermediate set up on any standard spiral. To obtain deflection angles from a line tangent to the first circular curve, compute the deflection angle of the circular curve and add (add going forward on the curve) to the deflection angle of the spiral at a corresponding distance from the P.C.S.

Step 3 provided the mechanics for computing the deflection angle of the first circular curve (3.5° curve). The product of that computation was 12°03'. This is used to compute the bearing of the line tangent to the first circular curve at P.C.S. plus station 268 + 02.94.

S 27°00'30" E	Bearing of LC ₂
- 12°03'00"	Curve deflection ∠
S 14°57'30" E	line tan. to P.C.S. of 3.5° curve

Given in figure 8-39, the spiral segment values are L = 90 (= d in 100' stations = .9), a = 5, D = 3.5°, S = 5°10'30".

Remember, the spiral deflection angle formula:

$$i = 10 ad^2$$

and circular curve deflection angle formula:

$$i = .3 DL$$

Use these, as follows, to compute the deflection angle of LC, to the line tangent to P.C.S.

The deflection angle of the spiral segment is:

$$i = 10ad^2 = 10(5 \times .9^2) = 40.5 \text{ minutes}$$

$$i = 00^\circ 40' 30'';$$

and the circular curve deflection angle is:

$$i = .3 DL \text{ or } .3 (3.5 \times 90) = 94.5 \text{ min.}$$

$$i = 1^\circ 34' 30''$$

The deflection angle to LC₃ is, therefore:

$$\begin{array}{r} 00^\circ 40' 30'' \\ + 1^\circ 34' 30'' \\ \hline 1^\circ 74' 60'' \\ \text{or} \quad 2^\circ 15' 00'' \end{array}$$

To obtain the bearing, of LC₄, subtract the deflection angle from the bearing of the line tangent to P.C.S. of the 3.5° circular curve.

$$\begin{array}{r} S 14^\circ 57' 30'' E \\ - 2^\circ 15' 00'' \\ \hline S 12^\circ 42' 30'' E \quad LC_3 \end{array}$$

Step 6 - Before we can solve for the length of LC₃ it is necessary to find the total length of the spiral (the included segment plus the omitted segment). Use the formula:

$$(\text{total}) L = \frac{100 D}{a}$$

where: D is the degree of curve (8°) and a = 5.

$$(\text{total}) L = 800/5 = 160 \text{ feet}$$

from the formulae

$$\frac{X}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-1)!(4n-1)(-1)} \right)$$

and

$$\frac{Y}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-2)!(4n-3)(-1)} \right)$$

for 160 feet, X = 5.95 feet Y = 159.80 feet.²⁰ Next, find the difference of the X and Y values between the full length spiral and the omitted segment.

<u>X</u>	<u>Y</u>	<u>L</u>	
5.95'	159.80'	160'	
<u>.50'</u>	<u>70'</u>	<u>70'</u>	omitted
5.45'	89.80'	90'	difference

Find the length of LC₃ by solving for:

$$LC_3 = \sqrt{X^2 + Y^2}$$

using the x and y remainders,

$$LC_3 = \sqrt{5.45^2 + 89.80^2}$$

$$= \sqrt{8093.7425}$$

$$LC_3 = 89.96' = \text{length of the long chord of the spiral segment}$$

Step 7 - Find the bearing of LC₄ (the long chord of the second circular curve).

First, compute for the back spiral deflection angle for the spiral segment (i = .3 DL) or,

$$i = .3 (8 \times 90') = 216 \text{ minutes}$$

$$i = 3^\circ 36' 00''$$

Compute the deflection angle of the spiral segment (i = 10 ad²), or

$$i = 10 ad^2 = 10(5 \times .9^2) = 40.5 \text{ min.}$$

$$i = 40' 30''$$

Subtract the deflection angle of the spiral segment from the back spiral deflection angle of the spiral segment.

$$\begin{array}{r} 3^{\circ}36'00'' \\ - 0^{\circ}40'30'' \\ \hline 2^{\circ}55'30'' \end{array}$$

Rule: Always add the deflection angle of the circular curve and the spiral when computing forward (towards the sharper end of the spiral). Subtract the deflection angle of the spiral (from the circular curve) when computing back.

Therefore,

$$\begin{array}{rcl} \text{S } 12^{\circ}42'30'' & \text{E} & \text{LC}_3 \\ - 2^{\circ}55'30'' & & \text{Back Sp. Deflect } \angle \\ \hline \text{S } 9^{\circ}47'00'' & \text{E} & = \text{Bearing of line tan to the spiral} \\ & & \text{and } 8^{\circ} \text{ curve right (at P.S.C.).} \end{array}$$

The values of the second circular curve are: $L = 71.77$; $D = 8^{\circ}$ and $A = 5^{\circ}44'30''$ ($\therefore \Delta/2 = 2^{\circ}52'15''$).

The bearing of LC_4 is, therefore, computed as:

$$\begin{array}{rcl} \text{S } 9^{\circ}47'00'' & \text{E} & \text{line tan at P.S.C.} \\ - 2^{\circ}52'15'' & & \Delta/2 \\ \hline \text{S } 6^{\circ}54'45'' & \text{E} & \text{Bearing of } \text{LC}_4 \end{array}$$

Step 8 – To find the length of LC_4 , use the formula:

$$\text{LC}_4 = 2R \sin \frac{\Delta}{2}$$

For an 8° curve where $\Delta/2 = 2^{\circ}52'15''$

$$\begin{aligned} \text{LC}_4 &= 2(716.20) \sin 2^{\circ}52'15'' \\ \text{LC}_4 &= 1432.4 \times .05008453 \\ \text{LC}_4 &= 71.74' \text{ (length of the long chord} \\ &\quad \text{of the } 8^{\circ} \text{ curve)} \end{aligned}$$

Step 9 - Find the bearing of LC_5 (the last spiral, or end spiral of the curve). Begin the computation by solving for the bearing of the line tangent to the 8° curve at P.C.S.

$$\begin{array}{rcl} \text{S } 6^{\circ}54'45'' & \text{E} & \text{LC}_4 \\ - 2^{\circ}52'15'' & & \Delta/2 \text{ of } 8^{\circ} \text{ curve} \\ \hline \text{S } 4^{\circ}02'30'' & \text{E} & \text{Bearing of line tan to the } 8^{\circ} \text{ curve} \\ & & \text{at the P.C.S.} \end{array}$$

LC_5 is, therefore,

$$\begin{array}{rcl} \text{S } 4^{\circ}02'30'' & \text{E} & \\ - 2^{\circ}40'00'' & & 2/3 \text{ "S" of end. sp.} \\ \hline \text{S } 1^{\circ}22'30'' & \text{E} & \text{Bear. of } \text{LC}_5 \end{array}$$

To check that computation subtract S from the bearing of LC_5 . The remainder should be the bearing of the forward main tangent.

$$\begin{array}{rcl} \text{S } 1^{\circ}22'30'' & \text{E} & \text{LC}_5 \\ - 1^{\circ}20'00'' & & 1/3 \text{ S} \\ \hline \text{S } 0^{\circ}02'30'' & \text{E} & \end{array}$$

From figure 8-39, the forward main tangent is $\text{S } 0^{\circ}02'30'' \text{ E}$.

Step 10 - Solve for the length of LC_5 , using the formula:

$$\text{LC}_5 = \sqrt{X^2 + Y^2}$$

where: $X = 2.3$ and $Y = 99.95$

$$\text{LC}_5 = \sqrt{2.33^2 + 99.95^2}$$

$$\text{LC}_5 = 99.98'$$

CHECK - To check the accuracy of your computations, check the curve delta angle against the total delta angles of the sub-arcs of the curve (the spirals and circular curves).

$$\begin{array}{rcl} \text{S } 43^{\circ}57'30'' & \text{E} & \text{Back main tan.} \\ \text{S } 00^{\circ}02'30'' & \text{E} & \text{Fwd. main tan.} \\ - 43^{\circ}55'00'' & & \\ \hline & & = \text{Total } \Delta \end{array}$$

and

$$\begin{array}{rcl} 4^{\circ}54'00'' & & \text{S of sp.1} \\ 24^{\circ}06'00'' & & \Delta \text{ of } 3.5^{\circ} \text{ curve} \\ + 5^{\circ}10'30'' & & \text{S of Sp. Seg.} \\ 5^{\circ}44'30'' & & \Delta \text{ of } 8^{\circ} \text{ curve} \\ 4^{\circ}00'00'' & & \text{S of End Sp.} \\ \hline = 42^{\circ}114'60'' \\ = 43^{\circ}55'00'' & & = \text{Total } \Delta \end{array}$$

The values balance.

Step 11 - Solve for LC_6 , the long chord of the whole curve. This is solved via latitude and departures as computed in Figure 8-42.

Thus, the long chord bearing is

$$\text{Tan.} = \frac{\text{departure}}{\text{latitude}} = .49278976$$

.49278976 is tan of $26^{\circ}14'01''$

$$\text{LC}_6 = \text{S } 26^{\circ}14'01'' \text{ E}$$

Step 12 - Compute the length of LC_6 by using the formula

$$\text{LC}_6 = \sqrt{\text{lat}^2 + \text{dep}^2}$$

or

$$\begin{aligned} \text{LC}_6 &= \sqrt{1074.86^2 + 529.68^2} \\ \text{LC}_6 &= 1198.28' \end{aligned}$$

Step 13 - Find the angles of the triangle of the whole curve.

$$\begin{array}{rcl} S\ 43^{\circ}57'30'' & E & [\text{Back Main Tan.}] \\ -S\ 26^{\circ}14'01'' & E & [LC_6] \\ \hline S\ 17^{\circ}43'29'' & & = \angle \text{ between tan and } LC_6 \end{array}$$

$$\begin{array}{rcl} S\ 26^{\circ}14'01'' & E & [LC_6] \\ S\ 00^{\circ}02'30'' & E & [\text{Fwd. Main Tan.}] \\ \hline S\ 26^{\circ}11'31'' & & = \angle \text{ between } LC_6 \text{ and forward} \\ & & \text{main tangent} \end{array}$$

$$\begin{array}{rcl} 180^{\circ}00'00'' & & \text{Sum}^{\circ} \text{ of any triangle} \\ 43^{\circ}55'00'' & & \text{Total } \Delta \\ \hline 136^{\circ}05'00'' & & = \text{Interior } \angle \text{ between forward} \\ & & \text{\& back semi-tangents.} \end{array}$$

CHECK —

$$\begin{array}{rcl} 17^{\circ}43'29'' & & \angle \text{ bet. BK tan. \& } LC_6 \\ 26^{\circ}11'31'' & & \angle \text{ bet. FWD. Tan. \& } LC_6 \\ 136^{\circ}05'00'' & & \angle \text{ bet. Semi-Tan.} \\ \hline 179^{\circ}59'60'' & = & 180^{\circ} = \text{Closed Triangle} \end{array}$$

Final Step (14) - Compute the main semi-tangents of the curve. Use the *law of sines*,

$$\text{where: } \frac{\sin a}{A} = \frac{\sin b}{B} = \frac{\sin c}{C}$$

for the triangle of figure 8-43, which represents our curve triangle.

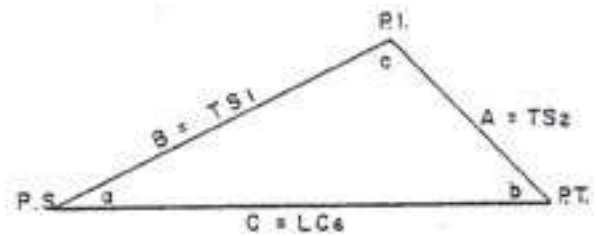


Figure 8-43

Let C represent LC_6 , the long chord of the total curve. In step 12, we computed LC_6 as 1198.28'; and in step 11 we found $\angle a = 17^{\circ}43'29''$, $\angle b = 26^{\circ}11'31''$ and $\angle c = 136^{\circ}05'00''$. The sines of each angle are as follows:

$$\sin 17^{\circ}43'29'' = .30444372$$

$$\sin 26^{\circ}11'31'' = .44138057$$

$$\sin 136^{\circ}05'00'' = .69365331$$

Use the formula $A = \frac{C \sin a}{\sin c}$ to find TS_2 of the curve (A of figure 8-43).

$$TS_2 = \frac{1198.28 \times .30444372}{.69365331}$$

$$TS_2 = 525.92' \text{ (P.I. to P.T.)}$$

Use the formula $B = \frac{A \sin b}{\sin a}$ to find TS_1 of the curve (B of figure 8-43).

Figure 8-42

BEARING	DEC. EQUIV.	LENGTH	COSINE	SINE	LATITUDE S	DEPARTURE E
S42°19'30"E	42.325 °	279.91'	.73933737	.67333518	206.95'	188.47'
S27°00'30"E	27.008 °	683.51'	.89094313	.4541149	608.97'	310.39'
S12°42'30"E	12.708 °	89.97'	.97550384	.21998241	87.77'	19.79'
S06°54'45"E	6.9125 °	71.74'	.99273111	.12035342	71.22'	8.63'
S01°22'30"E	1.375 °	99.98'	.99971206	.02399597	99.95'	2.40'
					<u>1074.86'</u>	<u>529.68'</u>

FORMULAE USED

LATITUDE	=	LENGTH	x	COSINE BEARING
DEPARTURE	=	LENGTH	x	SINE BEARING
TAN	=	DEPARTURE	÷	LATITUDE

$$\left\{ \begin{array}{l} 529.68 + 1074.86 = \\ = .49278976 \\ \tan .49278976 = 26.2336^{\circ} \\ = 26^{\circ}14'01'' \end{array} \right.$$

$$TS_1 = \frac{1198.28 \times .30444372}{.69365331}$$

$$TS_1 = 762.48' \text{ (P.S. to P.I.)}$$

Note: The approach used in this solution is also applicable to the two-spiral compound curve illustrated in figure 8-38A and B.

Exercise - Three Spiral Curve

Use the preceding steps 1 through 14 to compute the long chord and semi-tangents of the curve in figure 8-44.

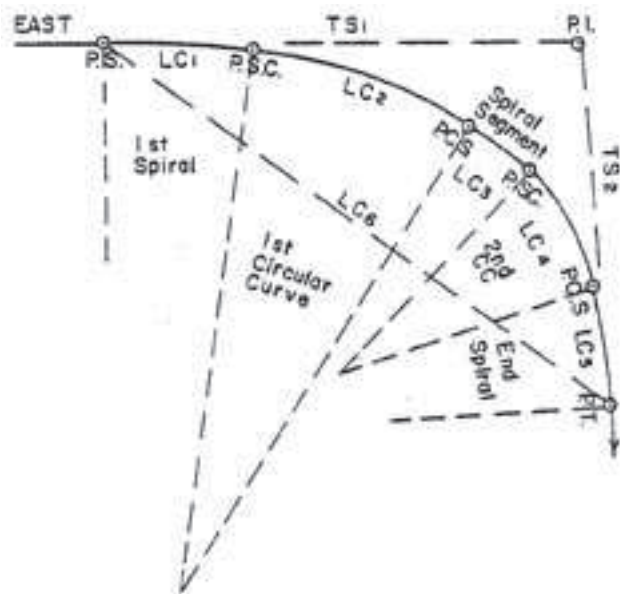


Figure 8-44

The given curve data is:

First Spiral:	L = 400' sp S = 8° A = 1
First Circular Curve:	C.R. = 4° Δ = 24°24' L = 610' R = 1432.39'
Spiral Segment:	L = 200' sp. ²¹ S = 12°00' A = 2
Second Circular Curve (c.c.):	C.R. = 8° Δ = 27°48' L = 347.5' R = 716.20'
End Spiral:	L = 320' sp. S = 12°48' A = 2½ (or 2.5)

If your computations are correct the curve values will be as follows:

Step 1	—	Bearing LC ₁	=	S87°20'E
Step 2	—	Length LC ₁	=	399.65'
Step 3	—	Bearing LC ₂	=	S69°48'E
Step 4	—	Length LC ₂	=	605.40'
Step 5	—	Bearing LC ₃	=	S52°16'E
Step 6	—	Length LC ₃	=	199.63'
Step 7	—	Bearing LC ₄	=	S31°42'E
Step 8	—	Length LC ₄	=	344.10'
Step 9	—	Bearing LC ₅	=	S9°16'E
Step 10	—	Length LC ₅	=	319.29'

$$\text{FORWARD MAIN TAN} = S5°00'E$$

$$\begin{aligned} \text{CHECK — East.} &= 90°00'00'' \text{ (BK Tan)} \\ \Delta &= 85° \text{ (Total } \Delta) \\ &= S5°E \text{ FWD. MAIN TAN.} \end{aligned}$$

and:	8°00'	S of Sp.1
	24°24'	Δ of 4° Curve Right
	12°00'	S of Sp. Segment
	27°48'	Δ of 8° Curve Right
	+ 12°48'	S of End Sp.
	85°00'	Total Δ

Step 11	—	Bearing LC ₆	=	S54°47'52"E
Step 12	—	Length LC ₆	=	1661.30'
Step 14	—	Length TS2	=	961.34'
		Length TS1	=	1273.70'

Right-of-Way Lines of the Standard Highway Spiral

The curve information supplied on strip maps always relates to the centerline traverse, not to the right-of-way lines. In figure 8-45 the spiral curve data is for the centerline of the highway right-of-way; however, TΔ, S and Δ apply to the right-of-way lines as well as the centerline. Moreover, R_p is the point of symmetry for the right-of-way lines as well as the centerline; however, the radius of each line is different. The radius of the centerline is 286.48'. The radius of the outside right-of-way line will be R + 50 (336.48'); of the inside right-of-way will be R - 50 (236.48'). If the radius of each line is different, the degree of curve is different for each line; the inside being

$$D^\circ = 5729.58 / R - 50 = 24.23^\circ;$$

the centerline being

$$D^\circ = 5729.58 / R = 20^\circ;$$

and the outside right-of-way being

$$D^\circ = 5729.58 / R + 50 = 17.03^\circ$$

It should be obvious from figure 8-45 that the length of each central curve right-of-way (r/w) line is different. Therefore, it stands to reason that the length of each spiral r/w line is different. This will not present a problem to the cartographer if the following rules are adhered to:

1. The P.S. of the inside and outside right-of-way lines are always on a line intersecting the centerline P.S. at right-angles to the back main tangent.
2. The P.T. of the inside and outside right-of-way lines always on a line intersecting the centerline P.T. at right angles to the forward main tangent.
3. The P.S.C. of the inside and outside right-of-way lines are at the intersection of a radius line, projected through the centerline P.S.C., and the right-of-way lines.
4. The P.C.S. of the inside and outside right-of-way lines are at the intersection of a radius line, projected through the centerline P.C.S., and the right-of-way lines.

RAILROAD SURVEYS

Railroad right-of-way survey plats are an important reference source for establishing cadastral map geometry. The right-of-way and centerline data are recorded on strip maps titled "Right-of-Way and Track Maps." Most railroad surveys were executed in the early 1900s; subsequently, much of the survey and

ownership data will be superceded by later surveys and later instruments of conveyance. The railroad should not, however, be rejected or rated subordinate to other data merely on the basis of the age of the survey. The traverse surveys were executed with suprisingly high precision and, therefore, must be considered in the analytical bridging process.

Like highway strip maps, the railroad strip maps provide survey ties to the lines and corners of sections, section subdivisions, donation land claims, subdivisions, old roads and highways, rivers, ditches, and other railroads. Moreover, from the standpoint of title abstract, the railroad strip maps are a treasure of historical ownership data.

This section will provide an explanation of the Right-of-Way and Track Maps, railroad curves and curve geometry. The plotting procedures are identical to highway right-of-ways; therefore, they will be omitted from this section.

Railroad Right-of-Way and Track Maps

The Right-of-Way and Track Maps represent the route strip maps for most common-carrier railroads. The detail drawings of the depots, yards and stations are commonly referred to as *Station Maps*.

Figure 8-46 is a small section of the Right-of-Way and Track Map of the Southern Pacific Railroad in Lakeside, Coos County. It is a good example of the type and quantity of usable cadastral data contained

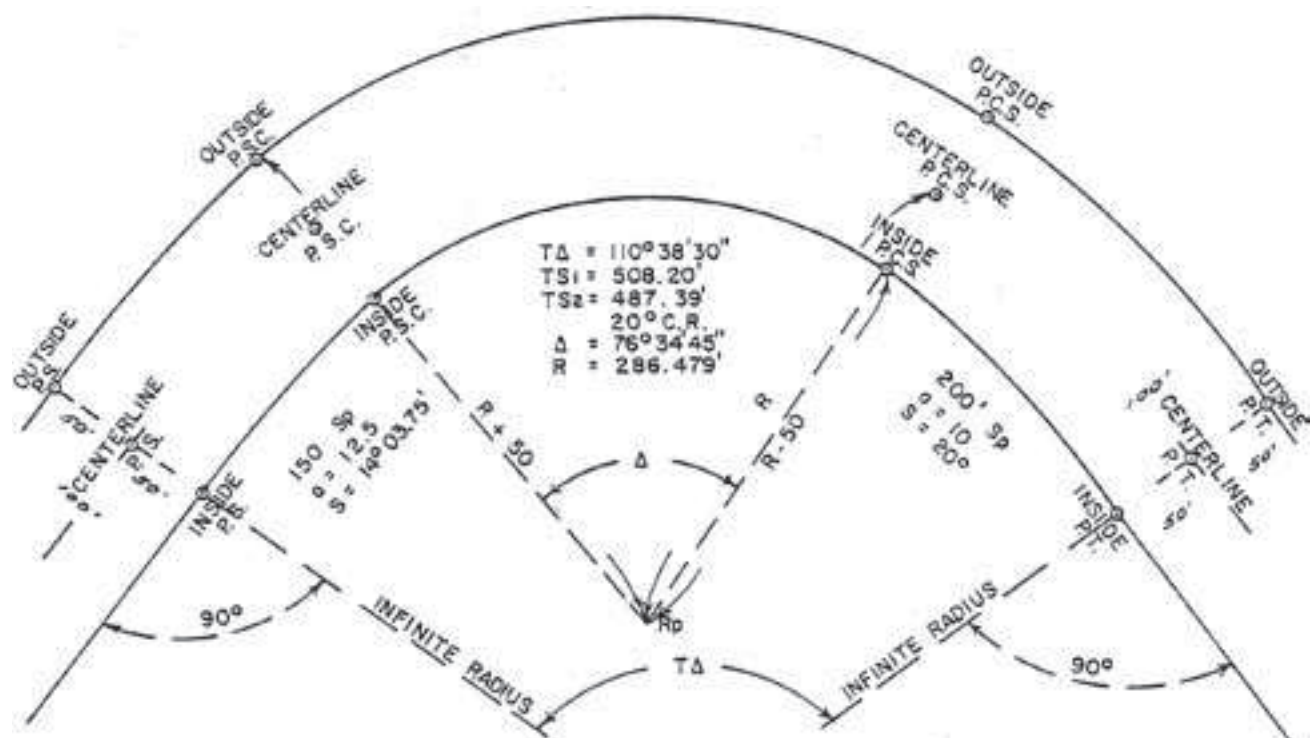


Figure 8-45

on most of the strip maps. The lettering "No. 2," "No. 8," and "No. 9" refers to a part of the drawing called the "Schedule of Property." Most railroad strip maps (at least those of the Southern Pacific Company and Union Pacific Company) will display the schedule. As figure 8-47 illustrates, the schedule contains valuable historical ownership data of the lands bisected by the railroad right-of-way. Parcel number 8, for example, was acquired from the United States by an 1875 Act of Congress. No. 9 was purchased from Peter Menegat and wife by a 1914 warranty deed recorded in DB 69-511 of Coos County. The right-of-way alienated by the Menegats contained 6.052 acres. For research purposes it would be reasonable to assume that the Menegats owned the land on both sides of the right-of-way; this, at least, will provide a starting point for title research. Parcel number 2 was conveyed to the Willamette Pacific Railroad Company by J. L. Simpson (et ux, et al). A county ordinance of 1912 provided for the county road crossing parcel number 2. A 1912 permit from the State Railroad Commission provided for a crossing grade on parcel number 2.

The Right-of-Way and Track Map²² also confirms a discrepancy between the plat of Lakeside location of the Coast Meridian and the railroad survey location of that meridian. It establishes the existence of a county road through the S 1/2 NE 1/4 of Section 13, T.23S. R.13W. W.M.; provides the location of Eel creek in the early 1900s (sometimes essential to the solution of riparian problems); provides location of abandoned centerline traverse "N"; establishes location of Ten Mile Creek; and shows the location of some of the lots, blocks, alleys and streets of the Town of Lakeside and Elk Park Addition to Lakeside.

Railroad Right-of-Way and Track Map abbreviations are:

Δ	=	Delta angle
S	=	Total angle of taper
B.C.	=	Beginning of Curve
C	=	Long chord
C.C.	=	Compound curve
Culv.	=	Culvert
Rtd	=	Distance from main tangent, in the taper part of the curve, to the radius point (Rp.).

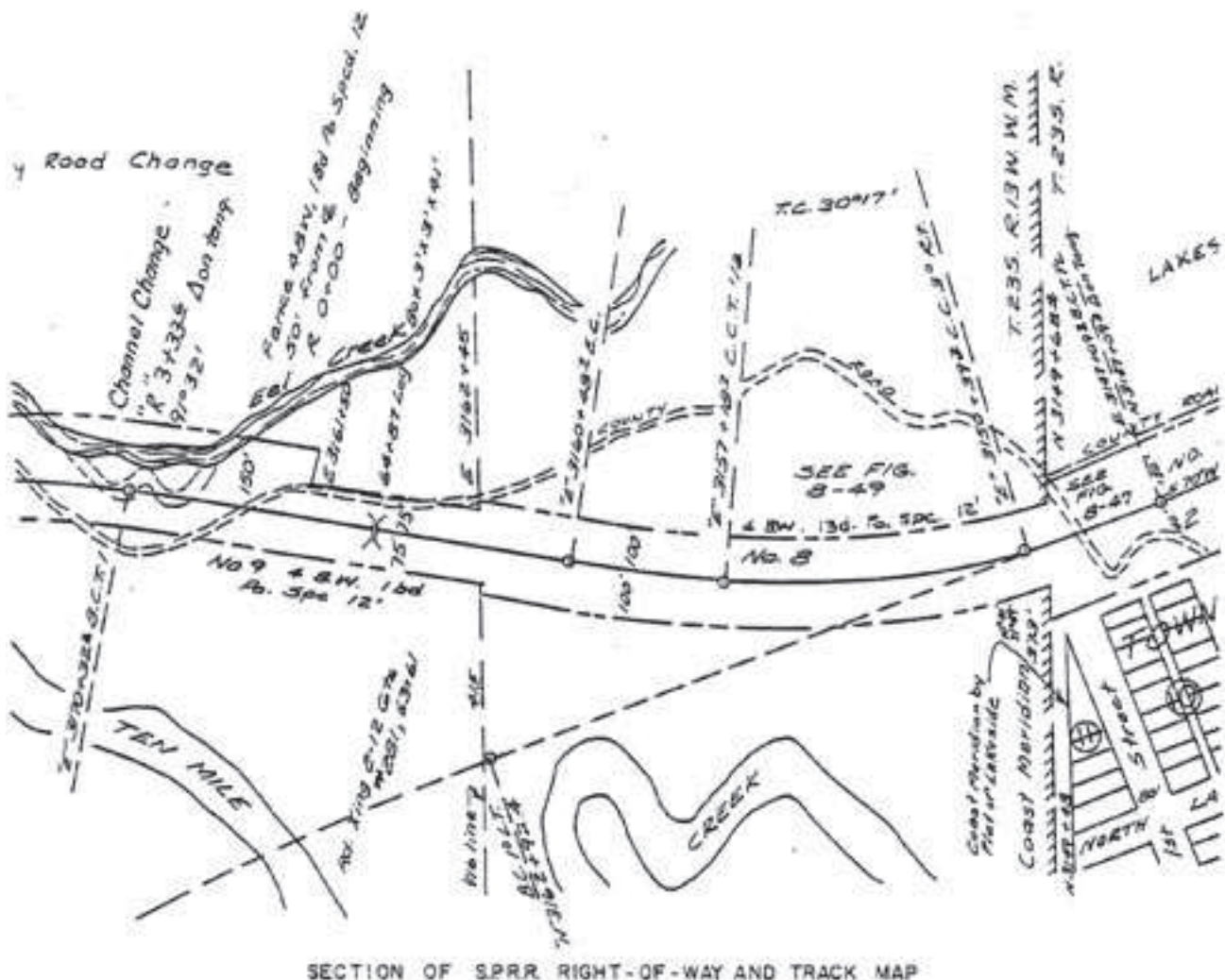


Figure 8-46

From S.P.R.R. Dwg V2/28 SHE "N" 3090+00 to "N" 3290+00									
SCHEDULE OF PROPERTY									
No.	Grantor	Grantee	Institu.	Date	Record	Cust'd. No.	Area	Sp. Pl.	(Abbreviated) Remarks
1.	J.L. Simpson et al.	Willamette Pac. R.R.	W.D.	10-11-1911	05-61-125 8-13-1911	11284	7.058		
2.	" " " "	"	"	"	"	20282			Attn. Co. Rd. crossing permit for King & Co. Rd.
	County of Coos, Ore	The Public	Ord.	11-8-1912		Ord 310			
	State RR Comm., Ore	Willamette Pac. R.R.	Permit	12-11-1914		F-1176			
3.	C.M. Holstrom et al.	"	W.D.	11-20-1911	05-61-503 12-25-1911	11336	2.437		
4.	" " " "	"	"	8-22-1914	" 69-490 8-25-1914	14197	1.452		
5.	Abraham Van Lile	"	"	9-8-1914	" 70-195 11-13-1914	14227			
6.	Co. Court of Coos Co.	"	Ord.	3-8-1915		Ord 129	4791		Property part of Van Lile's Co. Rd.
	Abraham Van Lile	"	W.D.	9-4-1914	05-70-196 11-13-1914	14281	879		Some trees on parcel
7.	State Land Board	"	G.C. Deed	3-5-1912	" 62-458 4-3-1912	11469	31500		
8.	U.S. Government	"	G.C. Deed	3-3-1895	05-69-511 8-31-1914	14223	5.861		
9.	Manegot et al.	"	W.D.	8-3-1914	" 69-379 7-30- "	14122	6.052		
10.	Anna Baker et al.	"	W.D.	7-10- "	" 70-372 12-26-1914	14275	2.882		
11.	Wm. Wilkins & Bennett et al.	"	G.C. Deed	9-11- "	" 72-54 6-12-1915	14275	6.494		Abstract from above mentioned
	Wm. Wilkins	"	Agreement	6-4-1915	" 70-372 11-17-1914	14300			See Note 2
15.	Wm. McNeill	Willamette Pac. R.R.	W.D.	2-3-1912	05-62-369 3-20-1912	11668	9.874		
16.	" "	"	"	8-8-1914	" 69-459 8-26-1914	14303	94.135		Quiltinga Parcel 12118
17.	L.J. Simpson et al.	"	G.C. Deed	10-31-1914	05-70-85 10-26-1914	14301			See Note 7
18.	" " " "	"	W.D.	9-10-1912	" 64-390 11-19-1912	12860	2.496		Reference to above mentioned Co. Rd. 14301
	L.J. Simpson et al.	Southern Pacific Co.	G.C. Deed	4-17-1915	" 71-369 5-4-1915	30410	25.400		
19.	T. Williams et al.	Willamette Pac. R.R.	G.C. Deed	7-28-1915	" 72-153 8-16- "	14028			
	U.S. Dept. of Agriculture	"	Stipulation	11-16-1911	" 61-673 12-1-1911	11455	2.84		
	" " " "	"	"	6-7-19	" 30729				
	" " " "	"	"	11-17-13	" 13723				

Notes: From S.P.R.R. Dwg V2/28

Note No. 1 The Willamette Pacific Railroad was purchased by the Southern Pacific Co. by B.L. deed and No. 17992 dated July 1, 1915 in 05-72-28 Coos County.
 Note No. 2 B.L. Deed 3-28-1915 and 1st. in parcel 11 being same tract from Sta. 3100+00 to Sta. 3201+00, 5.422 acs incl. in parcel 12 being same tract from abandoned line Sta. "N" 3177+00 to "N" 3193+00.
 Note No. 3 34222 acs. equal 2134 and shown as Parcel 2, 10, 11, Map 27, 2012 was shown as Parcel 1, 10 inclusive, Map 27 (reference here to S.P.R.R. Dwg V2/28)

THE ABOVE DATA IS FROM SHEET NO. 28 OF THE COOS BAY BRANCH OF THE SOUTHERN PACIFIC COMPANY'S RAILROAD, PORTLAND DIVISION, OREGON. MAP SCALE 1"=400', PREPARED BY S.P.R.R. CO. VALUATION DEPARTMENT. PARCEL 2 ABOVE IS IN LAKEVIEW, OREGON AT MILE 75.24

Figure 8-47

D	=	Degree of curve
D	=	Tangent offset to main curve produced to N (fig. 8-47).
E.C.	=	End of curve (the whole curve)
I	=	Length of circular curve
L	=	Length of taper or length of simple curve
LC	=	Long chord
L.t.	=	Turning left
N	=	The point offset from the tangent and radius point.
P.O.T.	=	Point on tangent
R	=	Radius
R.t.	=	Turning right
Sc	=	Station at centerline traverse
T	=	Distance on tangent to point N where the main curve produced becomes parallel to the back or forward main tangent.
T.C.	=	Total θ of the curve ($T.C. = \Delta$)
Tang.	=	Tangent
X	=	Distance on tangent to any station of the taper.
Xing	=	Crossing
Y	=	Offset from tangent

Railroad Centerline Stationing

The subsection on highway centerline stationing is applicable to railroad centerline stationing; however, there are some differences and railroad stationing policies that warrant noting.

Railroad Right-of-Way and Track Maps often contain the stationing of side tracks, abandoned tracks, spurs and other traverses. They also include stationing of switch boxes, railroad crossings, property lines, signal posts, fences, culverts, loading decks, frogs,²³ water tanks, station houses, fuel tanks, storage buildings, scales, grain elevators, utility lines, etc. Subsequently, it is often difficult to identify the current centerline traverse. Figure 8-48 is typical of the Right-of-Way and Track Maps that show confusing stationing. The secret to locating the proper centerline traverse is (in most instances) to locate a solid line marked with the 100 foot-interval station ties. This is usually the main line traverse (marked M.L. in figure 8-48).

On most Right-of-Way and Track Maps the equation stations are not identified by the word "EQUATION" (as with highway strip_maps). It is, therefore, advis-

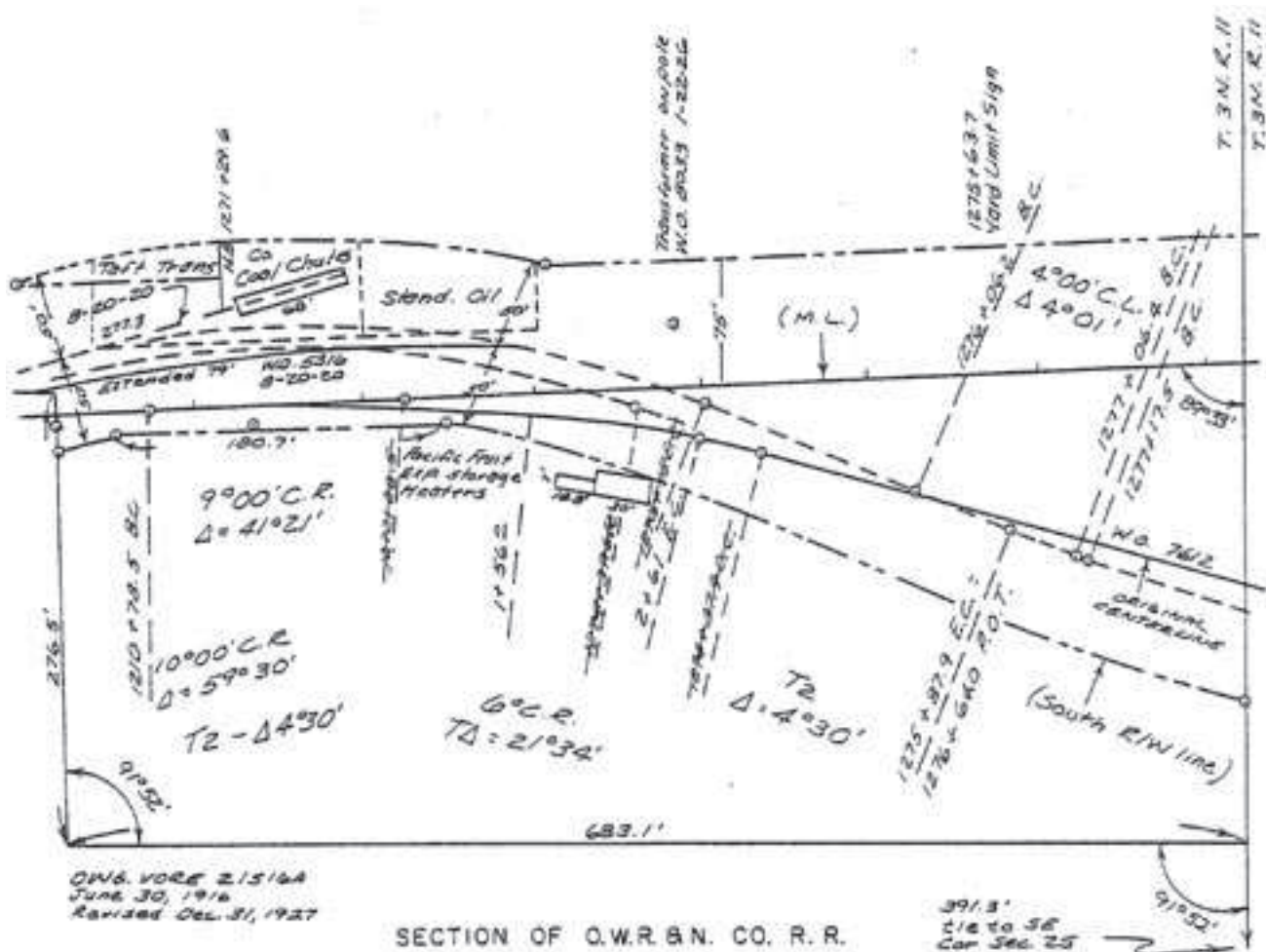


Figure 8-48

able to review the maps very carefully to identify all equation stations, being certain to mark or note the stations for easy identification later. If this is not done, there is an excellent possibility that you will encounter the same station problems identified with figure 8-4.

Railroad engineers and surveyors used letter designations with most stationing. This was done to prevent confusion over which traverse the stationing was referenced to, e.g., the “E” and “N” lines in figure 8-46. The designations A, B, C, D, E, G, H, K, L, L2, U, M, N, T and Z were used to identify stationing on the Mapleton-Myrtle Point Section of the Southern Pacific Railroad. It is, therefore, strongly recommended that you include the letter designation when labeling stations on the cadastral maps.

Railroad Curves

The first railroads were designed as simple curves connected by straight lines. In the later years the transitional curves were included in the design of railroads; never, however, totally replacing the simple curve. The simple curve has still been retained for most curves less than 1° of arc. It is, therefore, not uncommon to find one section of railroad with taper curves, simple curves, compound taper curves and compound simple curves.

The railroad simple curve principals are identical to the highway simple and circular curve principals²⁴. Therefore, the subsection, formulae, tables and illustrations on highway circular curves can be applied to the railroad simple curves.

The Railroad Taper Curve

The transitional curve employed in most railroad surveys in Oregon is a spiral-type curve referred to as *the taper curve*. This type of curve is basically like the *tangent-chord*²⁵ spiral and is so identical to the standard highway spiral that, with special care, the highway spiral tables can be used to obtain curve values. There are, however, some minute differences between the spiral and taper. Therefore, we will supply taper tables and some instruction on computing taper values.

Figure 8-49 is a detailed drawing of a right-hand taper curve in figure 8-46 (station E 3147 + 09.3 B.C. to plus station E 3160 + 48.7 E.C.) the parts between plus stations E 3147 + 09.3 and E 3150 + 39.3, and between E 3157 + 18.7 and E 3160 + 48.7 are the tapers. The arc connecting the tapers is the simple central curve. Greater detail of the taper is provided in figure 8-50. The circled letters are the designations of the taper elements. They are:

- A = The point where the main tangent ends and the taper begins (the B.C.). At this point the radius of the taper is infinite.
- B = The point on the semi-tangent that is opposite a point where the tangent to the circular curve (produced forward or backward) becomes parallel to the main tangent. It is “d” distance, at right angles, to the main tangent from point “N”.
- E = A point on the semi-tangent where a line tangent to the central curve and spiral at C.C. intersects the semi-tangent.
- G = The P.I. of the whole curve.
- H = The point of taper to the central (simple) curve. At this point the radius of the taper is identical to the radius of the central curve.
- N = The point where the arc of the central curve becomes parallel to the main tangent.
- X = (point x) The point on the semi-tangent, at X distance from point A, that is opposite point H. Line A pt X is the latitude of line AH; Line ptXH is the departure of line AH.

The central curve of the highway spiral is based on the degree of curve as defined by the central angle subtended by an *arc of 100 feet*, whereas, the central curve of the railroad taper curve is based on the degree of curve as defined by the central angle subtended by a *chord of 100 feet* (the same definition applied to railroad simple curves). The formula for the railroad simple curve is:

$$R = \frac{50}{\sin D^\circ / 2}$$

For example, the radius of a 4° railroad simple curve is

$$R = \frac{50}{.0348995} = 1432.6854'$$

Whereas, the formula based on the arc definition used for highway simple curves provides a *slightly* different answer.

$$R = \frac{5729.578}{D^\circ} = \frac{5729.578}{4}$$

$$R = 1432.3945$$

If the value of R for the chord definition is different from the value of R for the arc definition, it stands to reason that other curve values will be different; for example,

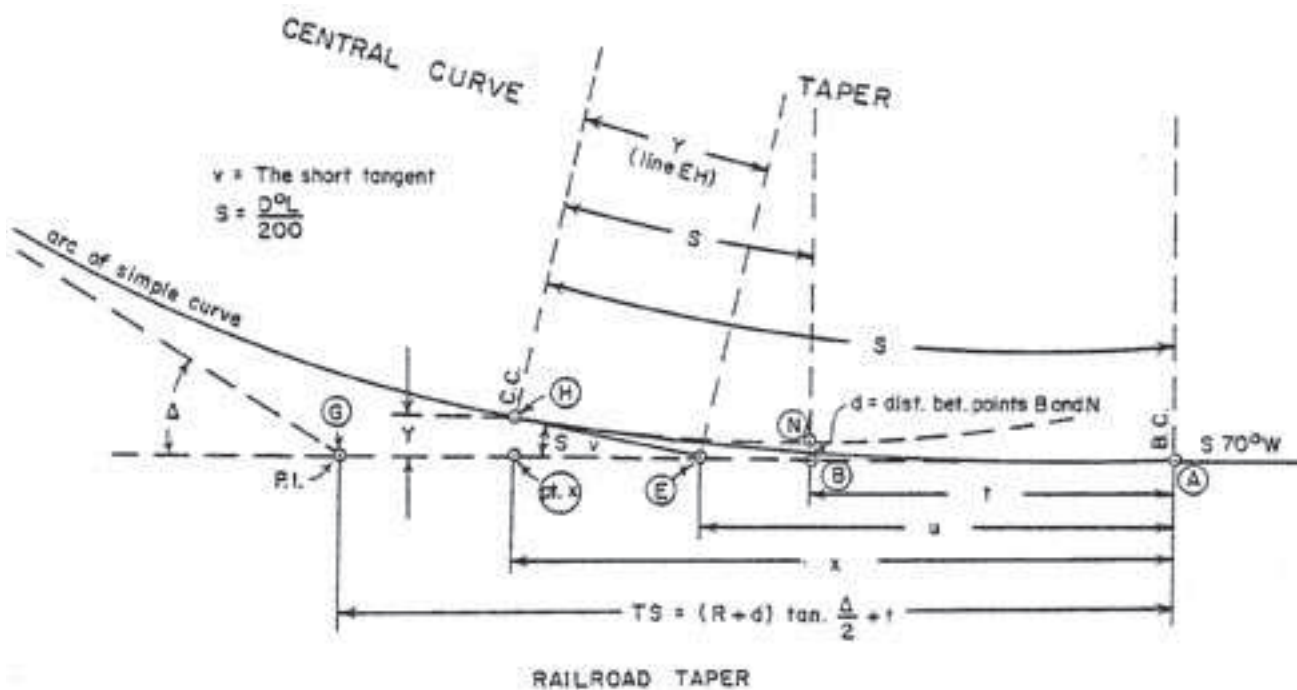
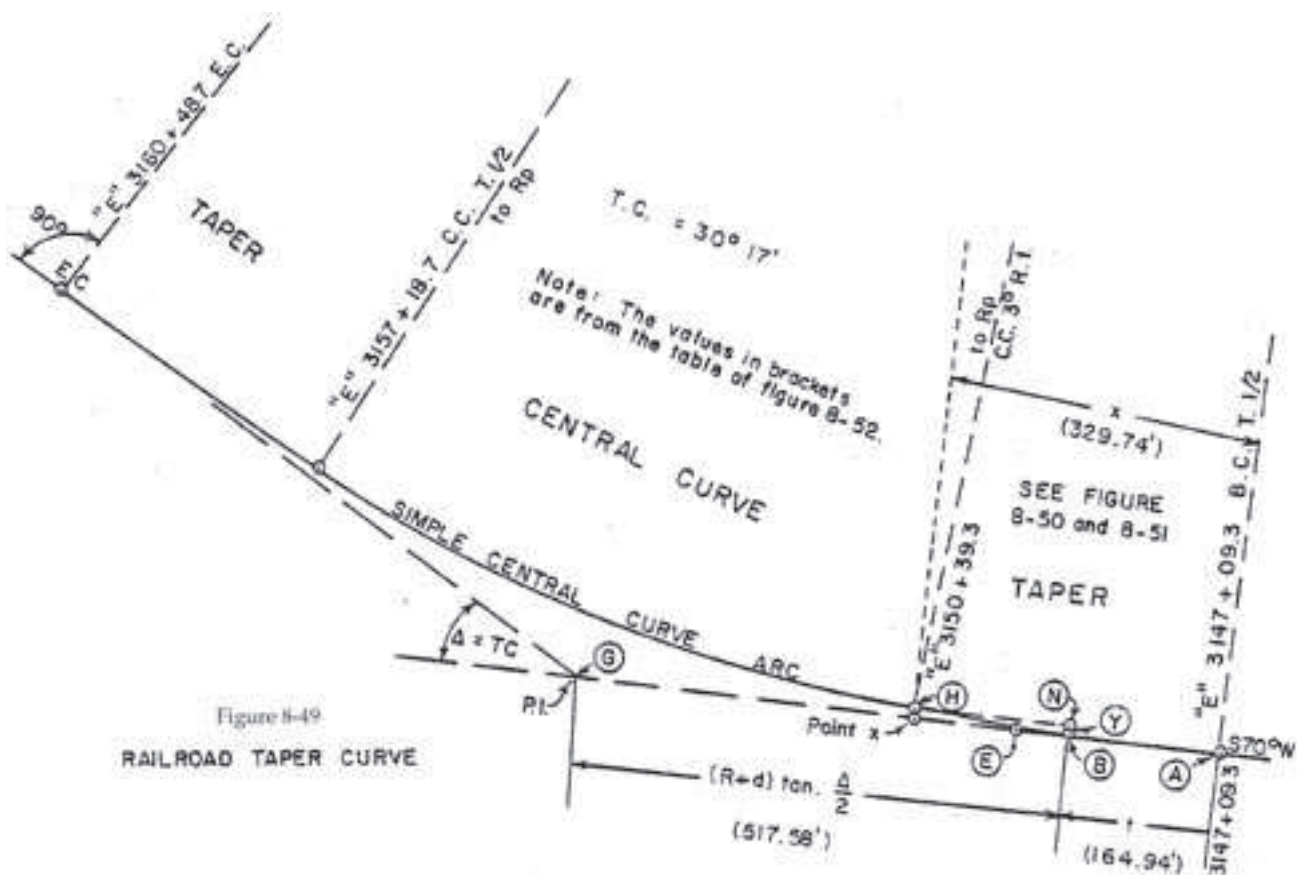


Figure 8-50

	Arc	Chord
Degree of curve	4°	4°
Delta angle	44°	44°
R	1432.40'	1432.68'
Semi-tangent	578.70'	578.80'
Long Chord	1073.15'	1073.36'
Middle Ord.	104.28'	104.30'
External Ord.	112.47'	112.49'
L	1099.45'	1099.66'

It should be obvious that the resulting differences of the values are too small to have an effect on the graphics of the curve. Subsequently, although the highway simple curve and spiral curve formulae will be only approximate for railroad simple curves and taper curves, they will suffice for most cadastral map purposes.

The values of the railroad taper in figures 8-49 and 8-50 can be derived from the following formulae:

- *Semi-tangent of total curve.*

$$TS = t + (R+d) \tan \frac{\Delta}{2}$$

- *Distance on the semi-tangent to point B (t).*

$$t = X R \sin S \text{ or,}$$

$$t = X - \frac{28.647889757L}{S} \sin S$$

$$t = 164.944 \text{ (for the example curve)}$$

- *Central angle of the taper(s).*

Where: D° = degree of curve and
 L = length of the taper.

$$S = \frac{D^\circ L}{200} = 4^\circ 57'$$

- *Departure -- Semi-tan. to point N (d).*

$$d = Y - R \text{ vers } S \text{ or,}$$

$$d = Y - \frac{28.647889757L}{S^\circ} \text{ vers } S$$

$$d = 2.807'$$

- *Latitude of taper (x).²⁶*

$$\frac{X}{L} = \sum \left(\frac{\theta^{2n-2}}{(2n-2)!(4n-3)(-1)^{n+1}} \right)$$

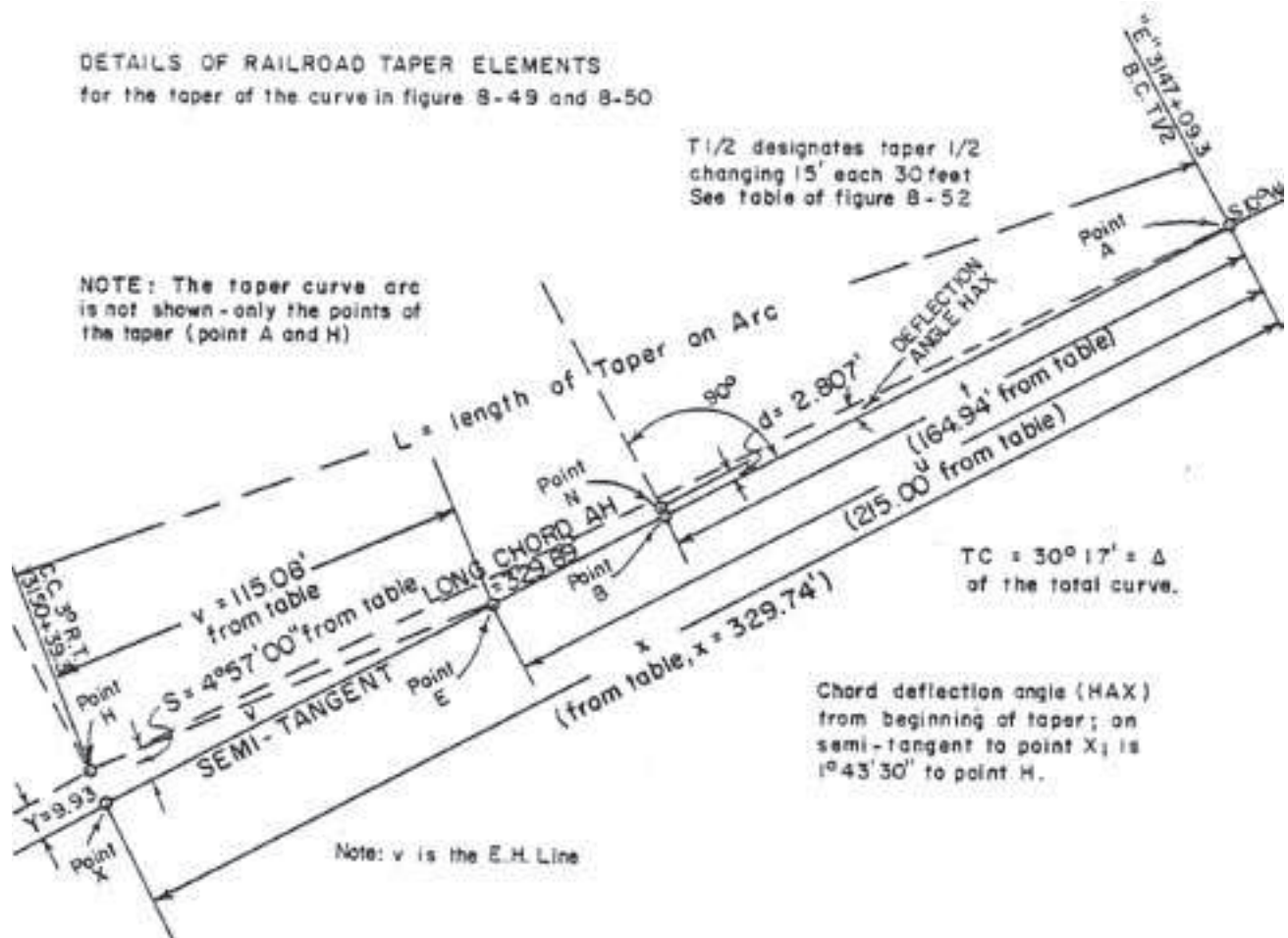


Figure 8-51

L ft.	D° Central Curve	S°	HAX	U feet	V feet	C feet	t feet	d feet	(R+d) feet	X feet	Y feet
30	30°	00°04'30"	00°02'15"	15.00	15.00	30.00	11.00	.004	11549.18	30.00	.02
60	45°	00°13'30"	00°05'37"	35.00	25.00	60.00	30.00	.030	7639.45	60.00	.10
90	1°	00°27'00"	00°10'30"	55.00	35.00	90.00	45.00	.098	5729.69	90.00	.27
120	1°15'	00°45'00"	00°16'51"	75.00	45.00	120.00	60.00	.198	4583.88	120	.59
150	1°30'	1°07'30"	00°24'45"	95.00	55.00	150.00	75.00	.344	3820.09	150	1.08
180	1°45'	1°34'30"	00°36'07"	115.00	65.00	180.00	90.00	.530	3274.68	179.98	1.79
210	2°	2°06'00"	00°45'00"	135.01	75.01	210.00	105.00	.825	2865.65	209.97	2.75
240	2°15'	2°42'00"	00°57'27"	155.02	85.02	239.90	119.99	1.08	2547.60	239.94	4.00
270	2°30'	3°22'30"	1°11'15"	175.04	95.04	269.96	134.98	1.67	2293.55	269.90	5.59
300	2°45'	4°07'30"	1°26'37"	195.06	105.05	299.93	149.96	2.16	2085.70	299.84	7.96
330	3°	4°57'00"	1°43'30"	215.00	115.08	329.89	164.94	2.81	1912.72	329.74	9.93
360	3°15'	5°31'00"	2°01'52"	235.14	125.12	359.84	179.92	3.57	1766.58	359.61	12.75
390	3°30'	6°09'30"	2°21'44"	255.20	135.10	389.76	194.88	4.64	1641.56	389.43	16.06
420	3°45'	7°52'30"	2°43'06"	275.29	145.77	419.65	209.83	5.49	1533.45	419.18	19.90
450	4°	9°	3°03'58"	295.40	155.37	449.58	224.77	6.67	1439.14	448.85	24.30
480	4°15'	10°12'00"	3°30'19"	315.55	165.50	479.33	239.69	8.00	1356.21	478.44	29.31
510	4°30'	11°28'30"	3°56'11"	335.14	175.67	509.10	254.58	4.50	1282.82	507.90	34.95
540	4°45'	12°49'30"	4°23'31"	355.98	185.81	538.81	269.46	11.17	1217.48	537.23	41.26
570	5°	14°15'00"	4°52'22"	376.27	196.16	568.45	284.30	13.07	1159.03	566.40	48.28

Figure 8-52

Where $\theta = S$ in radians

$$x = 329.7432$$

- Departure of the taper (Y).²⁷

$$\frac{Y}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-1)!(4n-1)(-1)^{n+1}} \right)$$

$$x = 9.93003$$

- The distance on the tangent from the B.C. to the intersection with a tangent through the first C.C. (v).

$$u = X - (Y \cot S)$$

$$u = 215.00'$$

- The distance on the tangent through the first C.C. from the C.C. to the intersection with the tangent through B.C. (v).

$$v = \frac{Y}{\sin S} \quad Y = \csc S$$

- The external ordinate of the whole curve. The distance from the P.I. of the total curve to the center of the arc of the central curve (on a radius line extending to the P.I.).

$$Es = d + (R+d) \operatorname{exsec} \frac{\Delta}{2}$$

The long chord of the taper (c).

$$c = \sqrt{Y^2 - X^2}$$

$$c = 329.893 = \text{line AH}$$

The taper tables, as shown in figure 8-52, can be used to obtain the taper values. Where $t = \frac{1}{2}$, for a taper between 30 and 570', simply figure the length of the taper and locate that value in the L column. The taper values will

be to the right of the L value. For our subject taper (of figure 8-49 and 8-50), the taper length is:

$$\begin{array}{r} 3150 + 39.3 = \text{C.C.} \\ - 3147 + 09.3 = \text{B.C.} \\ \hline 3 + 30.0 = L \end{array}$$

or, $L = 330'$

The D, S, HAX, U, V, C, t, d, (R + d), X and Y values for a 330' t½ taper are outlined with a heavy line in figure 8-52. Table 28 in the appendix will supply the values for most tapers between t½ and t4.

Plotting the Standard Railroad Taper

The taper of figure 8-49 (between E 3147 + 09.3 B.C. and E 3160 + 48.7 E.C.) is the subject of this discussion. Remember the first rule in plotting *any* type of curve (highway, railroad, county road, street, etc.): *always locate the points of the curve triangle B.C. P.I. E.C. before locating the arc and sub-elements of the curve. The first point to be located should be the P.I. This will keep the mistakes, blunders, personal errors, accidental errors, and systematic measuring and plotting errors within the confines of the curve.*

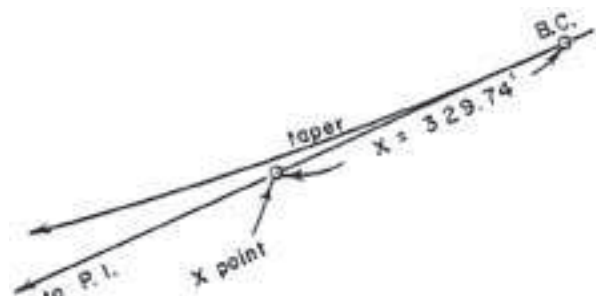


Figure 8-53

Step 1— After locating the points of the curve triangle, locate the x point on the semi-tangent (figure 8-53).

Step 2— From the x point on the semi-tangent, measure the Y distance on a line that is to the right and perpendicular to the main tangent. Ms is the point where the taper intersects the central curve; the C.C. (figure 8-54).

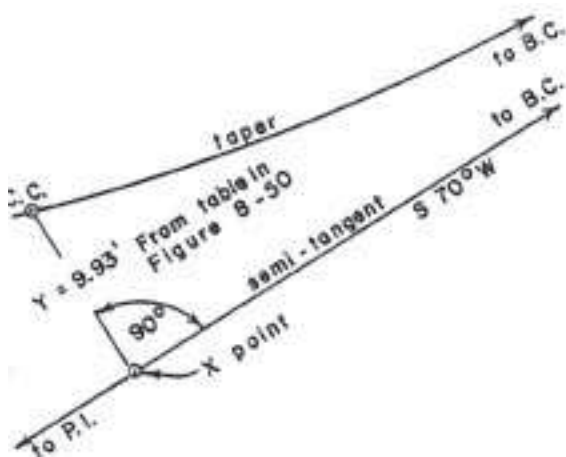


Figure 8-54

It is a good practice to think of each point in terms of *deflection angle* as well as the right-angle measurements. The deflection angle to the C.C., from the B.C., is under the HAX column of the taper table (opposite the taper length). For the subject taper, HAX is 1°43'30". Hence, the bearing of the long chord of the first taper is:

$$\begin{array}{r} \text{S } 70^{\circ}00'00'' \text{ W} \\ + \quad 1^{\circ}43'30'' \\ \hline \text{S } 71^{\circ}43'30'' \text{ W} \end{array}$$

Step 3 - Measure the t distance (164.94') from B.C., on the semi-tangent, to point B (figure 8-55).

Step 4 - On a line at right angles to the semi-tangent from point B, measure the d distance and the R + d distance (figure 8-55). The d distance locates point N, which is the point where the circular curve tangent becomes parallel to the back main tangent. Distance R + d locates the radius point.

The deflection angle of N B.C. B can be found by using the law of sines.

Repeat the foregoing steps to establish the points of the end taper. Rp must be the same for both tapers (when the first and end tapers are of equal length).

Step 5 - Using Rp as the point of symmetry of the central curve, use a pencil compass to plot the arc of the central curve (from C.C. to C.C.).

Step 6 - Railroad tapers are usually short; therefore, the tapers can be accurately plotted with an engineer's curve, French curve, railroad curve, or

possibly a ship curve. In this step use an appropriate curve template to plot the tapers, making certain that the tapers gently are away from the main tangent and gently flow into the circular curve. Keep in mind that the taper has the same radius at the C.C. as the abutting simple curve.

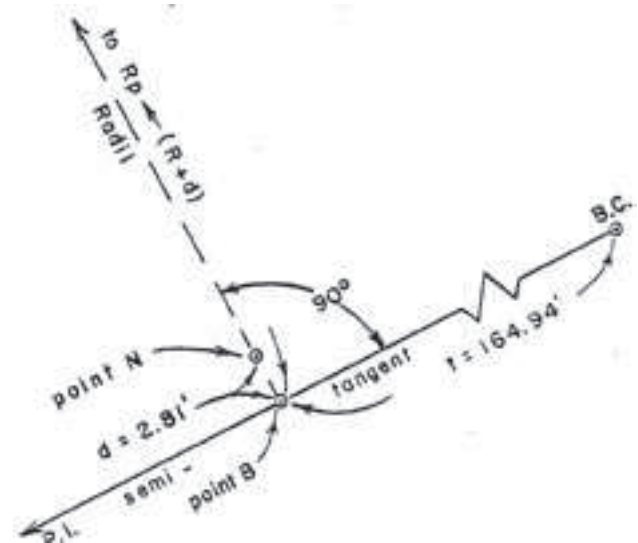


Figure 8-55

Semi-Tangent with Unequal Tapers

The semi-tangents of the curve of figure 8-56 can be derived from the formulae.

Where Δ is less than 90° :

$$TS = \frac{(R_1 + d_1) - (R + d \cos \Delta)}{\sin \Delta} + t$$

$$TS_1 = \frac{(R + d) - (R + d_1 \cos \Delta)}{\sin \Delta} + t_1$$

and, where Δ is greater than 90°

$$TS = \frac{(R + d_1) + (R + d_1 \cos \Delta)}{\sin \Delta} + t$$

$$TS_1 = \frac{(R + d) + (R + d_1 \cos \Delta)}{\sin \Delta} + t$$

Compound Railroad Curves

Compound railroad curves can be solved and plotted by the same procedures outlined for the compound highway spirals; however, the formulae are slightly different.

For example, a 2-taper compound curve would be the same configuration as the 2-spiral compound curve illustrated in figure 8-38A. The semi-tangent formulae are:

$$TS_1 = \frac{R_1 - (R_1 + d_1 \cos T\Delta_1)}{\sin T\Delta_1} + t_1$$

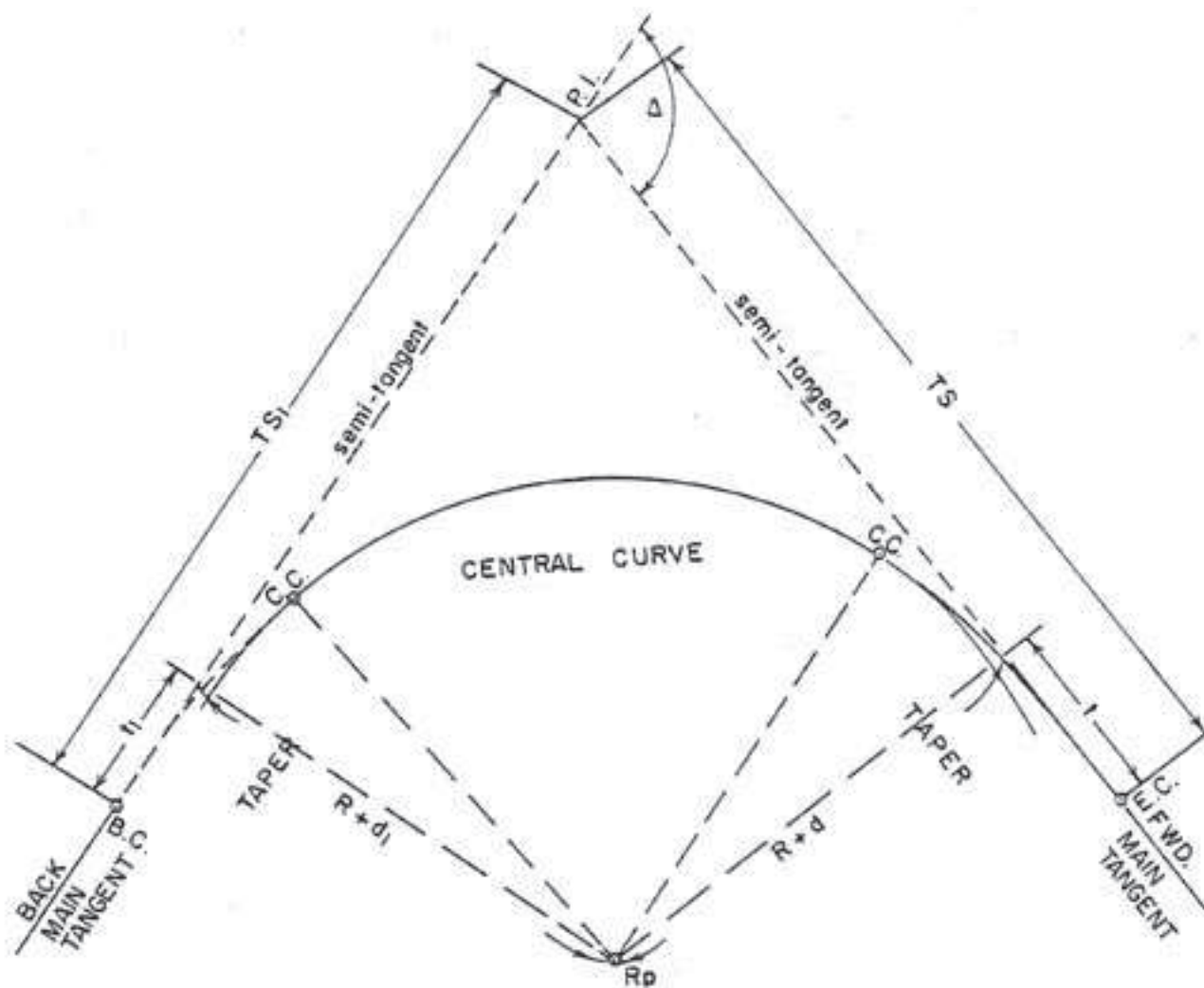
$$TS_2 = \frac{(R_1 + d_1) - (R_1 \cos T\Delta_1)}{\sin T\Delta_1}$$

$$TS_3 = \frac{(R_2 + d_2) - (R_2 \cos T\Delta_2)}{\sin T\Delta_2}$$

$$TS_4 = \frac{R_2 - (R_2 + d_2 \cos T\Delta_2)}{\sin T\Delta_2} + t_2$$

Here, the highway p value is substituted with the railroad d value (from the taper tables); and the highway q value (from the spiral tables) is substituted with the railroad t value (from the taper tables). Although the letters are different, the values represent the same points of measurement. With the railroad, as with the highway, the triangle P.I.1 P.I.2 (figure 8-38A) can be solved using the law of sines.

To solve for the three-taper curve (two end tapers and one intermediate taper segment), use the process outlined for the three-spiral highway curves. The highway formulae converted to railroad formulae are:



RAILROAD CURVE WITH UNEQUAL TAPERS

Figure 8-56

HIGHWAY

$$I = 10ad^2$$

$$LC_1 = \sqrt{X^2 + Y^2}$$

$$I = .3DL$$

$$LC_2 = 2R \sin \Delta / 2$$

$$L = \frac{100D}{a}$$

$$A = 100D \div L$$

$$\frac{X}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-1)!(4n-1)(-1)^{n+1}} \right) \text{ below}$$

$$\frac{Y}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-1)!(4n-1)(-1)^{n+1}} \right)$$

$$\frac{Y}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-2)!(4n-3)(-1)^{n+1}} \right) \text{ below}$$

$$\frac{X}{L} = \sum \left(\frac{\theta^{2n-1}}{(2n-2)!(4n-3)(-1)^{n+1}} \right)$$

From the preceding formulae it is evident that the highway spiral X value has the same meaning as the railroad taper Y value. Subsequently, the highway Y value has the same meaning as the railroad X value; however, switching the values in the LC formulae, as below, will have no affect on the result.

$$LC_4 = \sqrt{X^2 + Y^2}$$

$$LC_4 = 2R \sin \frac{\Delta}{2}$$

$$LC_5 = \sqrt{X^2 + Y^2}$$

$$LC_6 = \sqrt{lat^2 + dep^2}$$

RAILROAD

Same

$$LC_1 = \sqrt{Y^2 + X^2}$$

Same

Same

Same

Same

$$LC_4 = \sqrt{Y^2 + X^2}$$

same

$$LC_5 = \sqrt{Y^2 + X^2}$$

same

It should be apparent that, with care, the procedures for the highway spiral are applicable to any railroad curve.

Railroad Station Maps

Every set of railroad strip maps should include a station map of the lands, tracks and structures of station grounds. Often, however, the map has to be ordered from the railway company. The station maps are an excellent source of cadastral data; primarily, they supply important ties to subdivisions and townsites intersected by, or abutting, the station grounds. In most cases the station grounds were the center of the towns and cities, and it is commonplace to find streets, lots and blocks running parallel and perpendicular to the

(old) station grounds. Subsequently, the subdivisions and additions to the towns and cities were built upon the townsites that abutted the railroads. This is why the station grounds are often an excellent starting point for control mapping in urban areas. Of course, as with any survey plat, dimensions and distances of the station map often have to yield to more accurate measurements supplied by later surveys.

In addition to survey ties, the station maps also provide the location of improvements on the grounds that still exist today; e.g., loading docks, cold storage plants, grain elevators, and oil storage tanks. The locations can be confirmed by plats supplied to the Department of Revenue with the PCMs.²⁸

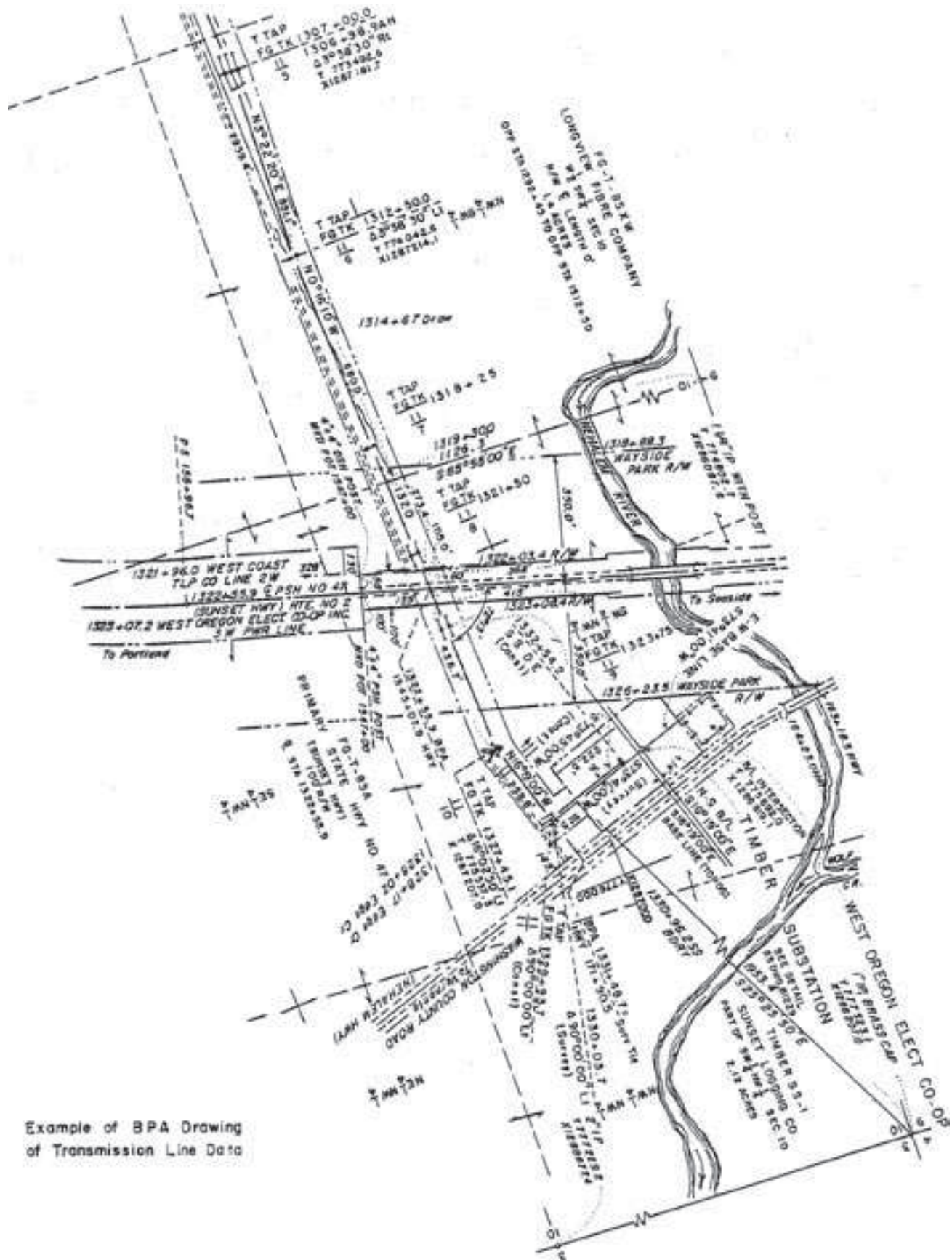
TRANSMISSION LINE ROUTE MAPS

Transmission line maps are maps of the easements of major electrical power lines (i.e. 115 to 750 KV). The maps of the major transmission lines, such as those of Portland General Electric and the Bonneville Power Administration, supply some of the best cadastral control data available. If you mentally add the transmission lines to the network of highways, county roads and railroads, it should become evident that the transmission line surveys provide a most important link for the analytical bridging of the survey networks.

The survey strip maps supplied by the Bonneville Power Administration (BPA) provide more reliable cadastral data, per square inch, than any other survey data. For example, part of sheet 11 of 11 (BPA drawing 325-11-D, serial 72521) shown in figure 8-57, contains over 25 ties, 7 coordinate ties, 3 ties to the section grid, 3 ties to the Sunset Highway, a tie to the West Coast Telephone Company line, a tie to the Nehalem Highway, the true to grid mapping angle (1-58'50"), the location of the Nehalem River, ownership data on all lands intersected by the easement, location of the Timber Substation, etc. Yet, the part shown in figure 8-57 represents only the north-half of sheet 11 of 11.

When plotting BPA lines, keep it in mind that the surveys are based on the Oregon Coordinate System; the bearings are *not* geodetic. To avoid confusion and obtain the best possible accuracy, always plot the transmission line traverse by coordinates - not by dimension and bearing. When showing grid bearings on the cadastral map, always label the bearing "grid" or "O.C.S." for Oregon Coordinate System.

Although the BPA surveys have a reputation for being very reliable, they are not infallible. The evidence supplied by the surveys must be analyzed and used



Example of BPA Drawing
of Transmission Line Data

Figure 8-57

as with any other survey. Many ties to property lines are good; however, examine this data carefully. Often the measurements are to *fence lines*, not *property lines*.

MISCELLANEOUS ROUTE SURVEYS

Surveys are made of every utility route. Be alert to the possibility that where a ditch, natural gas transmission line, canal, etc., exists, a survey might exist that could solve many of your mapping or title problems. Many of the sources for this data are listed in the chapter on Cadastral Reference Sources.

County roads and city streets are routes and are usually supported by surveys. When mapping, this data source is as important as any other route survey. The elements discussed in the section on highways are those used in most road and street surveys; however, symbolization and graphic treatment of the drawings often vary from those used by the Oregon State Highway Division. By exercising a little care, the procedures outlined for highways can be used for any route.

Remember, some of the older route surveys show only P.I. to P.I. measurements, as if curves were not designed into the road. In nearly every case you will find that the roads have curves; they were not constructed from P.I. to P.I. If curve data is not supplied

by later surveys, photos may have to be used to supply the approximate curve lines. This process must be done with great care because of the possibility of transferring photo distortion to the cadastral, map.

Some reference data on county roads are only reviews and field surveys of the *proposed* routes. They do not always represent the location of the road as constructed. In such cases it is the *actual* road location that must be shown by solid lines on the cadastral map. The *route as constructed and traveled* has the support of statutes and court rulings (except in the case of dedicated streets and alleys of additions, townsites and subdivisions). It is, however, a good practice to show the surveyed route by a dashed line where the road has not been constructed (unless fee title to the road was conveyed to the public – which is seldom the case).

A word of caution! It is not uncommon to find old road surveys that were executed by “dragging chain” instead of *breaking chain* (see Chapter 6). Consequently, the accumulated error in these surveys could (and have) resulted in the road location being off several hundred feet. If the general shape of the survey conforms to the constructed route, but the road appears “stretched out” on your map, there is an excellent possibility that the error is a result of a surveyor *dragging chain*.

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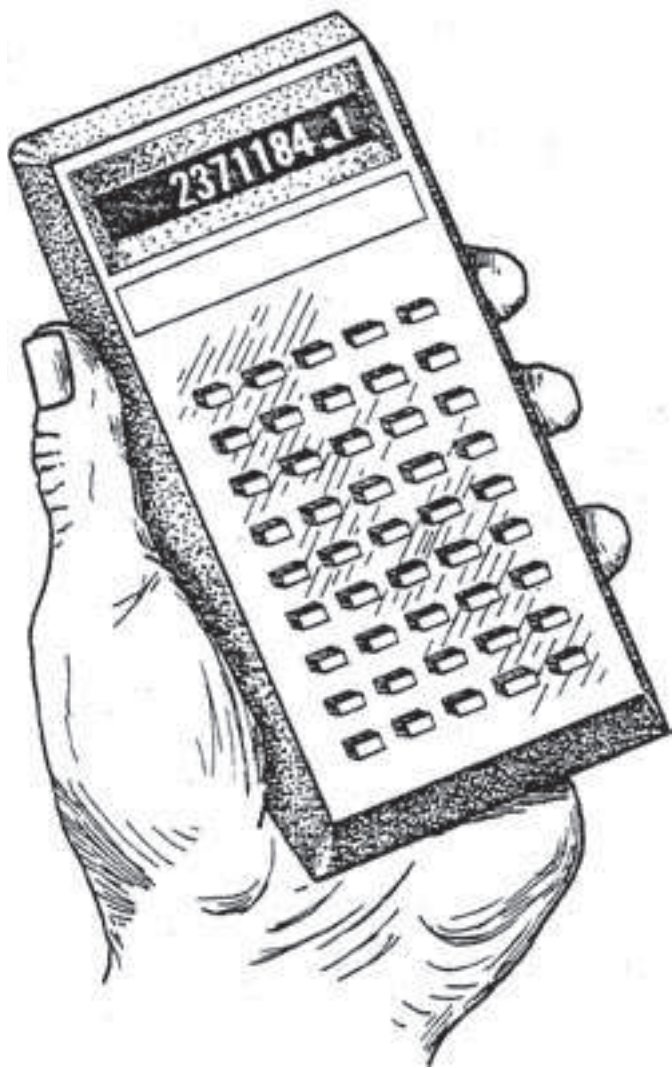
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CHAPTER 9

MAP COMPUTATIONS

INTRODUCTION

It is the primary function of this Chapter to make available, for ready reference, the solutions to many of the mathematical problems associated with cadastral cartography. Included here are the important rules, equations and formulae of cartography; however, some mathematical data included in other Chapters has been excluded here (specifically that of Chapters 6 and 8).

If we remove the drafting and research functions of cadastral cartography, the remaining problems are geometric and require trigonometric solutions. For this reason we have placed special emphasis on trigonometry fundamentals. However, we have made a special effort to associate the material with the problems of cartography. If you follow the procedures and rules provided, it is possible to solve many of the problems without any formal training in algebra, geometry, or trigonometry.

Some of the material will seem insultingly elementary to the cartographer fortunate to possess extensive mathematical skills. But there are cartographers (training level and journeymen) who either forgot the rules and elements of high school and college mathematics, or never possessed that knowledge. The material provided (that -will seldom surpass the complexity of analytical trigonometry) is for these cartographers; and especially those who consume many hours seeking graphic solutions to problems that could be mathematically solved in minutes.

The numerical problems were performed with an electronic hand calculator costing *less than twenty dollars*. The hand calculator is an essential mapping tool; well within the limitations of any budget. The features and functions of the calculator enable the cartographer to perform these cadastral computations:

- a. Algebraic data entry.
- b. +, -, x, ÷ functions
- c. Data entry +/- and π (pi).
- d. Display scientific notation, scientific notation removal, exponent increment, and exponent decrement.
- e. Algebraic functions x^2 , $\sqrt{x}$, $1/x$, y^x and $\sqrt[3]{y}$.
You will find the $\sqrt{x}$ (square root) function worth twice the investment.
- f. Data grouping capability ().
- g. Store, recall, sum and exchange memory functions.
- h. Percent functions: %, +%, x% and ÷%.
- i. Trig functions: sine, cosine, tangent, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$.
- j. Angular modes: degrees, radians and grads.
- k. Logarithmic: $\ln x$, $\log$, e^x and 10^x .
- l. Constant (k) operating with +, -, x, ÷, y^x and $\sqrt[3]{y}$.

- m. Eleven-digit calculating capacity and eight-digit display.

For large mapping or map maintenance operations, a cost saving can usually be realized by acquiring and applying a large-capacity programmable calculator.

Rule 1 - Once you have been provided a calculator never perform complex computations by hand.

Rule 2 - Never perform a computation unless it is needed. For example, it is beneficial to know how to check a traverse for closure; but it is unnecessary to make that computation without some indication that the traverse does not close.

CHECK YOUR COMPUTATIONS

Rule 3 -- Always check your computations - especially those critical to map geometry.

Most mathematical problems can be solved by more than one method: by *alternate formulae or equations; by tables of values; by graphics; by planimeter, drafting machine, engineer scale, etc.* Of course the alternate methods are usually less reliable, but they will suffice as an approximate check of your computations. For example, a planimeter can be used to check a DMD computation. If your error is small, however, it might not be discovered. But if the error is considerable, it will show by planimetry.

Tables of values should be used to provide exact mathematical data rather than for checking computations. Some tables, however, may not supply enough information but they can be used as a check on computations: for example, checking a trigonometric function computed to eight significant figures with a function table to four significant figures.

Each step in a long computation that cannot be checked by an alternate method should be checked by repeating the computation. When a serious error is discovered, the new computation should be checked before a correction is made. If possible, have someone check the important computations.

Common Sources of Errors

The following is a list of factors that commonly cause computation errors. The list is in order of the average frequency of occurrence in mapping computations.

- a. Incorrect rounding-off of numbers.
- b. Incorrect conversion of degrees, minutes and seconds to degrees in decimals, e.g., calling $6^{\circ}30'$, 63.30° , instead of 6.50° . Or, the incorrect conversion

of degrees in decimals to degrees, minutes and seconds, e.g., calling 6.50°, 6°50' instead of 6°30'.

- c. Transposition of numbers or formulae, e.g., writing 6.59 for 6.95.
- d. Performing computations in the incorrect order of mathematical operations.
- e. Use of wrong data.
- f. Use of wrong formula.
- g. Parallax (see glossary).

- h. Confusing the altitude and sides of non-rectangular polygons. For example, using the formula $A = lw$ to compute the area of the parallelogram in figure 9-1. Actually, the correct formula is $A = bh$. *This problem ranks number one in area computations. Many cartographers still assume that $A = lw$ will provide the same results can never be the same. This should be evident when we retain the values of w and l of figure 9-1 in figure 9-2, but decrease the value of h .*

In figure 9-1, $A = lw$ would produce an area of 10,595 square feet. The actual area is 10,000 square feet, or $A = wh$ (formally written $A = bh$).

On the other hand, $A = lw$ of figure 9-2 would still be 10,595 square feet. But it is evident that the polygon contains less area than that of figures 9-1. The true area is actually 1,900 square feet, or $A = hw$.

- i. Failure to check instruments settings.
- j. Failure to clear your calculator after each computation. One way to be sure that your hand calculator is cleared is to shut it off between computations. This will also minimize power consumption and increase the life of your battery.
- k. Forgetting to divide the numerator by the denominator in fraction formulae. For example, not dividing by 2 in the taper formula:

$$E = R \operatorname{exsec} \frac{\Delta}{2}$$

This is especially common in computations involving one-half the delta angle.

- l. Confusing, or neglecting the signs of numbers ((positive (+) and negative (-))). The correct treatment of the signs will be especially important in latitude and departure computations. Instructions on positive and negative numbers are available in most elementary algebra textbooks.

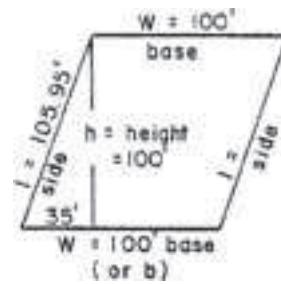


Figure 9-1

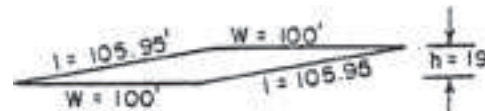


Figure 9-2

TABLES OF VALUES

Whenever possible use tables of mathematics values to shorten or avoid long computations. This practice will reduce computation time and increase the accuracy of the computations you must make. This manual includes the *hard-to-find* and *out-of-date* tables needed in cadastral cartography: i.e., *map scale conversions, chains to feet, compass conversions (cardinal to angular and cardinal to sexagesimal, Lambert Conformal projection (both zones), meridian convergence, constants for Oregon, etc.* Those tables generally available in commercial outlets, (such as *natural trigonometric functions, sines and cosines for radian measurement, common logarithms of trig functions, etc.*) have been excluded from the manual.

Interpolation

Many cadastral computations require the use of tables of values. All too often, the value needed is not provided in the tables (lying between two given tabular numbers). In most cases it is possible to find the missing value by a process known as *interpolation* -- the mathematical operation of completing a partial series of numbers or observations, in accordance with the law of the series. For example, you need the sine of 45°30' (expressed mathematically as $\sin 45^\circ 30'$), yet the table (figure 9-3) only provides functions' to the degree. The solution, by interpolation, is as follows:

Numerical Example No. 1. From the table, $\sin 45^\circ = .70711$ and $\sin 46^\circ = .71934$. Since sixty minutes (60') = 1°, thirty minutes (30) = $\frac{1}{2}$ one degree ($\frac{1}{2}^\circ$).

$\sin 46^\circ$	=	.7193
$\sin 45^\circ$	=	— .7071
Difference	=	.0122

therefore,

$$\begin{array}{rcl} \sin 45^\circ & = & .7071 \\ \frac{1}{2} \text{ of } .0122 & = & + \frac{.0061}{.7132} \end{array}$$

Hence,

$$\sin 45^\circ 30' = .7132$$

In this example, the proportional part of the difference (.0061) was added to $\sin 45^\circ$ because the sine increases as the value of the angle increases.

Numerical Example No. 2. Find $\csc 49^\circ 45'$.

The value lies between $\csc 49^\circ$ and $\csc 50^\circ$. From table 9-3 $\csc 49^\circ = 1.35250$ and $\csc 50^\circ = 1.3054$. Since there are 60' in 1° , 45' is equal to .75 of 1° (or $\frac{3}{4}$ of one degree).

$$\begin{array}{rcl} \csc 49^\circ & = & 1.3250 \\ - \csc 50^\circ & = & 1.3054 \\ \hline \text{Difference} & & .0196 \end{array}$$

therefore,

$$\begin{array}{rcl} \csc 49^\circ & = & 1.3250 \\ - .75 (.0196) & = & .0147 \\ \hline \csc 49^\circ 45' & & 1.3103 \end{array}$$

In this example, the proportional part of the difference (0.0147) was subtracted from $\csc 49^\circ$ because the cosecant (csc) decreases as the value of the angle increases.

Problems 1 and 2 point out one of the main rules of interpolation:

Rule 4 - When interpolating the values of trig functions add the value of minutes (and seconds) of the function to the value of the function if that function is a sine, secant or tangent.

Subtract the value of minutes and seconds of the function from the value of the function, if that function is a sine, cosecant or cotangent.

Note: Interpolation process. It is also is a time consuming and bothering the source of many computational errors. It is a process that can, in most cases, be avoided by using a slide-rule electronic calculator. By using an electronic calculator, numerical example No. I would have been solved by:

ENTERING: 45.50
PRESSING FUNCTION KEY:
ANSWER ON DISPLAY: .71325045

The entire process requires less than fifteen seconds.

SIGNIFICANT FIGURES

The concept of *significant figures* is important to cadastral surveying, and subsequently - important to cadastral cartography. The term refers to those digits in any number which have meaning, that is, whose values are definitely known to be correct. For example, the number 276440 has six significant Figures. In this concept the decimal point has no effect. Each of the following variations of 276440 also have six significant figures:

2.76440 276.440
00.276440 2764.40 and
27.6440 27644.0

The second number, 00.276440, points to another interesting fact about significant figures: *the number of significant figures in a decimal is not always the same as the number of digits in the number.*¹ This is because a zero is not always a significant figure; it all depends on its position with respect to the decimal point and figures. For example, the number of significant figures in the following numbers are:

0.0000028 has 2 significant figures
0.00000280 has 3 significant figures
0.02000080 has 7 significant figures
2.00080000 has 9 significant figures
2.800000 has 7 significant figures

ANGLE °	NATURAL TRIGONOMETRIC FUNCTIONS						
	SIN	COS	TAN	COT	SEC	CSC	
40°	.64279	.76604	.83910	1.19175	1.3054	1.5557	50°
41°	.65606	.75471	.86929	1.15037	1.3250	1.5243	49°
42°	.66913	.74314	.90040	1.11061	1.3456	1.4945	48°
43°	.68200	.73135	.93252	1.07237	1.3673	1.4663	47°
44°	.69466	.71934	.96569	1.03553	1.3902	1.4396	46°
45°	.70711	.70711	1.00000	1.00000	1.4142	1.4142	45°
46°	.71934	.69466	1.03553	.96569	1.4396	1.3902	44°
47°	.73135	.68200	1.07237	.93252	1.4663	1.3673	43°
48°	.74314	.66913	1.11061	.90040	1.4945	1.3456	42°
49°	.75471	.65606	1.15037	.86929	1.5243	1.3250	41°
50°	.76604	.64279	1.19175	.83910	1.5557	1.3054	40°
	COS	SIN	COT	TAN	SEC	CSC	

Figure 9-3

When we say that the significant figures are those known to be correct we do not mean that each is known to be accurate. Actually, mathematicians consider the number of significant figures that are accurate to be one less than the total number of significant figures; the last number is always considered as being unreliable and, therefore, only approximate. Hence, the measurement 1323.11' has six significant figures; five reliable, the last approximate. The measurement is, therefore, *to the hundredth*, but only accurate *to the tenth*. Suppose, for example, the measured value 941.26 has a probable error of ± 0.04 . This ± 0.04 casts doubt on the accuracy of the fifth digit of the measured value, but is not great enough to cast doubt on the fourth digit. The number 941.26 ± 0.04 is then said to have five significant figures. If the probable error in the same measured value were ± 0.073 , the value would have only four significant figures, as doubt is cast on the fourth digit making the fifth digit meaningless. The surveyor would probably record the value on the plat as 941.3, or 941.3 ± 0.07 . Hence, the following rule:

Rule 5 -- Each digit of a number is a significant figure until the digit is reached for which the probable error equals, or is more than 10 units.

Adding Significant Figures to Existing Numbers

The number of significant figures noted on a survey must be assumed to be adjusted or rounded-off *after the probable error has been calculated by the surveyor*. The cartographer should make no other assumption unless other data is available to support different values. Yet there is a myth in the cartographic community that the addition of zeros to a number to bring the number to the hundredth has the effect of adding credence to the number, e.g., labeling a surveyor's measurement of 1323 as 1323.00 on the cadastral map.² Actually this has the effect of adding what *appears to be* meaningful figures to the number. It is telling the map user that the surveyor's measurement is accurate to the nearest tenth of an inch. From our discussion on significant figures, we can see that the result is the cartographer's number is technically incorrect.

Rule 6 -- Do not change the number of significant figures in survey measurements by adding zeros to the end of the measurement value.

Would this principle apply to bearings? The answer is yes. If a surveyor records the bearing S69°W, he is recording the accuracy of that measurement (this is an assumption we must make). If the angular measurement was accurate to the nearest minute, we assume he would have recorded S69°00'W on his plat;

or if the survey was balanced and found to be zero minutes and zero seconds in the results, we assume the recorded value would be S69°00'00"W. It should, therefore, be clear that the addition of zeros to S69°W, by the cartographer, would be incorrect. It would have the effect of adding four meaningful figures to the surveyor's measurement. Hence, rule number 6 applies to bearings as well as distances.

Adding Zeros that are Not Significant Figures

The only way to add zeros to a number, and not make the zeros meaningful, is to place them at the beginning of the number; for example, adding two zeros to a decimal value (adding zeros to .67' to record 00.67'). In this case the zeros are not significant figures and, therefore, have no meaning. They are, however, beneficial because they place emphasis on the decimal. Thus, a map user will be less apt to mistake .67' for sixty-seven feet.

Likewise, adding a zero in front of the significant figures of a bearing will not destroy the meaning of the bearing. Hence, N02°W still means N2°W; the zero has no meaning.

Rounding Significant Figures

We have established that it is improper to add significant figures to a number. Does this mean that significant figures cannot be removed from large cumbersome numbers to provide a desired number of significant figures? No, significant figures can be removed if the following rules are adhered to.³

Rule 7 -- Significant figures can be removed from map, survey and deed lengths to the hundredth of a foot, rod, chain, etc.

Therefore, it is permissible to shorten 2376.154' to 2376.15'; but not to 2376'.

Rule 8 -- Significant figures can be removed from acreage values to the nearest hundredth of an acre.

Hence, .0462 acres can be reduced to .05 acres.

Rule 9 -- When dropping significant figures (rounding), rules 11 through 15 must be adhered to.

Rule 10 - Significant figures must never be dropped from angle measurements (bearings, azimuth, etc.).

Rule 11 -- When the figure to be dropped is less than 5, the figure preceding remains unchanged.

Therefore, .053269 to the nearest hundredth becomes .05.

Rule 12 - When the figure to be dropped is more than 5, the figure preceding is increased by 1.

Thus, 3.45620 to the nearest hundredth becomes 3.46.

Rule 13 -- When using rules 11 and 12 consider only the figure to be dropped and the preceding figures, disregard the figures that follow.

In otherwords, the number .044446 cannot be rounded to .05 by rounding each figure back from figure 6, i.e., .044446 to .04445 to .0445 to .045 to .05.

When dropping the figure 5, a little more consideration must be applied. Although elementary math books suggest *always increasing the preceding figure by one when the figure 5 is dropped*, this will provide poor results on more complex computations. Therefore, that rule should not be used to round numbers (including assessed acreages). Use the following rules:

Rule 14 -- Whenever the figure 5, followed by all zeros, is dropped the preceding figure remains unchanged if even, but is increased by one if odd.

Therefore, .0450 to the nearest hundredth becomes .04 and .0750 becomes .08. Contrary to rule 13, when the number 5 is followed by figures other than zero, those figures must be considered.

Rule 15 - Whenever the figure to be dropped is 5 followed by figures other than zero, the preceding figure is always increased by one.

Therefore .0451 to the nearest hundredth becomes .05. The figure preceding the 5 is dropped even when the 5 is followed by a zero, but that zero is followed by a figure greater than zero. Thus, even .045001 becomes .05.

Rule 14 and 15 will provide a better probability that solutions will balance. This will become evident in latitude and departure computations and other computations of higher mathematics. The rules must be adhered to when rounding acreages and distances to hundredths on the cadastral map.

ORDER OF MATHEMATICAL OPERATIONS

When several mathematical operations are involved in one problem the operations are to be performed in the following order:

1. Operations in parenthesis.
2. Powers and roots.
3. Multiplication and division in their order of occurrence.
4. Additions and subtractions.

An exception to the above rules is when reverse order of the rules are used to solve equations.

Numerical Example No. 3. The equation $4x - 8 = 12$ can be solved by performing additions and subtrac-

tions first, then using inverse operations as indicated in the equation.

$$4x - 8 = 12 \Rightarrow 4x - 8 + 8 = 12 + 8$$

- 8 and + 8 cancel each other

therefore,

$$4x = 20 \therefore 4x \frac{4x}{4} = \frac{20}{4}$$

thus $x = 5$

EXTRACTING SQUARE ROOTS

When we find what number, when multiplied by itself equals 9 we have extracted the square root of 9. In mathematics this is expressed as:

$$\sqrt{9} = 3$$

because $3^2 = 9$

The extraction of the root of a number such as 38686.40 requires many steps when using hand calculations. On the other hand, the root can be extracted in seconds on an electronic hand calculator with the $\sqrt{x}$ key.

Numerical Example No. 4 To find the square root of 38686.40 on your electronic hand calculator:

ENTER: 38686.40
PRESS: $\sqrt{x}$ or $\sqrt{}$
DISPLAY: 199.68859

Rounded, this is 196.69'.

Check: Square the answer (196.69²)

ENTER: 196.69'
PRESS: x^2
DISPLAY: 38686.956

THE TRIANGLE

The term *polygon*, as used in this chapter, means a figure represented by a plane surface circumscribed, by 3 or more intersecting linear sides. The most important figure of cartography is the *triangle*. A triangle is a figure formed by three straight lines meeting at three points. The lines are referred to as *sides* or *legs* of the triangle, and the points are the *vertices* (plural) or *vertex* (singular) of the triangle.

A triangle with three equal sides is an *equilateral triangle*. A triangle with two equal sides is an *isosceles triangle*. And a triangle with no equal sides is a *scalene triangle*. More important is the relationship of the angle to the triangle. Every triangle has three angles. If one angle of a triangle is exactly 90° it is a *right angle*;

therefore, a triangle containing an angle of 90° is a *right triangle*. Triangles containing an angle greater than 90° are *obtuse triangles*. A triangle whose angles are all less than 90° is an *acute triangle*.

In trigonometry, any triangle having no right angle is an *oblique triangle*; therefore, obtuse and - acute triangles are oblique triangles. Every oblique triangle has two right triangles as illustrated in figure 9-4. *Note: In our illustrations a 90°, or right triangle will be graphically represented as:*

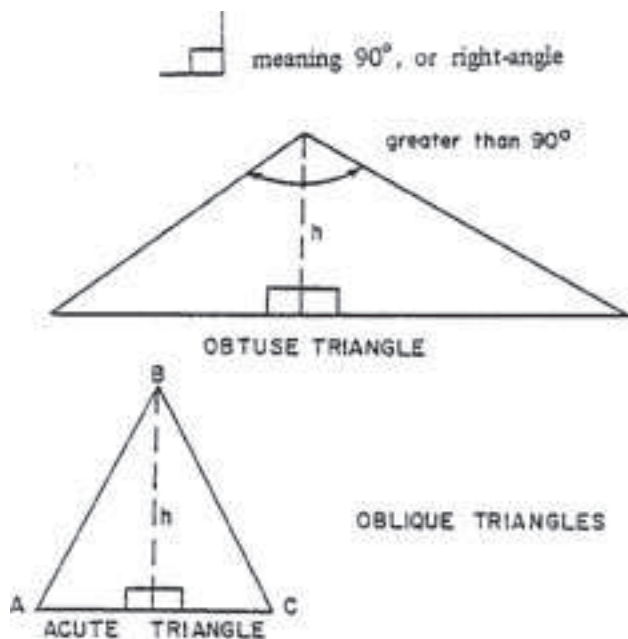


Figure 9-4

the small square meaning 90°.

In figure 9-4 h represents the height (or altitude) of the triangle and the *side* of the right triangles.

Note: The height of a triangle does not have to be the "up and down - line of a triangle. It can be any line from any vertex to the opposite side. Therefore, if we view the acute angle of 9-4 as in 9-5, the height can be from vertex C to line AB.

THE RIGHT TRIANGLE IN CARTOGRAPHY

Every polygon of the cadastral map can be divided into triangles. From the previous section we established that every triangle is either a right triangle, or is composed of two right triangles. It therefore stands to reason that the mathematics of the right triangle is essential to cartography. The specific mathematics of the right triangle is *trigonometry*.

In trigonometry the right triangle is known as the *Pythagorean triangle*. This is based on Pythagoras' Theorem that *in any right triangle the sum of the squares*

of the sides adjacent the right triangle is equal to the square of the hypotenuse. For the triangle of Figure 9-6 this is mathematically expressed as:

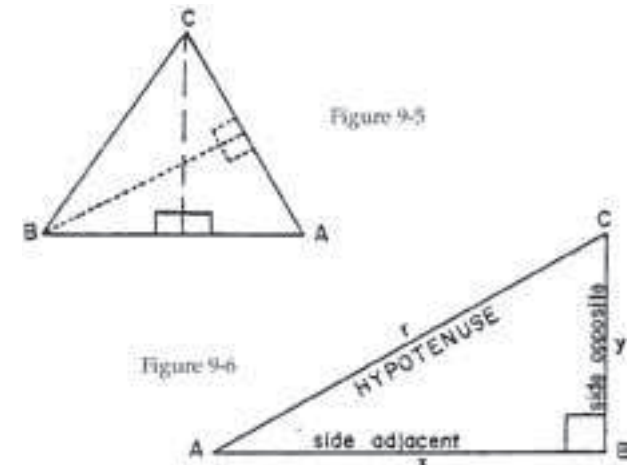
$$1.^4 \quad r^2 = x^2 + y^2$$

Therefore, if we know the length of sides x and y, we can use the following formulae to find the length of r.

$$2. \quad r = \sqrt{x^2 + y^2}$$

or,

$$3. \quad r = \sqrt{r^2}$$



Numerical Example No. 5. Find the value of r where x = 500 and y = 230'.

First square x and y and add their sums.

$$\begin{array}{rcl} x^2 & = & 250,000 \\ y^2 & = & 52,900 \\ \hline & & 302,900 \end{array}$$

If $r^2 = 302,900$, then the square root of 302,900 equals the length of r, the hypotenuse; or,

$$r = \sqrt{r^2} = \sqrt{302900}$$

and

$$\sqrt{302900} = 550.36352$$

thus, $r = 550.36'$

Numerical Example No. 6. Find the value of x where r = 244.15' and y = 200' Start with equation 1.

$$x^2 + y^2 = r^2$$

therefore,

$$\begin{array}{l} X^2 + 200^2 = 244.15^2 \\ X^2 = 244.15^2 - 200^2 \end{array}$$

Use the following equation to solve for x:

$$4. \quad x = \sqrt{r^2 - y^2}$$

therefore,

$$x = \sqrt{596098.22 - 40000}$$

$$x = \sqrt{19609.22}$$

$$x = 140.03'$$

Numerical Example No. 7. Use equation 5 to find y when $r = 700'$ and $x = 606.22'$.

$$x = \sqrt{r^2 - y^2}$$

Start with equation 1.

$$700^2 = 606.22^2 + y^2$$

Now use equation 5.

$$y = \sqrt{700^2 - 606.22^2}$$

$$y = \sqrt{122497.31}$$

$$y = 350'$$

From this discussion we can conclude that *any right triangle can be solved if the lengths of two sides are known.*

Angles of Triangles

Whenever all angles of one triangle are equal to the angles in another triangle, the two triangles are said to be *similar triangles*. For example, triangle A in figure 9-7 is similar to triangle B. Since the triangles are similar by definition, the following proportion involving the lengths of the sides is true:

$$6. \quad \frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'}$$

This principle can be used to find the value of two sides of a similar triangle if all sides of the other similar triangle are known and one side of the subject triangle is known. Numerical example number 8 shows how this can be useful in cadastral cartography.

Numerical Example No. 8. Find the length of n and c' of parcel 2 of figure 9-8. Use the mathematical proportion of equation 6 to solve for b' and c' of triangle ABC.

Figures 9-8B and 9-8C show each value of the triangles of 9-8A.

Careful analyzation of figure 9-8 will show that triangle ADE is similar to triangle ABC. Thus, they are similar triangles.

To solve, substitute the known values in equation 6.

$$\frac{70}{100} = \frac{78.26}{b'} = \frac{35}{c'}$$

Solve the first two ratios for b' .

$$\frac{70}{100} = \frac{78.26}{b'}$$

$$b' = \frac{(78.26)(100)}{70}$$

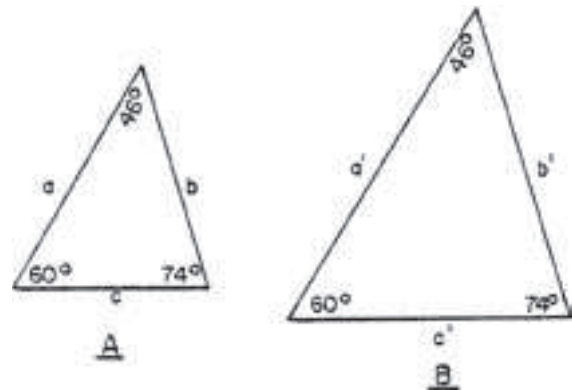


Figure 9-7

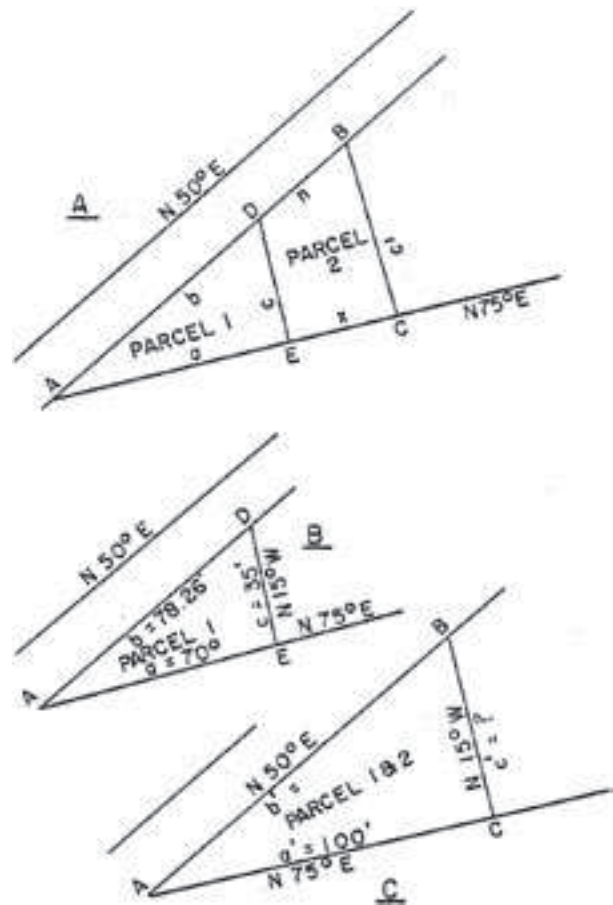


Figure 9-8

Therefore, $b' = 111.8'$. Subtract the length of b to find side n . Thus, $n = 111.8' - 78.26' = 33.54'$.

Use the first and third of the equal ratios to find c' .

$$\frac{70}{100} = \frac{35}{c'}$$

$$c' = \frac{(100)(35)}{70'}$$

$$c' = 50$$

Rule 16 - The sum of the interior angles of any triangle is equal to 180°.

With that rule we can prove that two triangles are similar if two angles of one triangle are equal to two angles of the other triangle. The remaining angle in *any triangle* must be equal to 180° minus the sum of the other two angles.

Rule 17 - Two right triangles are similar if an acute angle of one triangle is equal to an acute angle of the other triangle.

If these angles are equal, the triangles are similar because the right angles in the two triangles are also equal to each other. Whenever one acute angle of a right triangle is given, the other acute angle may easily be found. Assuming that the acute angle given is 25°, the other acute angle is:

$$180^\circ - 90^\circ - 25^\circ = 90^\circ - 25^\circ = 65^\circ$$

However, 65° and 25° are complements of each other.⁵ Therefore, if one acute angle of a right triangle is equal to θ , the other acute angle will be $(90^\circ - \theta)$.

Most of the practical uses of trigonometry are based on rule 18.

Rule 18 - Two right triangles are said to be similar if one acute angle of one triangle is known to be equal to one angle of the other triangle.

Therefore, in figure 9-9 we have two similar right triangles. We may, therefore, write the mathematical proportion:

$$7. \quad \frac{x}{x'} = \frac{y}{y'}$$

or interchanging the mean terms in the proportion, we have:

$$8. \quad \frac{x}{y} = \frac{x'}{y'}$$

and, in like manner:

$$9. \quad \frac{y}{r} = \frac{y'}{r'}$$

and

$$10. \quad \frac{x}{r} = \frac{x'}{r'}$$

THIS IS THE MAIN PRINCIPLE OF TRIGONOMETRY.

Functions of Right Triangles

The ratios of the sides of right triangles are technically called *natural trigonometric functions*. They are the *sine*, *cosine*, *tangent*, *cotangent*, *secant* and *hypotenuse cosecant* (abbreviated sin, Cos, tan, cot, sec, csc). The functions and ratios of the triangle of Figure 9-10 are:

$$11. \quad \text{tangent } \theta = \frac{y}{x} = \tan \theta$$

$$12. \quad \text{sine } \theta = \frac{y}{r} = \sin \theta$$

$$13. \quad \text{cosine } \theta = \frac{x}{r} = \cos \theta$$

Once we know the ratio for one right triangle it is true for all *similar right triangles* no matter how large or small.

There are three other possible ratios which are reciprocals of the first three.

$$14. \quad \text{cosecant } \theta = \frac{r}{y} = \csc \theta$$

$$15. \quad \text{secant } \theta = \frac{r}{x} = \sec \theta$$

$$16. \quad \text{cotangent } \theta = \frac{x}{y} = \cot \theta$$

The reciprocal of the sine will provide the value of the cosecant.

$$17. \quad \csc \theta = \frac{r}{y} = \frac{1}{y \div r} = \frac{1}{\sin \theta}$$

The reciprocal of the cosine will provide the value of the secant.

$$18. \quad \sec \theta = \frac{r}{x} = \frac{1}{x \div r} = \frac{1}{\cos \theta}$$

The other functions, the tangent, and the cotangent can also be expressed in terms of the sine and cosine.

$$19. \quad \tan \theta = \frac{y}{x} = \frac{y \div r}{x \div r} = \frac{\sin \theta}{\cos \theta}$$

and

$$19. \quad \cot \theta = \frac{x}{y} = \frac{x \div r}{y \div r} = \frac{\cos \theta}{\sin \theta}$$

In any right triangle the side y is the side opposite the angle whose function is needed. The side x is always adjacent the angle. Therefore, we can summarize the

information in this section in the following manner (refer to figure 9-10).

$$\sin \theta = \frac{y}{r} = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{x}{r} = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{y}{x} = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{\sin \theta}{\cos \theta}$$

$$\csc \theta = \frac{r}{y} = \frac{\text{hypotenuse}}{\text{opposite side}} = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{r}{x} = \frac{\text{hypotenuse}}{\text{adjacent side}} = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{x}{y} = \frac{\text{adjacent side}}{\text{opposite side}} = \frac{\cos \theta}{\sin \theta}$$

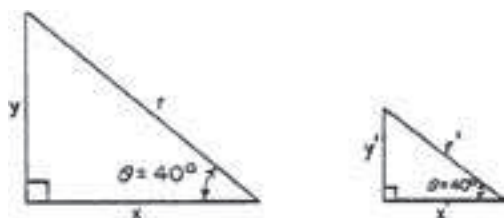


Figure 9-9

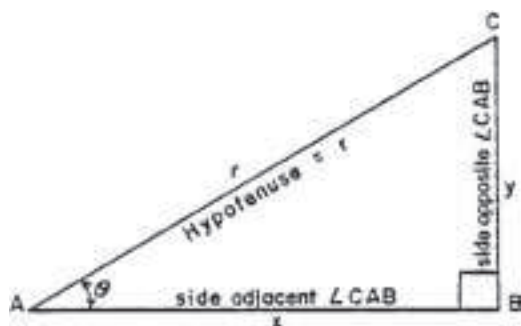


Figure 9-10

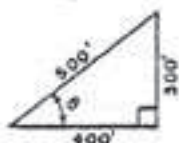


Figure 9-11

Numerical Example No. 9. Find the values of the trigonometric functions of the angle θ of figure 9-11.

$$\sin \theta = \frac{y}{r} = \frac{300}{500} = 0.60000$$

$$\cos \theta = \frac{x}{r} = \frac{400}{500} = 0.80000$$

$$\tan \theta = \frac{y}{x} = \frac{300}{400} = 0.75000$$

$$\sec \theta = \frac{r}{x} = \frac{500}{400} = 1.25000$$

$$\csc \theta = \frac{r}{y} = \frac{500}{300} = 1.66667$$

$$\cot \theta = \frac{x}{y} = \frac{400}{300} = 1.33333$$

If we substitute 500' with 50' or 5', 400' with 40' or 4', and 300' with 30' or 3', for the triangle of figure 9-11, the ratios would be the same, for example:

$$\sin \theta = \frac{y}{r} = \frac{30}{50} = 0.60000$$

$$\sin \theta = \frac{y}{r} = \frac{3}{5} = 0.60000$$

Numerical Example No. 10. Find the values of the trigonometric functions of the angle θ of figure 9-12.

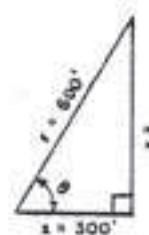


Figure 9-12

Here we have only two sides given; however, we can find the third side by using the Pythagorean Theorem (equation 1).

$$r^2 = x^2 + y^2$$

by interchanging the terms

$$y^2 = r^2 - x^2$$

so that

$$y^2 = 600^2 - 300^2 = 270000$$

and

$$y = \sqrt{270000} = 519.62$$

Using the values of x , y and r :

$$\sin \theta = \frac{y}{r} = \frac{519.62}{600} = 0.86603$$

$$\cos \theta = \frac{x}{r} = \frac{300}{600} = 0.50000$$

$$\tan \theta = \frac{y}{x} = \frac{519.62}{300} = 1.73207$$

$$\begin{aligned}\csc \theta &= \frac{r}{y} = \frac{600}{519.62} = 1.15469 \\ \sec \theta &= \frac{r}{x} = \frac{600}{300} = 2.00000 \\ \cot \theta &= \frac{x}{y} = \frac{300}{519.62} = 0.57734\end{aligned}$$

Trigonometric function tables can be used to find the numerical values of the ratios of the sides of right triangles. If you need the ratio of two sides of a right triangle containing a known acute angle θ , you look for the angle θ in a table to find the desired ratio. For example, table 9-3 is a simple table of natural trig. functions of angles 400 to 500. The cotangent of 430, for example, is under the column cot (at the top) and to the right of 430, or 1.07237.

Most trig tables in textbooks are only to the degree and minutes of a degree; however, some, books of tables are to the second, and in ten decimal places.

Considerable time savings can be realized by using your electronic hand calculator with the trigonometry functions keys. The following example was performed in seconds, whereas use of the trigonometry tables required several minutes. There are two other distinct advantages in using the electronic hand calculator: namely, fewer mistakes will be made in obtaining functions of the angles - especially large angles, and interpolation can be eliminated.

Numerical Example No. 11. To complete a computation you need the ratio of $x \div y$ (the sides adjacent the right angle) of 43° or the *cotangent* of 43° . This can be obtained from your electronic hand calculator as follows:

ENTER: 43
PRESS FUNCTION KEY: $\tan$
DISPLAY: .93251508
PRESS RECIPROCAL KEY: $1/x$
DISPLAY RESULT: 1.0723687; the
cotangent of .932.51508.

The total operation required less than 15 seconds.

Using Trigonometry To Solve For Missing Cadastral Measurements

Tangent of an Angle

The ratio y/x or

$$\frac{\text{opposite side}}{\text{adjacent side}}$$

can be used whenever one of these sides and an acute angle are given and it is desired to find the other side.

Numerical Example No. 12. Find the length of side y of the parcel of land in figure 9-13.

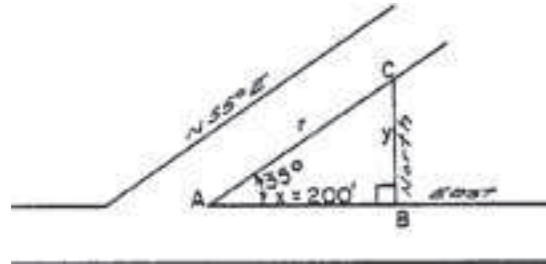


Figure 9-13

From 9-13

$$\tan 35^\circ = \frac{y}{x} = \frac{y}{200} \therefore \tan 35^\circ = \frac{y}{200}$$

From your calculator:

$$\tan 35^\circ = .70021$$

From this we can establish:

$$\frac{y}{200} = 0.70021$$

therefore, $y = 200 (0.70021$

or $y = 140.04'$

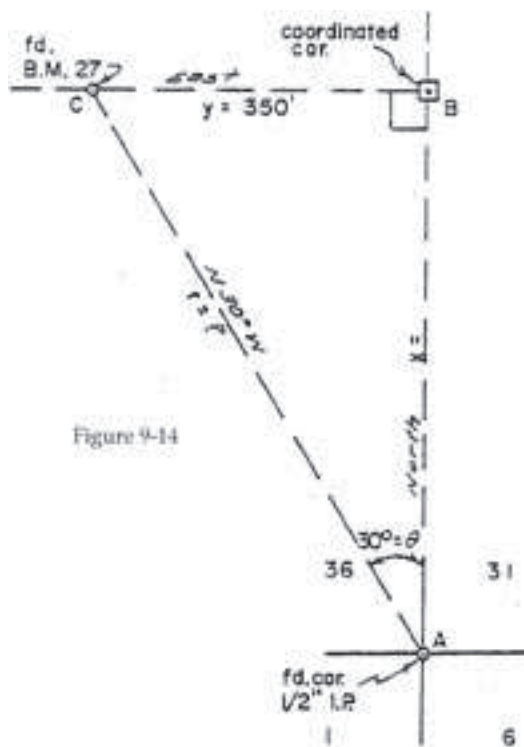
Now, use our electronic calculator to solve for r (the hypotenuse) using equation 2.

ENTER: 200
PRESS: x^2 then $+$
ENTER: 140.04
PRESS: x^2 then $=$
PRESS: $\sqrt{x}$ (or $\sqrt{\square}$)
DISPLAY: 244.15405
ANSWER: $r = 244.15'$

Sine of an Angle

Whenever we want to find y or r , and either of these and an acute angle is given, we may use the sine to find the unknown value.

Numerical Example No. 13. Use the following formula to find the value of r of the triangulation in figure 9-14.



$$\sin A = \frac{y}{r}$$

$$\sin 30 = \frac{350}{r} = 0.5$$

and

$$0.5 = \frac{350}{r} \text{ or } r = \frac{350}{.5}$$

thus, $r = 700'$

Use your electronic calculator and equation 4 to solve for x .

ENTER: 700
PRESS: x^2 then $-$
ENTER: 350
PRESS: x^2 then $=$ and $\sqrt{x}$
DISPLAY: 606.21778
ANSWER: 606.22'

Check your computation. If, according to the Pythagorean Theorem $x^2 - y^2 = r^2$, then 606.22^2 plus 350^2 should equal 490000 (r^2). When you check this on your calculator the display will read 490002.69. Do not be concerned about the +2.69. This is the result of rounding the computation (606.21778 to 606.22). The 490002.69 is close enough because:

$$\sqrt{490002.69} = 700.00'$$

as well as:

$$\sqrt{490002} = 700.00'$$

Cosine of an Angle

Whenever we want to find x or r and an acute angle are given, we may use the cosine to find the missing values of a parcel of land.

Numerical Example No. 14. Find the values of x and parcels of figure 9-15.

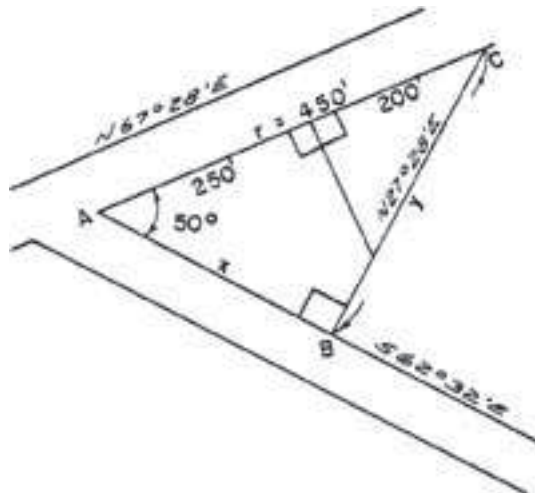


Figure 9-15

Solution: Use equation 13 to find x .

$$\cos 50^\circ = \frac{x}{450}$$

and $\cos 50^\circ = .64279$,

therefore,

$$.64279 = \frac{x}{450}$$

interchanging the terms

$$(.64279)(450) = x$$

thus, $x = 289.26'$

Use equation 5 to solve for y .

$$y = \sqrt{450^2 - 289.26^2}$$

$$y = 344.72'$$

The solution to some missing measurements seem beyond the capabilities of mathematic solution. However, many of these are well within the realm of simple trigonometry. For example, most of the measurements of the parcels of figure 9-16 appear unobtainable via office computations. But as the following example demonstrates, the sine, cosine and tangent functions can be used to find every missing measurement.

Numerical Example No. 15. Find the length of the boundaries DN, OD, ON, OP, DP and DR of the parcels of figure 9-16.

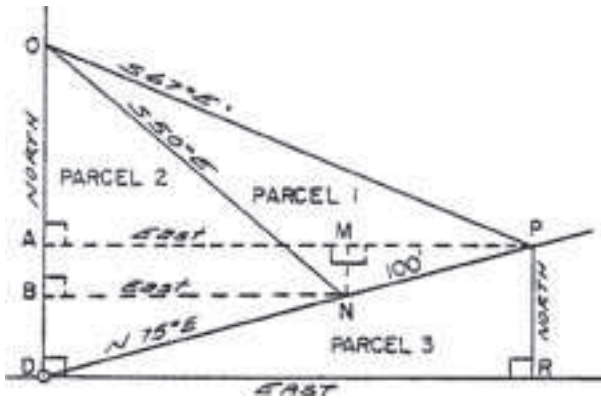


Figure 9-16

First, put down the values obtainable from the diagram.

$$\begin{aligned}\angle RDP &= 15^\circ & \angle OND &= 55^\circ \\ \angle OPA &= 23^\circ & \angle NOD &= 150^\circ \\ \angle DPA &= 15^\circ & \angle ODN &= 75^\circ \\ \angle POA &= 67^\circ & \angle POD &= 67^\circ\end{aligned}$$

And

$$\begin{aligned}MN &= AB = 100 \sin 15^\circ = 25.88, \\ MP &= 100 \cos 15^\circ = 96.59 \\ OD &= OA + AB + BD\end{aligned}$$

Now, set down the tangent ratios of the 23° triangle (OPA) and 40° triangle (ONB).

$$\tan 23^\circ = \frac{OA}{AP} = \frac{OA}{AM + MP} = \frac{OA}{AM + 96.59}$$

$$\tan 23^\circ = 0.4245 = \frac{OA}{AM + 96.59}$$

$$OA = 0.4245 AM + 41.00$$

$$\tan 40^\circ = \frac{OB}{BN} = \frac{OA + AB}{AM} = \frac{OA + 25.88}{AM}$$

$$\tan 40^\circ = 0.8391 = \frac{OA + 25.88}{AM}$$

$$OA = 0.8391 AM - 25.88$$

We now have two relations for the line segment OA. Subtracting one from the other, we obtain:

$$O = -0.4146 AM + 66.88'$$

$$\text{So, } AM = 161.3' \text{ and } OA = 109.47'$$

$$AP = AM + MP = 257.89'$$

Use equation 2 to find line OP

$$OP = \sqrt{AP^2 + OA^2} = 280.16'$$

And, $AB = MN = 25.88$ hence, ON can be solved using equation 2; or

$$ON = \sqrt{BN^2 + OB^2} = 210.56'$$

To find BD,

$$\tan 15^\circ = \frac{BD}{BN}$$

$$\tan 15^\circ = .2679 = \frac{BD}{BN}$$

$$.2679 = \frac{BD}{161.3}$$

and

$$BD = (.2679)(161.30) = 43.21'$$

$$\text{thus, } OD = OA + AB + BD = 178.56'$$

and,

$$DN = \sqrt{BD^2 + BN^2} = 166.99'$$

so,

$$DP = DN + 100' = 266.99'$$

Finally, we can use the cosine of an angle to find DR, and we can find line PR from the formula:

$$PR = \sqrt{DP^2 + DR^2}$$

Find DR.

$$\cos 15^\circ = \frac{DR}{266.99}$$

$$.9659 = \frac{DR}{266.99}$$

$$(.9659)(266.99) = DR$$

$$DR = 257.88'$$

PR is found as follows:

$$PR = \sqrt{266.99^2 + 257.88^2}$$

$$PR = 369.15'$$

From one measurement and six bearings we computed all the missing lengths of each parcel polygon.

FUNCTIONS OF ANGLES GREATER THAN 90°

Thus far in our discussion we have worked with the trigonometric functions of an angle in a right triangle. Since the size of an acute angle in a right triangle must be less than 90° , the functions have been restricted to the first quadrant. However, *all angles have sines, cosines and tangents*. Our problem now is to make general definitions of the functions, so as to include those angles greater than 90° .

Sine of an Angle

The numerical value of the sine of an angle is equal to the projection of a unit radius on the y - axis. In figure 9-17 we have a circle with a unit radius.

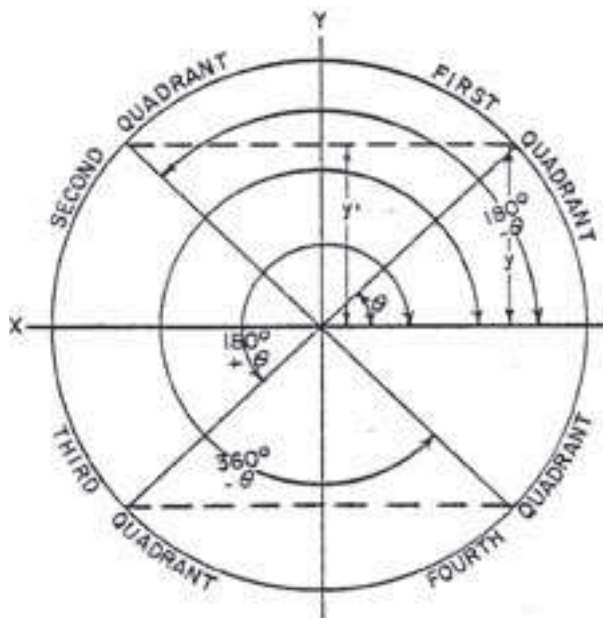


Figure 9-17

According to equation 12, our first definition of the sine of an angle is:

$$\sin \theta = \frac{y}{r}$$

However, r is now equal to 1 so,

$$\sin \theta = y'$$

But y is equal to y' (of figure 9-17) which is the projection of the unit radius on the y - axis

Therefore,

$$\sin \theta = y'$$

does not contradict the first definition of the sine of an angle less than 90° .

Now, consider an angle in the second quadrant. In figure 9-17 we have constructed the angle $(180^\circ - \theta)$.

The sine of this angle is evidently the same as the sine of the angle in the first quadrant⁶ or,

$$21. \sin (180^\circ - \theta) = \sin \theta$$

In the third quadrant the projection of the unit radii on the y - axis becomes negative. The sine of the angle $(180^\circ + \theta)$ is the same in magnitude but of opposite sign to that of an angle in the first quadrant, so that

$$22. \sin(180^\circ + \theta) = -\sin \theta.$$

The last two equations give the value of the sine of any angle between 90° and 270° in terms of the sine of an angle less than 90° . The sine of an angle in the fourth quadrant is found from the formula:

$$23. \sin (360^\circ - \theta) = \sin (-\theta) = -\sin \theta.$$

If we plot the angle increasing to the right and the value of the sine vertically, we obtain a sine curve (illustrated in figure 9-18).

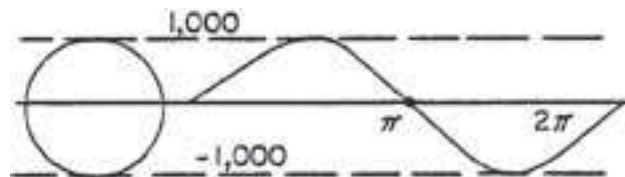


Figure 9-18

The numerical value of the sine varies between plus one and minus one and never goes beyond the limits as the angle varies.

Cosine of an Angle

The numerical value of the cosine of an angle is equal to the projection of a unit radii on the x - axis. Using the same method of analysis as used for the sine we can evaluate the cosine of any angle.

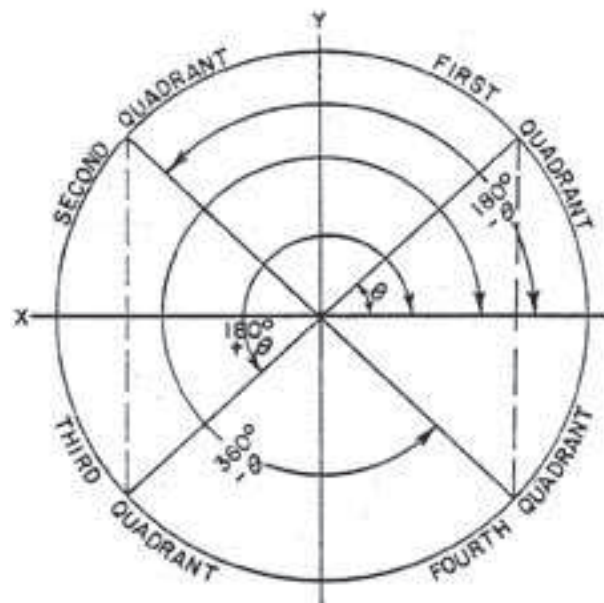


Figure 9-19

In figure 9-19, notice that the projections of the unit radius on the x - axis (the cosine of the angles θ and $180^\circ - \theta$) are the same in length—but of a different sign.

$$24. \cos (180^\circ - \theta) = -\cos \theta$$

Also, the cosine of an angle in the third quadrant may be found by the relation:

$$25. \cos (180^\circ + \theta) = -\cos \theta.$$

And finally, the cosine of an angle in the fourth quadrant may be found from the relation:

$$26. \cos (360^\circ - \theta) = \cos (-\theta) = \cos \theta.$$

Tangent of an Angle

The value of the tangent of an angle is equal to the length of that part of the tangent to the unit circle at zero degrees between $y = 0$ and the intersection of the continuation of the unit radius with the tangent line.

In figure 9-20 the line MN is the tangent to the unit circle at zero degrees. The continuation of the unit radius CD cuts the tangent at M. According to this definition MA is the tangent of angle 6. This new definition does not contradict the rule where $\tan \theta$ from triangle CMA is:

$$\tan \theta = \frac{MA}{CA}$$

because $CA = 1$, so

$$\tan \theta = MA$$

For angles in the second quadrant:

$$27. \tan (180^\circ - \theta) = \tan \theta$$

For angles in the third quadrant:

$$28. \tan (180^\circ + \theta) = \tan \theta.$$

For angles in the fourth quadrant

$$29. \tan (360^\circ - \theta) = \tan (-\theta) = -\tan \theta.$$

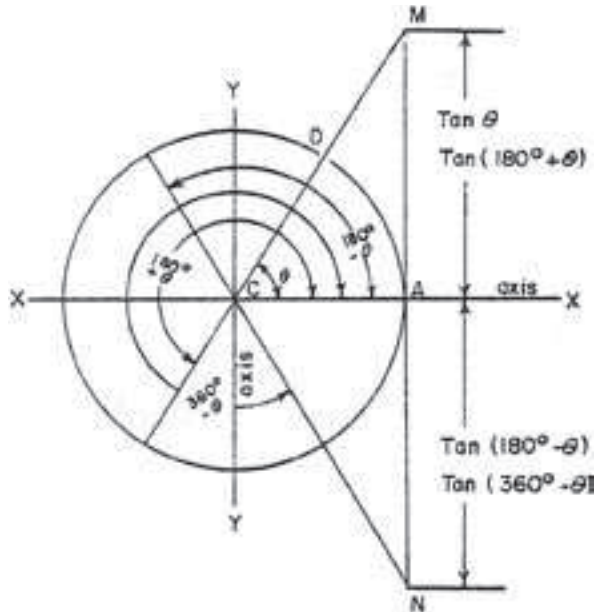


Figure 9-20

Graph of the Tangent

The graph of the tangent, in figure 9-21, shows a special kind of discontinuity called *infinite discontinuity*.

When the angle is slightly less than 90° the value of the tangent will be very large and positive. When the angle is exactly 90° , the tangent and the y -axis are parallel; hence, they will never meet. Therefore, the tangent of 90° is plus or minus infinity. When the angle becomes slightly greater than 90° the tangent assumes very large negative values. Thus, the tangent goes from large positive values through infinity to large negative values at 90° . The same occurs at 270° .

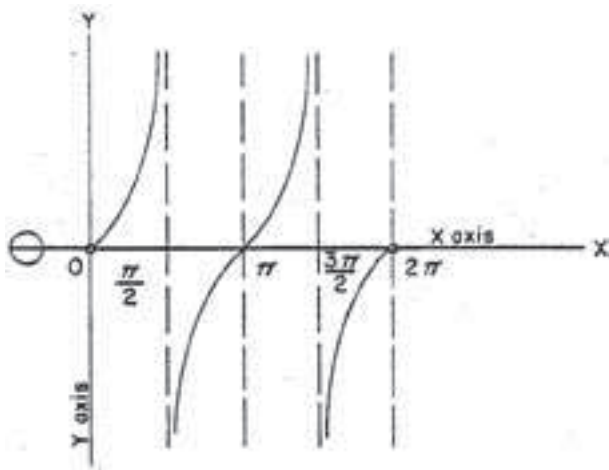


Figure 9-21

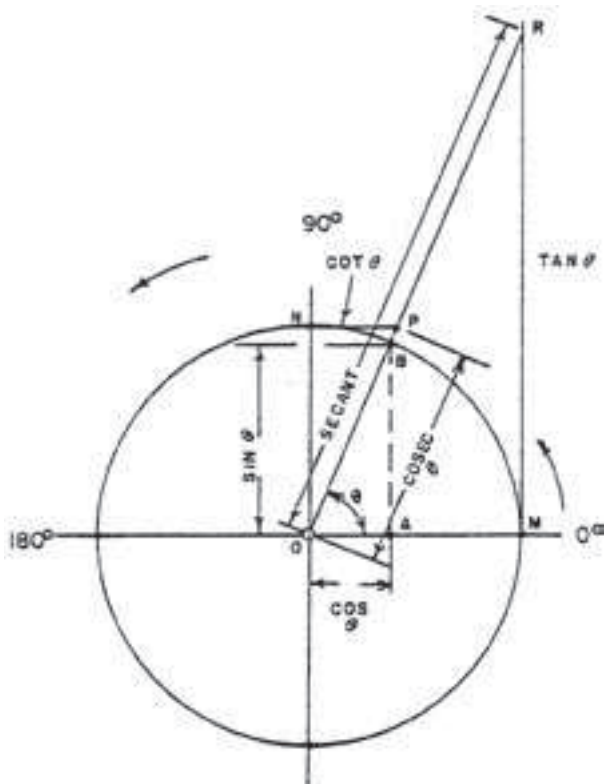


Figure 9-22

Composite Circle Diagram

All trigonometric functions can be shown as lengths of lines in a circle diagram (illustrated in figure 9-22). The circle has a unit radius. We can learn a number of

facts from this diagram. For example, the three sides of the right triangle OAB are $\sin\theta$, $\cos\theta$ and 1; so from the Pythagorean theorem

$$30. \sin^2\theta + \cos^2\theta = 1$$

Also,

$$31. 1 + \tan^2\theta = \sec^2\theta$$

and in triangle ONP

$$32. 1 + \cot^2\theta = \csc^2\theta$$

These equations will be true for any angle.

Some examples of sines in each quadrant are:

$$\begin{array}{ll} 15^\circ = +.258819 & (1\text{st}) \\ 93^\circ = +.99863 & (2\text{nd}) \\ 187^\circ = -.121869 & (3\text{rd}) \\ 280^\circ = -.984808 & (4\text{th}) \end{array}$$

Some examples of cosines in each quadrant are:

$$\begin{array}{ll} 1^\circ = +.999848 & (1\text{st}) \\ 96^\circ = -.104528 & (2\text{nd}) \\ 193^\circ = -.974370 & (3\text{rd}) \\ 292^\circ = +.374606 & (4\text{th}) \\ 470^\circ = -.342020 & (2\text{nd}) \end{array}$$

Some examples of tangents in each quadrant are:

$$\begin{array}{ll} 2^\circ = +.034921 & (1\text{st}) \\ 100^\circ = -5.67128 & (2\text{nd}) \\ 200^\circ = +.363970 & (3\text{rd}) \\ 304^\circ = -1.48256 & (4\text{th}) \end{array}$$

COFUNCTIONS AND COMPLEMENTARY ANGLES

In figure 9-23 (A and B), triangle B is exactly the same as triangle A, except that triangle B is turned on its side:

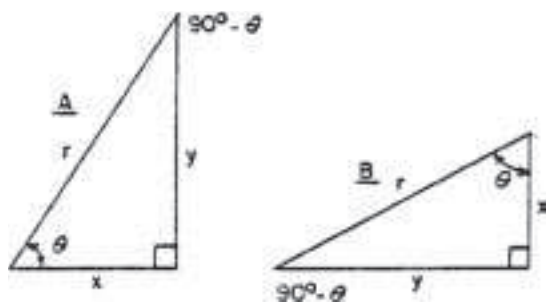


Figure 9-23

In triangle A:

$$33. \sin\theta = \frac{y}{r}$$

$$34. \cos\theta = \frac{x}{r}$$

$$35. \tan\theta = \frac{y}{x}$$

$$36. \sec\theta = \frac{r}{x}$$

$$37. \csc\theta = \frac{r}{y}$$

$$38. \cot\theta = \frac{x}{y}$$

In triangle B:

$$39. \cos(90^\circ - \theta) = \frac{y}{r}$$

$$40. \sin(90^\circ - \theta) = \frac{x}{r}$$

$$41. \cot(90^\circ - \theta) = \frac{y}{x}$$

$$42. \csc(90^\circ - \theta) = \frac{r}{x}$$

$$43. \sec(90^\circ - \theta) = \frac{r}{y}$$

$$44. \tan(90^\circ - \theta) = \frac{x}{y}$$

The ratio y/r in triangle A is equal to ratio y/r in triangle B; therefore,

$$45. \sin\theta = \cos(90^\circ - \theta)$$

and

$$46. \cos\theta = \sin(90^\circ - \theta)$$

$$47. \sin\theta = \cot(90^\circ - \theta)$$

$$48. \sec\theta = \csc(90^\circ - \theta)$$

$$49. \csc\theta = \sec(90^\circ - \theta)$$

$$50. \cot\theta = \tan(90^\circ - \theta)$$

From this section we can conclude that *the trigonometric function of an angle is equal to the cofunction of its complement.*

SIMPLE TRIGONOMETRIC IDENTITIES

There are numerous ways of expressing a function of trigonometry. For example:

$$\begin{aligned} \sin\theta &= \sin(180^\circ - \theta) = \cos(90^\circ - \theta) \\ &= -\sin(180^\circ + \theta) = -\sin(360^\circ - \theta) \\ &= -\cos(270^\circ - \theta) = 1/\csc\theta. \end{aligned}$$

Also, from the formula

$$51. \sin^2 \theta + \cos^2 \theta = 1$$

$$\sin \theta = \pm \sqrt{1 - \cos^2 \theta}$$

Many times, especially in calculus, one particular method of expressing the function is more useful than any of the others. For example, $\sin^3 \theta$ must be changed as shown before the function can be integrated.

$$52. \sin^3 \theta = \sin \theta \sin^2 \theta = \sin \theta (1 - \cos^2 \theta).$$

The form on the extreme right is easily integrated.

Sometimes it is possible to change a trigonometric expression to a simpler form, as follows:

Numerical Example No. 16. Simplify the expression

$$\sin \theta \cos \theta \tan \theta$$

The first step is *usually* that of changing the relation so that it contains only sines and cosines, hence:

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

then

$$\sin \theta \cos \theta \frac{\sin \theta}{\cos \theta}$$

By cancellation this becomes

$$\sin^2 \theta.$$

Numerical Example No. 17. Simplify the expression

$$\sin (180^\circ - \theta) \tan (90^\circ - \theta) \cot (180^\circ - \theta)$$

The first step is to change the relation so it only contains functions of θ .

$$\sin (180^\circ - \theta) = \sin \theta$$

$$\tan (90^\circ - \theta) = \cot \theta$$

$$\cot (180^\circ - \theta) = \frac{1}{\tan (180^\circ - \theta)} = \frac{1}{-\tan \theta}$$

$$= -\cot \theta$$

Substituting in the original expression

$$\sin \theta \cot \theta (-\cot \theta);$$

and changing the relation so the first two functions can be combined.

$$-\sin \theta \frac{\cos \theta}{\sin \theta} \cot \theta$$

hence

$$-\cos \theta \cot \theta$$

Note: An equity which is true for all values of an unknown is called an identity. There are definite rules for the verification of identities. Establishing an identity consists of changing either one or both sides of the equality until both

sides are the same. The fundamental role in proving identities is expressed in rule number 19.

Rule 19 - - Never work across the equals sign. The algebraic rules for cross multiplication are never used.

OBLIQUE TRIANGLES— THE LAW OF SINES AND LAW OF COSINES

In the discussion on triangles we concluded that an *oblique triangle* is a triangle having no right-angle and every oblique triangle is composed of two right triangles. The solution to the missing sides of those triangles, as used for numerical example number 15, can be simplified by using *the Law of Sines* and *the Law of Cosines*.

The Law of Sines

The Law of Sines states that for any triangle, the ratio of the length of one side to the sine of the angle opposite is equal to the corresponding ratio for any other side and corresponding angle. Or,

$$53. \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

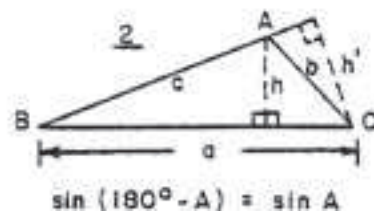
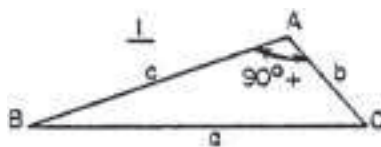


Figure 9-24

As proof, triangle 1 of figure 9-24 has been reconstructed as triangle 2. By dropping a perpendicular from A to the opposite side (a), we obtain

$$54. \sin B = \frac{h}{c} \text{ or } h = c \sin B$$

and

$$54. \sin C = \frac{h}{b} \text{ or } h = b \sin C$$

We have two expressions for h which are equal to each other; therefore,

$$56. c \sin B = b \sin C$$

or

$$57. \frac{c}{\sin C} = \frac{b}{\sin B}$$

Dropping a perpendicular from C to the opposite side, and making use of the fact that $\sin (180^\circ - A) = \sin A$, we can prove that

$$58. \frac{a}{\sin A} = \frac{b}{\sin B}$$

Therefore, from the last two expressions:

$$59. \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

This is the law of sines. It will prove valuable in cadastral computations such as those used to compute missing measurements of highway spirals and railroad tapers.

Numerical Example No. 18. A fractional lot in a subdivision block, shown in figure 9-25, has three known parts. To find the length of the missing sides (a and b), when $C = 97.50^\circ$, $B = 30^\circ$ and $c = 500'$, or use the Law of Sines.

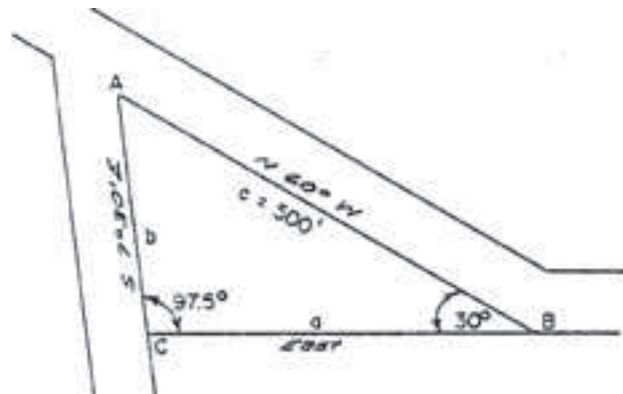


Figure 9-25

$$\frac{500}{\sin 97.5^\circ} = \frac{b}{\sin 30^\circ}$$

Since 97.5° is in the second quadrant

$$\sin (180^\circ - \theta) = \sin 82.5^\circ$$

and

$$\sin 82.5^\circ = 0.991445$$

Also

$$\sin 30^\circ = 0.50000$$

Therefore

$$\frac{500}{0.991445} = \frac{b}{0.50000}$$

Hence $b = 252.16'$

To find side a:

$$\text{Angle } A = 180^\circ - B - C = 52.5^\circ$$

and from the Law of Sines

$$\frac{500}{\sin 97.5^\circ} = \frac{a}{\sin 52.5^\circ}$$

or

$$\frac{500}{0.991445} = \frac{a}{0.793353}$$

or

$$a = \frac{500(0.793353)}{0.991445} = \frac{396.68}{0.991445}$$

$a = 400.1$

The Law of Cosines

In any triangle the square of one side is equal to the sum of the squares of the other two sides, minus twice the product of these two sides multiplied by the cosine of the angle between them.

This is known as *the Law of Cosine* and it is expressed as

$$60. a^2 = b^2 + c^2 - 2bc \cos A$$

or,

$$61. a = \sqrt{b^2 + c^2 - 2bc \cos A}$$

or

$$62. b^2 = a^2 + c^2 - 2ac \cos B$$

or

$$63. b = \sqrt{a^2 + c^2 - 2ac \cos B}$$

or

$$64. c^2 = a^2 + b^2 - 2ab \cos C$$

or

$$65. c = \sqrt{a^2 + b^2 - 2ab \cos C}$$

The equations can be proven by dropping a perpendicular line from the apex of the triangle (figure 9-26) to the base and treating the oblique triangle as two right triangles.

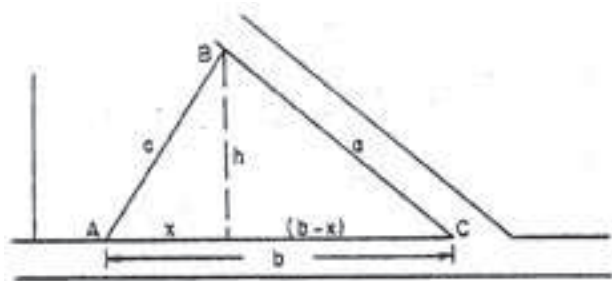


Figure 9-26

Therefore,

$$66. \cos A = \frac{x}{c}$$

or

$$67. x = c \cos A$$

and

$$68. h^2 = c^2 - x^2$$

Substituting in $x = c \cos A$ the value of x given in $h^2 = c^2 - x^2$:

$$69. h^2 = c^2 - c^2 \cos A$$

In BDC

$$70. h^2 = a^2 - (b - x)^2$$

which expands to

$$71. h^2 = a^2 - b^2 + 2bx - x^2$$

Substituting for x , the value given by $x = c \cos A$:

$$72. h^2 = a^2 - b^2 + 2bc \cos A - c^2 \cos^2 A$$

Equating the two values h^2 in $h^2 = c^2 - c^2 \cos A$ and $h^2 = a^2 - b^2 + 2bc \cos A - c^2 \cos^2 A$ we have:

$$73. c^2 - c^2 \cos A = a^2 - b^2 + 2bc \cos A - c^2 \cos^2 A$$

Cancelling like terms and rearranging we have the equation for the Law of *Cosines*.

$$74. a^2 = b^2 + c^2 - 2bc \cos A$$

Numerical Example No. 19. Using the Law of Cosines, the easterly line of the triangular parcel in figure 9-27 can be solved as follows:

9-20

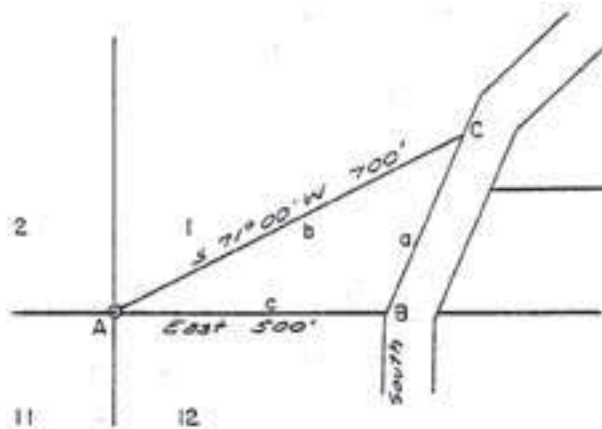


Figure 9-27

Solution:

$$\begin{aligned} a^2 &= 700^2 + 500^2 - 2(500)(700) \cos 19^\circ \\ a^2 &= 490,000 + 250,000 - 700,000 \cos 19^\circ \\ a^2 &= 740,000 - 700,000 (0.94552) \\ a^2 &= 740,000 - 661.864 \\ a^2 &= 78,136 \end{aligned}$$

thus,

$$a = \sqrt{78136}$$

so, $a = 279.53'$

THE INVERSE TRIGONOMETRIC FUNCTIONS

It is often convenient and useful to turn a trigonometric function around so that instead of writing

$$75. \tan \theta = A$$

it is more useful to write $\theta =$ the angle whose tangent is A . However, rather than writing the words we use the notation:

$$76. \theta = \arctan A$$

or

$$77. \theta = \tan^{-1} A$$

For any angle there is one and only one value of the function to fit it. But, there are numerous angles which will satisfy an inverse function, e.g.

$$\theta = \arctan 1$$

can be written

$$\tan \theta = 1$$

however, *one* is the tangent of many angles such as 45° , 225° , 405° , 585° and others.

For any inverse trigonometric function there are two angles less than 360° which will satisfy it. Therefore,

$\theta = \arccos 0.500$ refers to 60° and 300°
 $\theta = \arccos (-0.500)$ refers to 120° and 240°
 $\theta = \arcsin 0.707$ refers to 45° and 135°
 $\theta = \operatorname{arcsec} 2$ refers to 60° and 300°

Since a given inverse trigonometric function has many values, one of these values is selected as its *principal value*. The principal value of an inverse function is its *smallest numerical value*. The principal values are those used in most mapping problems. If it happens that there are values numerically equal but opposite in sign, the positive angle is the principal value. The principal value of

$$\tan^{-1} 1$$

is 45° , and of

$$\tan^{-1} (-1)$$

is -45° . Since

$$\cos^{-1} \left(\frac{1}{2} \right)$$

is satisfied by both $+60^\circ$ and -60° , the principal value is considered $+60^\circ$. The principal value of

$$\cos^{-1} \left(-\frac{1}{2} \right)$$

is 120° .

All principal values lie between -90° and 180° proceeding counter-clockwise. Principal values for positive numbers are between 0° and 90° . For negative numbers, principal values of the inverse sine, tangent, cotangent and cosecant lie between -90° and 0° , while the principal values of the inverse cosine and secant lie between 90° and 180° .

Numerical Example No. 20. Find the principal value of the angle in the function $\theta = \operatorname{arcsec} 2.236$.

The angle whose secant is 2.236 is $63^\circ 26'$. If the trig. tables do not list secant values, or your hand calculator does not have this function, the function can be changed to:

$$\theta = \arccos \frac{1}{2.236} = \arccos 0.4472$$

Now, the angle whose cosine is 0.4472 is $63^\circ 26'$. This angle is in the first quadrant and is the principal value desired.

Relations Among the Inverse Functions

If

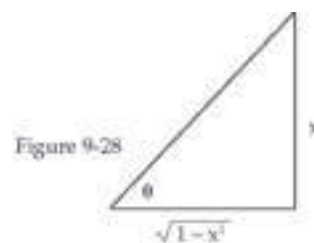
$$78. \theta = \arcsin x$$

we can write

$$79. \sin \theta = x.$$

Figure 9-28 is a triangle containing the angle of $\sin x$. Assume the hypotenuse is equal to one (1). The remaining side of the triangle will be

$$\sqrt{1-x^2}$$



We can now write all the functions of angle θ in terms of the sides of the triangle.

$$\begin{aligned}
 80. \quad \sin \theta &= x & \csc &= \frac{1}{x} \\
 \cos \theta &= \sqrt{1-x^2} & \sec &= \frac{1}{\sqrt{1-x^2}} \\
 \tan \theta &= \frac{x}{\sqrt{1-x^2}} & \cot \theta &= \frac{\sqrt{1-x^2}}{x}
 \end{aligned}$$

From these we can write the inverse functions.

$$\begin{aligned}
 81. \quad \theta &= \arcsin x = \arccos \sqrt{1-x^2} = \\
 &= \arctan \frac{x}{\sqrt{1-x^2}} = \operatorname{arcsec} \frac{1}{x} = \\
 &= \operatorname{arcsec} \frac{1}{\sqrt{1-x^2}} = \operatorname{arccot} \frac{\sqrt{1-x^2}}{x}
 \end{aligned}$$

Numerical Example No. 21. Using the principal values find the tangent of the angle whose sine is

$$\frac{\sqrt{3}}{2}$$

$$\tan \left(\arcsin \frac{\sqrt{3}}{2} \right) = ?$$

Draw a triangle containing the arc sin

$$\frac{\sqrt{3}}{2}$$

The remaining side will be given by:

$$x = \sqrt{2^2 - (\sqrt{3})^2} = \sqrt{1} = 1$$

Using the tangent ratio

$$\tan \theta = \sqrt{3}$$

the angle θ is 60° . The triangle is shown in figure 9-29.

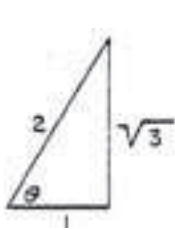


Figure 9-29

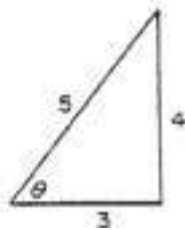


Figure 9-30

Numerical Example No. 22. Using the principal values, find

$$\sin \left(\arccos \frac{3}{5} - \arcsin \frac{4}{5} \right)$$

The missing side of the triangle of figure 9-30 contains

$$\arccos \frac{3}{5}$$

Is given by:

$$y = \sqrt{5^2 - 3^2} = \sqrt{16} = 4$$

Note that the triangle also contains

$$\arcsin \frac{4}{5}$$

so that

$$\arccos \frac{3}{5} = \arcsin \frac{4}{5}$$

and our original expression becomes

$$\sin 0^\circ$$

which is zero.

Numerical Example No. 23. Find x in the relation

$$\arctan \sqrt{\frac{x}{1-x^2}} = \arcsin \frac{1}{2-x}$$

In figure 9-31 two angles are equal to each other, but one is defined by its tangent and the other by its sine. We have constructed

$$\arctan \sqrt{\frac{x}{1-x^2}}$$

in the figure. The remaining side of the triangle is

$$r^2 = \sqrt{(1-x^2) + x^2}$$

or, $r = 1$

knowing r we can set up the relation

$$\arctan \sqrt{\frac{x}{1-x^2}} = \arcsin x$$

Substituting this value in the original equation we have

$$\arcsin x = \arcsin \frac{1}{2-x}$$

Since the angles are equal, their sines equal. We can now solve for x .

$$x = \frac{1}{2-x}$$

$$2x - x^2 = 1$$

or,

$$x^2 - 2x + 1 = 0$$

$$(x-1)^2 = 0$$

thus

$$x = 1$$

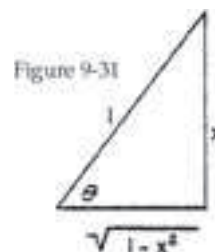


Figure 9-31

FACTORIAL SIGN

In the curve formulae

$$\frac{Y}{L} = \sum \left(\frac{\theta^{2n-2}}{(2n-2)!(4n-3)(-1)^{n+1}} \right)$$

and in transcendental functions (in calculus, trig. and logarithmic functions grouped together) the exclamation mark (!) is a *factorial*. For example, $3!$ is read as *3 factorial*, and is equal to $1 \times 2 \times 3$ (or 6). $5!$ is read as *5 factorial*, and is equal to $1 \times 2 \times 3 \times 4 \times 5$, or 120.

BALANCING ANGLES

In any survey of a polygon, there are geometric conditions which angles should satisfy; however, because of the probable occurrence of errors made in survey observations, the angles seldom balance mathematically.

Small angular errors are often insignificant when plotting; however, when establishing map triangulation and computing Double Meridian Distances, latitude and departures, coordinates, and areas, it is essential that the angles meet the following conditions.

Rule 20. In a closed traverse the sum of the interior angles must equal $(n-2)(180^\circ)$; where n is equal to the number of sides of a traverse.

Rule 21. In a closed traverse the difference between the sum of the right deflection angles and the sum of the left deflection angles must equal 360° .

Numerical Example No. 24. Use rule number 21 to check the polygon in figure 9-32 for angular closure.

First, compute $(n-2) 180^\circ$

$$(n-2) 180^\circ = (7-2) 180^\circ = 900^\circ$$

Therefore, the sum of the interior angles should equal 900° .

Add the interior angles

$\angle A$	$=$	59°	$21'$	$30''$
$\angle B$	$=$	89°	$27'$	$51''$
$\angle C$	$=$	90°	$34'$	$09''$
$\angle D$	$=$	88°	$41'$	$-$
$\angle E$	$=$	210°	$26'$	$40''$
$\angle F$	$=$	203°	$14'$	$-$
$\angle G$	$=$	158°	$16'$	$-$
sum	$=$	897°	$179'$	$130''$
or	$=$	900°	$01'$	$10''$

The error of closure is $01' 10''$.

Numerical Example No. 25. Use rule number 21 to check the polygon in figure 9-32.

Note: By subtracting the interior angles from 180° , the right deflection angles can be established. By subtracting 180° from the interior angles greater than 180° , the left deflection angles can be established.

Add the right deflection angles and then add the left deflection angles.

RIGHT D.A.

$\angle A$	$=$	120°	$38'$	$30''$
$\angle B$	$=$	90°	$32'$	$09''$
$\angle C$	$=$	89°	$25'$	$51''$
$\angle D$	$=$	91°	$19'$	$-$
$\angle G$	$=$	21°	$44'$	$-$
sum	$=$	411°	$158'$	$90''$
or	$=$	413°	$39'$	$30''$

LEFT D.A.

$\angle E$	$=$	30°	$26'$	$40''$
$\angle F$	$=$	23°	$14'$	$00''$
sum	$=$	53°	$40'$	$40''$

Now find the difference between the sums of the right and left deflection angles.

sum R.D.A.	$=$	413°	$39'$	$30''$
sum L.D.A.	$=$	53°	$40'$	$40''$
Difference	$=$	359°	$58'$	$50''$

To find the error of closure subtract the difference from 360° .

360°	$=$	359°	$59'$	$60''$
—	$=$	359°	$58'$	$50''$
error of closure	$=$		$1'$	$10''$

or 70 seconds.

Before a traverse can be applied in mapping, the angles should be adjusted to satisfy the geometric conditions of a closed polygon (rules 1-0 and 21). There are three basic approaches to adjusting (balancing) the angles of the polygon.

1. Make *arbitrary adjustments* to one or more angles.
2. Apply all adjustments to angles that might not have been measured with the degree of accuracy that the other angles were measured. This *method requires some knowledge of the survey conditions and environment*.
3. Apply an *average correction* to all angles. The average correction is found by dividing the error of closure by the number of angles in the polygon. This does the job, but is unscientific and usually results in lines being out of harmony with abutting data.

Never attempt to adjust angles until the following steps have been taken.

Analyze the bearings to determine if the error might be due to transposition of figures. For example, an eighteen-minute error could be the result of the bearing $S 89^\circ 53' 30'' E$ being transposed to $S 89^\circ 35' 30'' E$.

Check all survey and deed information of abutting parcels. Possibly the location of the error will be evident by matching survey values to deed values and abutting survey measurements.

Finally, check your survey computation for mistakes.

Note: The methods defined here are intended for mapping purposes only. Survey textbook and reference books should be reviewed for information on the survey approach to closure.

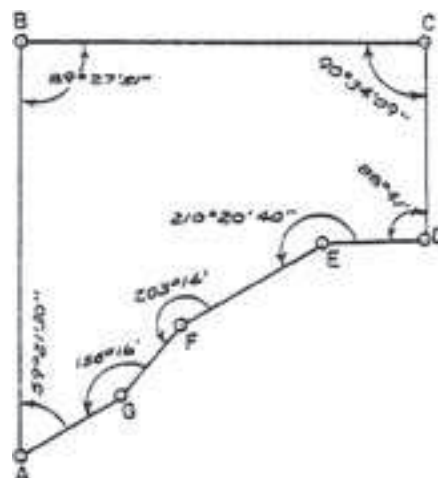


Figure 9-32

Using the Arbitrary Method of Closure

Numerical Example No. 26. Using the arbitrary approach to closing, the interior angles of the subject polygon (figure 9-32) can be balanced by adjusting the *second* values to 15 seconds.

Note. Remember! In our discussion on significant figures we established the rule that we could not add to the total number of significant figures of a bearing or angle. Therefore, the changes, in seconds, will be made to those bearings carried out to seconds.

EXISTING ANGLES	ADJUST- MENT	ADJUSTED ANGLES
∠A=59° 21' 30"	- 15"	59° 21' 15"
∠B=89° 27' 51"	- 36"	89° 27' 15"
∠C=90° 34' 09"	+ 6"	90° 34' 15"
∠D=88° 41' —	0"	88° 41' —
∠E=210° 26' 40"	- 25"	210° 26' 15"
∠F=203° 14' —	0"	203° 14' —
∠G=158° 16' —	0"	158° 16' —
= 897° 179' 30"	- 70"	897° 179' 60"
OR 900° 01' 10"	—	900° 00' 00"

The arbitrary adjustment is just that - *arbitrary*. There is no hard and fast rule for arbitrary adjustment. In numerical example number 26 it appeared to close the polygon, but there is no assurance that the location of the correction corresponds to the true location of the error. In another polygon the above procedure will be undesirable. But in mapping we should keep in mind that our objective is to balance the polygon. It is not the approach that is significant here, it is the result.

CAUTION

REGARDLESS OF THE METHOD USED TO CLOSE A POLYGON, DO NOT LABEL MAP LINES WITH ADJUSTED VALUES WITHOUT A REGISTERED SURVEY TO SUPPORT THE NEW BEARINGS. THE ADJUSTED FIGURES COULD BE INTERPRETED AS SURVEYOR'S OFFICIAL FIELD MEASUREMENTS.

Closing a Polygon by Choosing a Probable Angle of Error

This method requires some knowledge of the survey conditions, such as methods used, equipment used, or obstacles to accurate measurement.

Numerical Example No. 27. A quadrangle map shows that point B, in figure 9-32, is out of the line sight from point A because of a ridge between the two points. It would be reasonable to assume that an error could have been made in the measurement of angles A and B. In this case the 70" error would be divided equally and applied to the suspect angles.

EXISTING ANGLES	ADJUST- MENT	ADJUSTED ANGLES
A=59° 21' 30"	- 35"	59° 20' 55"
B=89° 27' 51"	- 35"	89° 27' 16"
C=90° 34' 09"	0	90° 34' 15"
D=88° 41' —	0	88° 41' —"
E=210° 26' 40"	0	210° 26' 15"
F=203° 14' —	0	203° 14' —
G=158° 16' —	0	158° 16' —
= 897° 179' 130"	- 70"	897° 179' 120"
or 900° 01' 10"	—	900° 00' 00"

The above method was used because of evidence indicating the angles of error. The evidence, however, is weak, and in this case the solution is not guaranteed to be any more accurate than the *arbitrary method*. If survey conditions are unknown, the best assumption is that all angles were measured with equal precision. In this case the following method should be used.

Balancing Angles by Method of Averages

By dividing the total angular error by the number of angles and applying the quotient to each angle, the polygon in Figure 9-32 will be balanced.

Numerical Example No. 28.

Known: angular error = 70"
number of angles = 7

Divide the error by the number of angles.

$$70'' \div 7 = 10''$$

10" = angular correction per angle.

Subtract the angular correction from each angle.

EXISTING ANGLES	ADJUST- MENT	ADJUSTED ANGLES
A=59° 21' 30"	- 10"	59° 20' 20"
B=89° 27' 51"	- 10"	89° 27' 41"
C=90° 34' 09"	- 10"	90° 33' 59"
D=88° 41' —	- 10"	88° 40' 50"
E=210° 26' 40"	- 10"	210° 26' 30"
F=203° 14' —	- 10"	203° 13' 50"
G=158° 16' —	- 10"	158° 15' 50"
= 897° 179' 130"	- 70"	897° 175' 300"
or 900° 01' 10"	—	900° 00' 00"

Note: All of the foregoing methods are based on assumptions that may be incorrect; however, they are satisfactory for the purpose of further computations. The bearings on the map must not be changed to correspond with angle adjustments. The adjusted bearings could be interpreted as representing field measurements.

COMPUTATION OF LATITUDE AND DEPARTURE

The adjustment of angles for closure is done to satisfy the geometric conditions of a closed polygon. However, angular adjustments alone will not result in mathematical traverse closure; it is still necessary to adjust the linear measurements of the traverse.

Before a traverse can be mathematically closed, it is essential to compute the *latitude* and *departure* of each course in the traverse.

The *latitude* of a course is the linear distance that one end of a course is north or south of the other end of the course.

The *departure* of a course is the linear distance that one end of a course is east or west of the other end of the course.

In Figure 9-33 line AF is the latitude of course AB; line FB is the departure of course AB; line BG is the latitude of course BC; and line GC is the departure of course BC.

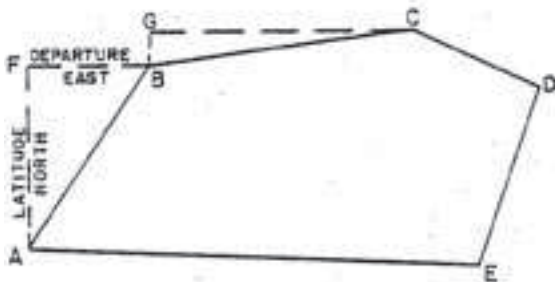


Figure 9-33

North latitudes are designated as positive (+) values, and south latitudes are designated as negative values (-).

East departures are designated as positive (+) values, and west departures are designated as negative (-) values. They are to be mathematically treated as positive and negative numbers.

The latitude and departure of a line can be computed from the bearing and length of the course. If angles have been adjusted for closure, the adjusted bearings are used. The formula for computing the latitude of a course is:

$$\text{Latitude} = \text{Dist. of course} \times \cos \text{ of bearing}$$

or

$$\text{Lat} = (\text{dist.})(\cos \text{ of bearing})$$

Numerical Example No. 29. The bearing of a course is N31°28'W. The length of the course is 209 feet. The latitude is computed as follows:

$$\cos \text{ of } N31^{\circ}28'W = .8529$$

therefore, lat = 209' × .8529

$$= 178.26'$$

The bearing is *north and east*-, therefore, the answer will have a positive value.

Thus, Lat. = 178.26'

The departure of a line can be computed from the formula:

$$\text{Departure} = \text{Dist. of course} \times \sin \text{ of bearing}$$

or

$$\text{Dep.} = (\text{dist.})(\sin \text{ of bearing})$$

Numerical Example No. 30. To compute the departure of the course N31°28'W 209 feet, proceed as follows:

$$\sin \text{ of } N31^{\circ}28'E = .5220024$$

therefore, dep. = 209' × .5220024

$$= 109.098502$$

The bearing is *north and east*: therefore, the answer will have a positive value.

Thus, dep. = 109.10'

Using Latitude and Departure to Check for Mathematical Closure

To check a polygon for mathematical closure, the north (positive) latitudes are added and the south (negative) latitudes are added. If the difference between the sums equals zero, the latitudes are said to balance. Any difference between the sums is the *error in latitude*.

Next, the east (positive) departures are added and the west (negative) departures are added. If the difference between the sums equals zero, the departures are said to balance. Any difference between the sums is the *error of departure*.

Figure 9-34 shows the computed latitudes and departures of a six-sided polygon.

TRAVERSE CLOSURE

After latitudes and departures have been computed and the error in closure determined, it is necessary to adjust the linear measurements for mathematical closure. There are five basic methods for closing a traverse.

1. The *arbitrary* or *random* method (*part of which includes angular closure previously discussed*).
2. The *transit* method.

3. The *compass rule* method.
4. The *method of least squares*.
5. The *Crandall* method.

The Arbitrary Method

The arbitrary method includes the arbitrary adjustment of angles (discussed in the section on balancing angles) and the arbitrary adjustment of linear measurements. Use of this method will allow direct arbitrary adjustment of linear measurements of any traverse line. This method is satisfactory for plotting a traverse, but it will not necessarily provide a pure mathematical closure. The correct approach to adjustment is to apply the arbitrary adjustment to selected latitudes and longitudes.

Numerical Example No. 31. In figure 9-34 the error in departure is 0.99. The error in latitude is 0.38. To arbitrarily adjust for closure, subtract the error in latitude from the longest north latitude.

$$178.26 - 0.38 = 177.88$$

Now subtract 0.99 from the *longest* east departure.

$$206.71 - 0.99 = 205.72$$

This results in a zero error in latitude, and departure.

The arbitrary method could be more scientific than described in example no. 31. Two or more values could be adjusted if there was evidence that the linear measurements of certain lines were less likely to be as accurate as the other lines of the traverse.

The Transit Rule Method

If it is known that the angles were measured with a greater degree of precision than the linear measurements, the transit rule approach could be applied to close the traverse.

The formula for transit rule adjustments of latitude is:

$$82. \quad \frac{\text{Corr. in Latitude}}{\text{Latitude}} = \frac{\text{error in lat.}}{\text{sum of all lats.}} \times \text{lat.}$$

Numerical Example No. 32. To adjust the 178.26 north latitude in figure 9-35, proceed as follows:

Using the transit rule formula (equation 82):

$$\begin{aligned} \text{Corr. in lat.} &= \frac{0.38}{842.08} \times 178.26' \\ &= .080442 \end{aligned}$$

The correction is .08

Subtract .08 from 178.26'.

Rule 22. Add corrections to the column with the smallest sum; subtract from the column with the largest sum.

$$178.26' - .08' = 178.18'$$

Hence, the corrected latitude = 178.18'

The formula for transit rule adjustments of departure is:

$$83. \quad \frac{\text{Corr. in Departure}}{\text{Departure}} = \frac{\text{error in dep.}}{\text{sum of all dep.}} \times \text{dep.}$$

Numerical Example No. 32. To adjust the 109.10' east departure, proceed as follows:

Using the transit rule for departure (equation 83):

$$\begin{aligned} \text{Corr. in lat.} &= \frac{0.99}{813.37} \times 109.10 = \\ &= .132792 \end{aligned}$$

Thus, corr. in dep. = .13

Subtract .13 from 109.10

Rule 23. Add corrections to the column with the smallest sum; subtract from the column with the largest sum. (Bear in mind that in other transit rule problems there will be other combinations of larger columns.)

$$109.10' - 0.13' = 108.97$$

BEARINGS	DISTANCE IN FEET	COSINE	SINE	LATITUDES		DEPARTURES	
				N(+)	S(-)	E(+)	W(-)
N31°28'E	209.00	.8529440	.5220024	178.26		109.10	
N85°13'E	65.40	.0833880	.9963172	5.45		65.17	
N12°59'E	116.60	.9744355	.2246676	113.62		26.20	
N86°30'E	207.10	.0610485	.9981348	12.64		206.71	
S29°20'W	482.75	.8717844	.4898897		420.85		236.49
N56°45'W	202.92	.5482932	.8362862	111.26			169.70
Unbalanced latitude and departure				421.23	420.85	407.18	406.19
Error in latitude and departure				<u>-420.85</u>		<u>406.19</u>	
				.38		.99	

Figure 9-34

The corrected departure = 108.97'

Figure 9- 35 shows the balanced latitudes departures for the values in figure 9-34.

To obtain the adjusted linear measurement the following formula should be used:

$$84. \quad \text{Adjusted Dist.} = \sqrt{\left(\frac{\text{balanced lat}}{\text{lat}}\right)^2 + \left(\frac{\text{balanced dep.}}{\text{dep.}}\right)^2}$$

Adjusted linear measurements can be used for plotting; however, the adjusted dimension should never be shown on the map unless shown in brackets to indicate a computed distance (brackets represent true measurement as opposed to record measurement).

Compass Rule Method

This is considered as one of the best methods for cadastral map purposes. It is based on the assumption that all angles and distances were measured by the surveyor with equal precision. Compass rule adjustments of latitude can be computed by using the formula

$$85. \quad \text{Corr. in Latitude} = \left(\frac{\text{error in lat.}}{\text{perimeter}} \right) \left(\text{linear distance} \right)$$

Numerical Example No. 33. To adjust the north latitude 178.26' when the error in closure is 0.38, and the distance is 209 feet;

$$\text{Corr. in lat.} = \frac{0.38}{1283.77} \times 209' = .0619$$

subtract .06 from 178.26

Remember rules 22 and 23.

$$178.26' - .06 = 178.20$$

Hence, the correction in lat = 178.20'.

Figure 9-36 shows the latitude and departure balanced by the compass rule method. The formula for the correction of departures is:

$$86. \quad \text{Corr. in Departure} = \left(\frac{\text{error in dep.}}{\text{perimeter}} \right) \left(\text{linear distance} \right)$$

LATITUDES		DEPARTURES		Balanced Latitudes	Balanced Departures
N(+)	S(-)	E(+)	W(-)		
178.26		109.10		+178.18	+108.97
5.45		65.17		+ 5.45	+ 65.09
113.62		26.20		+113.57	+ 26.17
12.64		206.71		+ 12.63	+206.46
	420.85		236.49	-421.04	-236.78
111.26			169.70	+111.21	-169.91
Sum =				+421.04	+406.69
Sum =				-421.04	-406.69
Difference =				000.00	000.00
				Balanced	

Figure 9-35

DISTANCE	LATITUDE		DEPARTURE		Balanced Latitudes	Balanced Departures
	N(+)	S(-)	E(+)	W(-)		
209.00'	178.26		109.10		+178.20	+108.94
65.40'	5.45		65.17		+ 5.43	+ 65.12
116.60'	113.62		26.20		+113.58	+ 26.11
207.10'	12.64		206.71		+ 12.58	+206.55
482.75'		420.85		236.49	-420.99	-236.86
202.92'	111.26			169.70	+111.20	-169.86
1283.77	421.23	420.85	407.18	406.19	+420.99	+406.72
			Positive Values		-420.99	-406.72
			Negative Values			

Figure 9-36

Note: In figure 9-36 the N (+) latitude has a greater sum than the S (–) latitude, therefore corrections were subtracted. Departure corrections are treated in the same manner.

Other Adjustment Methods

The *least squares* method and *Crandall* method are based on the theory of probability. Both are mathematically superior to the arbitrary, transit rule and compass rule methods; but the former, being a more complicated, is not as economical to use as the arbitrary, compass rule or transit rule methods.

Many of the preceeding, computations can be simplified by the use of logarithms and traverse tables that give values to each minute of arc.

COMPUTING AREAS

The unit of area, in the cadastral map system, is *square feet* converted to acres.

One acre of land is equal to 43,560 square feet (not feet square). Square feet can be converted to acres by using either:

$$87. \quad \text{Acres} = \frac{\text{square feet}}{43,560} \text{ or}$$

$$88. \quad \text{Acres} = (\text{Sq. Ft.})(0.000022956)$$

The result can be checked by using the “square feet to acreage” conversion table (no. 24) in the appendix.

Area of Rectangular Polygons

The area of a rectangle can be easily computed by finding the product of the length and width.

$$89. \quad A(\text{in square ft.}) = 1w$$

Numerical Example No. 34. To find the area of a rectangle that is 800 feet long and 300 feet wide:

$$(800)(300) = 240,000 \text{ sq. ft.}$$

To convert to acres:

$$240,000 \text{ sq. ft.} / 43,560 = 5.51 \text{ Ac.}$$

or,

$$(240,000)(0.000022956) = 5.51 \text{ Ac.}$$

If the vertical sides of a polygon are not at right angles to the base, then the polygon is not a rectangle and the formula $A = 1w$ cannot be used.

Area of Parallelograms

The area of the parallelogram shown in Figure 9-37 can be computed by using the formula:

$$90. \quad A = bh$$

Where: A = area in sq. ft.

b = base

h = height, or altitude of the parallelogram.

Note: The height (h) of a parallelogram is not the *length of either side*. It is the distance, on a line perpendicular to the base, from the lower base to the upper base.

Unfortunately, the height of a parallelogram-shaped parcel of land is rarely given in a deed or survey. However, by using the methods discussed on indirect measurement, h can be accurately determined.

Numerical Example No. 35. To find the area of the parallelogram in figure 9-37, proceed as follows:

Determine the value of h ;

Where angle $B = h/c$, or

Where $h = c \cos B$.

$$h = 200 (\cos B) =$$

$$h = 200 (0.93969) = 187.94$$

or,

$$h = 187.94'$$

Now solve for $A = bh$.

$$A = 300' \times 187.94' =$$

$$A = 56,382 \text{ sq. ft.}$$

Convert to acres

$$56,382 \text{ sq. ft.} \div 43,560 = 1.29$$

Hence, the area of the parallelogram = 1.29 acres.

Another method of determining the area of a parallelogram is to divide it into two triangles, as illustrated in figure 9-38, and solve the area of triangles.

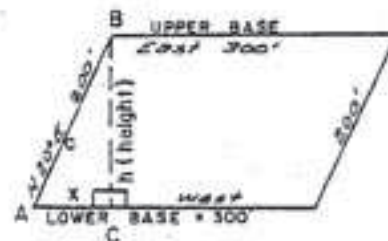


Figure 9-37

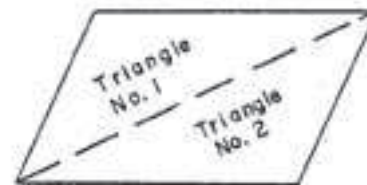


Figure 9-38

It is a common mistake to compute the area of a parallelogram as though it were a rectangle; that is, by using the formula:

$$A = lw$$

Where: l = the base, and
 w = length of one side of the parallelogram.

The apparent logic behind this approach is that, if the triangle at one end of the parallelogram were moved to the other end, as in figure 9-39, we would have a rectangle—therefore, the rectangle formula could supposedly be used.

It is true that by placing the triangle at the other end of the parallelogram, we have a rectangle. But, the length of one side of the parallelogram (c in Figure 9-39) is not the same as the width of the rectangle (w). Here, w equals h , the height of the parallelogram. In figure 9-39,

$$(A = 1 w) = (A = bh).$$

If the formula $A = lw$ were applicable (where w was one side of the parallelogram) then the parallelogram in figure 9-40 would contain the same area as that in figure 9-39. It should be evident, however, that the areas are not equal.

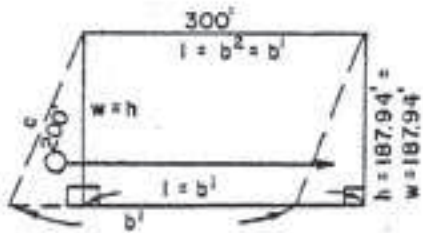


Figure 9-39

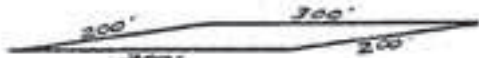


Figure 9-40

Area of Trapezoids

The formula for computing the area of a trapezoid is:

$$91. \quad A = \frac{1}{2} h(b_1 + b_2) \text{ or,}$$

$$A = h \left(\frac{b_1 + b_2}{2} \right)$$

Where: h = height of the trapezoid
 b_1 = lower base
 b_2 = upper base (the opposite side)

Numerical Example No. 36. To find the area of the trapezoidal parcel in figure 9-41, proceed as follows:

Solve for h where angle $B = 19^\circ$ and $c = 270'$.

$$\cos 19^\circ = 0.945519$$

$$\cos B = \frac{h}{c} \text{ or } \cos 19^\circ = \frac{h}{270}$$

$$\text{or, } h = (0.945519)(270) = 255.291$$

$$\text{Hence, } h = 255.29'$$

Now, by using the computed value of h we can solve for the area of the trapezoid.

$$A = h \left(\frac{b_1 + b_2}{2} \right) = (255.29) \left(\frac{720 + 490}{2} \right)$$

$$\text{or, } A = (255.29) (605) = 154,450.45 \text{ sq. ft.}$$

Converted to acres is:

$$\frac{154,450.45}{43,560} = 3.55 \text{ Ac.}$$

The area of a trapezoid, like that of the parallelogram, can be divided into two triangles and solved, by using the formula for the area of triangles.

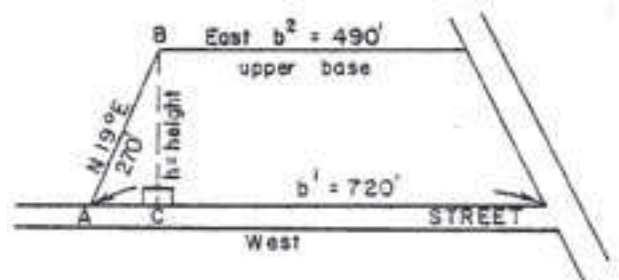


Figure 9-41

Area of Triangles

The area of a triangle can be computed by dividing the product of the base and height by two. This rule is expressed as:

$$92. \quad A = \frac{1}{2} (b)(h), \text{ or } A = \frac{1}{2} bh, \text{ or } A = \frac{bh}{2}$$

Numerical Example No. 37. To find the area of the triangular shaped parcel in figure 9-42; where $b = 600'$ and $h = 400'$:

$$A = \frac{600 \times 400}{2} = \frac{240,000}{2} = 120,000 \text{ sq. ft.}$$

Convert to acres.

$$\frac{120,000}{43,560} = 2.75 \text{ Ac.}$$

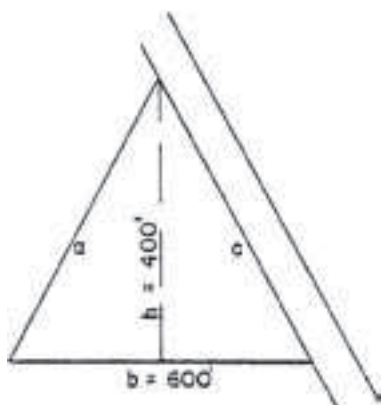


Figure 9-42

The height of a triangle is seldom given in a deed or on a survey plat; however, sides a, b and c are usually given in both the deed and survey. If all sides, a, b and c are known, the area can be computed using the formula:

$$93. \quad A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$

If sides a, b, and c, and sin c are known, the following formula can be used to compute the area:

$$94. \quad A = \frac{ab \sin c}{2}$$

Area of a Quadrilateral

The area of a quadrilateral can be computed by dividing it into two triangles (ABC and ACD) and then solving for the area of each triangle.

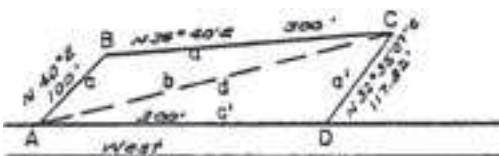


Figure 9-43

Before solving for the area of each triangle, it will be necessary to compute the distance AC. Refer to the *law of cosines* (equations 60 through 64) to solve for AC.

To solve for each triangle, use the formula.

$$95. \quad \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{where } s = \frac{a+b+c}{2}$$

Area by D.M.D.

After the angles of a traverse have been geometrically balanced and the latitude and departure have been balanced, the area of a polygon can be computed using the D.M.D. (Double Meridian Distance) method.

Figure 9-44 shows the relationship of the meridian, meridian distance, departure, double meridian distance, and latitude, with the courses of a traverse.

The *Double Meridian Distance* (written D.M.D.) of a course is defined as the sum of the distances of the ends of the course from a meridian.

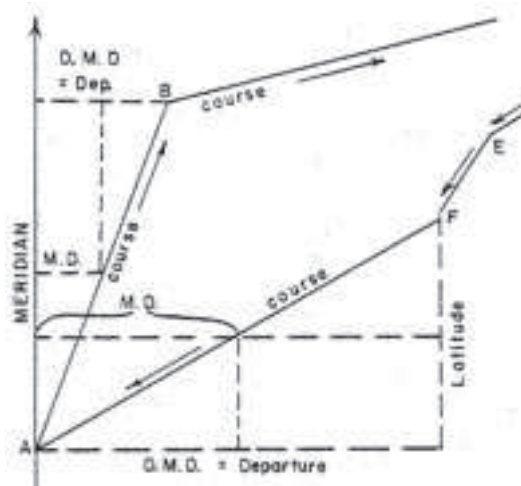


Figure 9-44

In figure 9-44, the departure of AB is also the D.M.D., and the departure of FA is the D.M.D. of FA; however, the other departures of the traverse are not equal to the D.M.D. of the courses. The D.M.D. of each course is twice the distance of the midpoint of the course from the meridian.

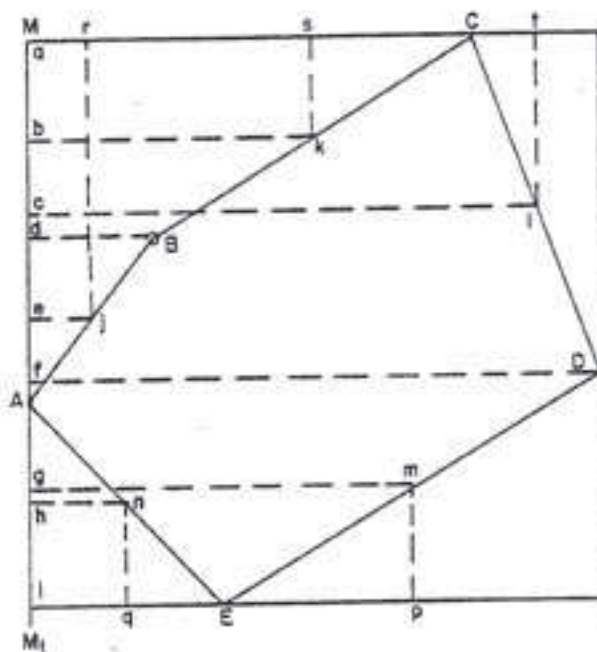


Figure 9-45

In figure 9-45, MM' is the meridian of the polygon ABCDE. The balanced latitudes are indicated by lines dA, ad, af, Ai, and Do. The meridian distances are represented by lines ej, bk, cl, gin, and hn. To arrive at

the D.M.D., these lines are doubled and multiplied by the corresponding latitudes.

The product of the D.M.D. and the balanced latitudes is equal to the double areas of the trapezoids and triangles of ABCDE. Negative and positive double areas are listed in separate columns and added. The difference between the two sums is divided by 2 to obtain the area in square feet.

The rules used for computing latitude, departure, D.M.D., double areas, and areas are:

1. Latitude = distance x cos of bearing.
2. Departure = distance x sin of bearing.
3. D.M.D. of the first course = the departure of the first course.
4. D.M.D. of the other courses = the D.M.D. of the previous course plus the departure of the previous course plus the departure of the course itself.
5. D.M.D. of the last course = the departure of the last course, but with opposite sign.
6. Double areas = the balanced latitudes x the corresponding D.M.D.s.
7. Area in square feet = the difference between negative and positive double areas $\div$ by 2.
8. The acreage is equal to the area in square feet 43,560.

Figure 9-49 is a sample of area computation by the D.M.D. method of the parcel in figure 9-46.

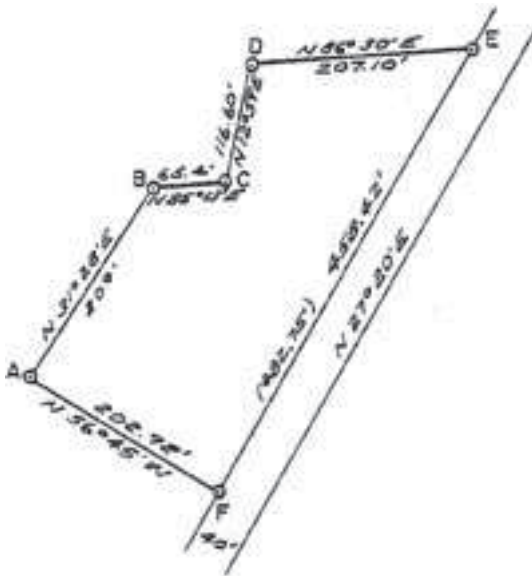


Figure 9-46

TOTAL LATITUDE & DEPARTURE

To have a convenient way to locate points, two perpendicular lines can be used as reference lines; the

vertical *reference meridian* and the horizontal *reference parallel*. (See figure 9-47.) Together these lines may be spoken of as *coordinate axes*. (In this discussion we are referring to coordinates in general - not necessarily the Oregon Coordinates.) The point where they intersect is the origin of the coordinates.

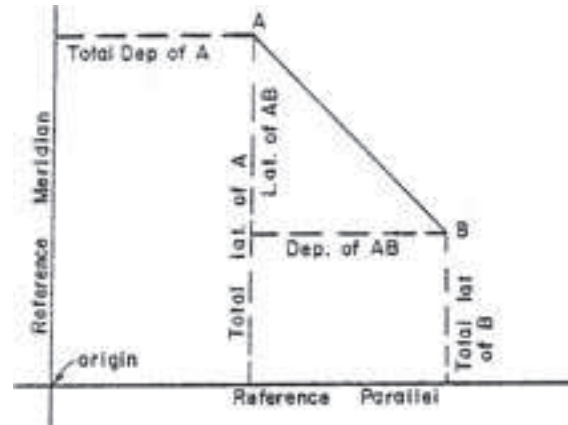


Figure 9-47

The total departure of a point is its perpendicular distance from a reference meridian. The total latitude of a point is its perpendicular distance from a reference parallel.

Latitude and departure are referenced to the location of a line, but *total latitude and departure* refers to a point. Total latitude and departure of a point are the same as *rectangular coordinates* of a point.

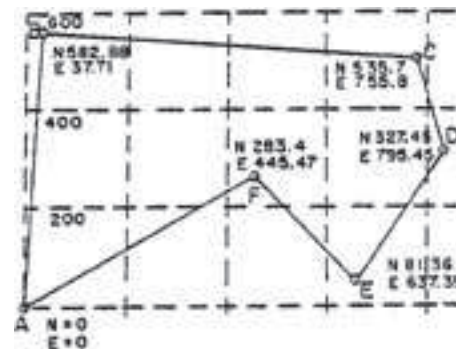


Figure 9-48

The origin of the coordinates of the traverse in figure 9-48, was placed through the most westerly and most southerly point so that the coordinates would all be positive. This concept is identical to that of the Oregon Coordinate system. In the state plane coordinate system the origin of the coordinates of each zone (defined in ORS 93.330) is located south, west and just outside the zone so that all coordinate values are positive.

In figure 9-48 the total latitudes are preceded by N and the total departures are preceded by E (the same method as applied by the Highway Division when noting state plane coordinates).

The adjusted latitudes and departures for the traverse in figure 9.48 are:

Course	Lat.	Dep.
AB	+ 582.88	+ 37.71
BC	- 47.17	+ 718.10
CD	- 208.25	+ 39.65
DE	- 246.09	- 158.06
EF	+ 202.04	- 191.92
FA	- 283.40	- 445.47

Note that the latitude and departure of course AB are also the traverse coordinates of AB. The same is true of the latitude and departure of the last course (FA). The following demonstrates how the other coordinates were derived. (Note: The signs of the latitudes and departures were disregarded in the computation. The mathematical operations are simply addition and subtraction).

Point	Total Lat.	Total Dep.
A	0.00	0.00
B	582.88	37.71
	- 47.17	+ 718.10
C	535.71	755.81
F	283.40	445.47
	- 202.04	+ 191.92
E	81.36	637.39
	+ 246.09	+ 158.06
D	327.45	795.45
	+ 208.25	- 39.65
C	535.70	755.80

AREA BY COORDINATES

To find the area within a traverse, when the coordinates of the control points are known, multiply the total latitude of each point by the difference between the total departure of the following and preceding points, and take one-half the sum of these products.

Numerical Example No. 38. Using in figure 9-48 compute as follows:

Point	Total Lat. Of Point	Diff. Bet. Total dep. Of fol. & preceding Pt.	Twice the area (total lat. X total dep. Diff.)
A	0	- 407.76 (37.71 - 445.47)	0
B	+ 582.88	+ 755.80 (755.8 - 0)	+ 440,540

C	+ 535.70	- 757.74 (795.45 - 37.71)	+ 405,921
D	+ 327.45	- 118.41 (637.39 - 755.8)	- 38,773
E	+ 81.36	- 349.98 (44.47 - 795.45)	- 28,474
F	+ 283.40	- 637.39 (0 - 637.39)	- 180,636
			$2\sqrt{598,578}$
		Square Ft. =	299,289

In that computation, the total latitude of point D is 327.45. The following point is E, and the preceding point is C. The total departure of E is 637.39, and the total departure of C is 755.80.

$$\begin{aligned} \text{Whereas: } & 637.39 \\ & - 755.80 \\ & = -118.41 \end{aligned}$$

Multiplied by the total latitude:

$$\begin{aligned} & 327.45 \\ \times & -118.41 \\ = & -38,773 \end{aligned}$$

The total double area is 598,578. Dividing by 2 produces the square foot area 299,289. Of course, the computation was made using only five figures, therefore the area is only accurate to five figures, therefore the area could be said to be 299,290 square feet, or 6.87 acres.

COMPUTING COORDINATES

To establish state plane coordinates of a point, compute the latitude and departure of the course and tie the desired point of the course to a point of known coordinates, such as a triangulation station.

The latitude and departure is computed using the length and bearing of the course by solving for a right triangle, using the formulas.

$$\begin{aligned} 96. \text{ Lat} &= \text{dist.} \times \cos \text{ bearing.} \\ \text{Dep} &= \text{dist.} \times \sin \text{ bearing.} \end{aligned}$$

Numerical Example No. 39. For the line of a traverse running on an Oregon Coordinate and bearing of N $2^{\circ} 28' 04''$ W, and a distance of 3330.27', compute the latitude and departure as follows:

- $\cos 2^{\circ} 28' 04'' \text{ W} = .99907259$
 $\sin 2^{\circ} 28' 04'' \text{ W} = .04305753$
- Compute the latitude
 $(3330.27) (.99907259) = 3327.18$
the lat. = 3327.18'

COMPUTATION OF LATITUDES, DEPARTURES, & AREA

BY THE D.M.D. METHOD

(Area shown in figure 9-46)

STA	BEARINGS	DEFLECTION ANGLES	DISTANCE	COSINE	SINE	LATITUDES		DEPARTURES		BALANCED		D.M.D.	DOUBLE AREAS	
						N (+)	S (-)	E (+)	W (-)	LAT.	DEP.		+	-
A	N 31° 20' E	89° 13' R	20.4'	.8527440	.5220024	178.26		109.10		+178.18	+108.97		194.16	
B	N 85° 13' E	53° 45' R	68.40'	.0833880	.9965172	5.46		68.17		+5.43	+65.09		150.3	
C	N 12° 59' E	22° 14' L	116.60'	.9744355	.2040676	115.62		26.20		+113.87	+26.17		4250.8	
D	N 86° 30' E	73° 31' R	203.10'	.0610488	.9981348	12.68		208.71		+12.63	+208.46		746.5	
E	S 29° 20' W	122° 30' R	482.35'	.8717844	.4898897		420.85		236.49	-421.08	-236.38	+578.60		24772
F	N 36° 45' W	93° 53' R	202.98'	.5488432	.8362868	111.26			168.70	+111.21	-168.71		1089.6	
Unbalanced latitudes & departures						421.23	420.85	407.18	406.19				9002.8	242772
						420.85		406.19					-	9002.8
									.99					152744

RULES

Latitude = distance x cos. of bearing.
Departure = distance x sin. of bearing.

D.M.D. of the first course = the departure of the first course.

D.M.D. of the other courses = the D.M.D. of the previous course + the departure of the previous course + the departure of the course itself.

D.M.D. of the last course = the departure of the last course, but with an opposite sign.

Double Areas = the balanced latitudes x the corresponding D.M.Ds.

Area = the difference between double areas divided by two.

$$\frac{152744}{2} = 76372.0 \text{ sq feet}$$

$$\frac{76372.0}{43.660} = 1.75 \text{ acres}$$

BY TRANSIT RULE

Correction to lat. (84207 = N + 5 Lat)

$$A. .37 \left(\frac{178.26}{84207} \right) = .08 \quad 178.26 - .08 = 178.18$$

$$B. .37 \left(\frac{546}{84207} \right) = .002 \quad 546 - .002 = 545$$

$$C. .37 \left(\frac{11.66}{84207} \right) = .05 \quad 113.62 - .05 = 113.57$$

$$D. .37 \left(\frac{12.68}{84207} \right) = .01 \quad 12.64 - .01 = 12.63$$

$$E. .37 \left(\frac{410.85}{84207} \right) = .14 \quad 420.85 + .14 = 421.04$$

$$F. .37 \left(\frac{111.26}{84207} \right) = .05 \quad 111.26 - .05 = 111.21$$

Correction to dep. (813.87 = N + 5 Dep)

$$A. .99 \left(\frac{109.10}{813.87} \right) = .13 \quad 109.10 - .13 = 108.97$$

$$B. .99 \left(\frac{68.17}{813.87} \right) = .08 \quad 65.17 - .08 = 65.09$$

$$C. .99 \left(\frac{26.20}{813.87} \right) = .03 \quad 26.20 - .03 = 26.17$$

$$D. .99 \left(\frac{208.71}{813.87} \right) = .25 \quad 206.71 - .25 = 206.46$$

$$E. .99 \left(\frac{236.49}{813.87} \right) = .29 \quad 236.49 + .29 = 236.78$$

$$F. .99 \left(\frac{168.70}{813.87} \right) = .21 \quad 169.70 + .21 = 169.91$$

- c. Compute the departure
 $(3330.27) (.04305753) = 143.39$
 the dep. = 143.39'

(Note: When computing latitudes and departures to establish Oregon state plane coordinates, always convert to grid bearings.)

After the latitudes and departures have been computed, add north latitudes or subtract south latitudes from the "Y" or "N"orth grid coordinate; and add east departures or subtract west departures from the "Y" or "E"ast coordinates.

Numerical Example No. 40. To find the coordinates of the northwesterly end of a line running N 2° 28' 04" W a distance of 3330.27 feet, when the southeasterly end of the course has the coordinates X 1,396,976.71 and Y 863,028.10, proceed as follows:

- From numerical example No. 39
 $\text{lat} = 3327.18'$
 $\text{dep} = 143.39'$
- Add the lat to the "Y" coordinate:
 $863,028.10 + 3327.18 = 866,355.28$
- Subtract the departure from x:
 $1,396,976.71 - 143.39' = 1,396,833.32$

Hence, the coordinates of the northwesterly end of the line are:

$$X = 1,396,833.32$$

$$Y = 866,355.28$$

Figure 9-50 is an example of conversion to coordinates of a section of U.S. Highway Number 20.

DETERMINING THETA

To properly orient the meridian of a drafting machine from and (state plane coordinate) to true north (geodetic north), it is necessary to know the angular difference between their meridians. The value representing the angular difference is called *theta* (θ) the *mapping angle*.

At each point in the Oregon Coordinate System, the value of theta will be different.

The formula for determining theta is:

$$97. \tan \theta = X' \div (Rb - Y)$$

Where:

$$C = 2,000,000$$

$$X' = X - C$$

Rb = The vertex of the conic projection
 21,383,8521.48' for the North Zone.
 and 22,888,667.15' for the South Zone.
 (see table 20.) The vertex of the zones are at lat. 43" 40' for the North Zone (at that lat. Y = 0) and at lat. 410 40' for the South Zone (at that lat. Y = 0).

Figure 9-51 illustrates the graphics of the factors X', θ , R, Rb, Y, Y', and X.

Numerical Example No. 41. To determine theta (θ) at point A (in figure 9-51) when X = 2,189,746.36, Y = 999,672.21, in the South zone.

- Subtract C from X to get X'
 $2,189,746.36 - 2,000,000$
 $X' = +189,746.36$
- Compute for the tan of θ
 $\tan \theta = X' \div (Rb - Y)$
 $\tan \theta = +0.00866 \ 85734$
- From a table natural trig. functions:
 $\theta = +00^\circ 29' 47.9768''$

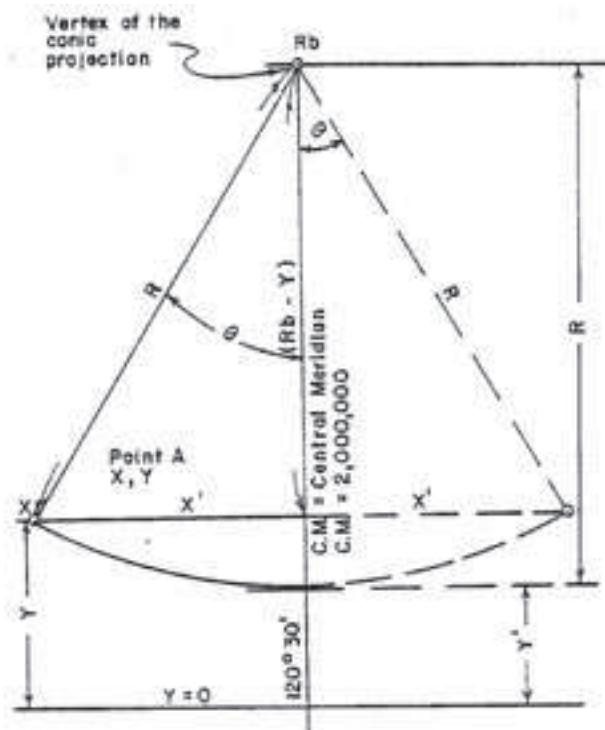


Figure 9-51

To check that computation locate the value in the Y' column of table 17 that is closest to the Y value in the above computation. In the Y' column, the closest Y value to 999,672.21 is 1,002,299.13. Using table 17, and interpolating, find the value of 1 minute of θ in feet for 44° 25' (same line as 1,002,299.13 in table 17), or 1" of $\theta = 6356 + 9.5 = 6365.5$, or 6366.

TRAVERSE SHEET

County Columbia
 Highway U.S. 30 (along 60-7-3)

Section Right-of-Way
 Line Center

Calculated by G. Hirsch
 Checked by N. Foster

Sheet No. One

STATION	CURVE DATA		Tan.	Sub. Tan.	P. I. to P. I. $\frac{L}{2}$	Calculated Course	Course	Mile	LATITUDE		DEPARTURE		CO-ORDINATES	
	Degree	Angle							N.	S.	E.	W.	Lat.	Elev.
P1. 273+41.43 P.O.B.					3330.27	N 72° 05' 04" W	7790.2157	.04303753	3323.09				863.025.70	6396.976.77
P1. 328+50.07	29° 38' 12"											143.37	860.355.68	1,396,833.32
P1. 342+90.39	19° 41' 30"				3511.60	N 72° 06' 05" W	8571.1163	.53121501	1260.37			803.87	867.635.77	6396.030.03
P1. 353+09.95	36° 34' 00"				3624.31	N 71° 47' 25" W	61850.368	.78378773	633.39			1024.68	865.209.31	6393.225.15
P1. 363+09.99	22° 30' 00"				1023.90	N 72° 12' 20" W	76687.691	.84262893	1033.30			207.20	869.336.81	6394.877.86
P1. 422+42.94	39° 22' 00"				6734.47	N 72° 43' 25" W	79025.476	.91183726	669.26			26.3123	874.008.65	1,391,306.63
P1. 464+94.33	5° 38' 00"				4360.80	N 72° 08' 05" W	92959.010	.06066718	9369.01		164.85		878.377.66	6391.037.43
P1. 507+86.68	30° 18' 00"				4642.85	N 72° 12' 05" W	95489.628	.29607723	5056.28		1261.36		882.433.94	6392.692.84
P1. 548+62.4	28° 50' 00"				9374.07	N 72° 15' 00" W	836120.22	.57402302	2880.25			8182.16	893.274.19	6392.550.70
P1. 616+76.3	4° 40' 00"				1287.70	N 72° 05' 30" W	96504.121	.49370468	637.65			1581.57	891.111.84	6388.969.13
P1. 631+86.5	24° 48' 00"				1530.5	N 71° 55' 10" W	55830.680	.89669284	884.72			1305.60	891.946.41	6386.666.53
P1. 637+03.7					542.7	N 72° 18' 00" W	1326.603	.99030989	23.41			537.71	895.020.02	6384.124.82
End														

TRAVERSE FORM

Figure 9-50

Find the quotient of:

$$X' \div 1 \text{ minute } \theta \text{ in feet}$$

or

$$\begin{aligned} X' &\div 6366 \\ 189,746.36 &\div 6366 \\ &= 29.81 \text{ minutes} \end{aligned}$$

or $00^\circ 29' 49''$

(θ in numerical example computed as $00^\circ 29' 47.9768''$)

Determining Feet Per 1' of θ

An approximate value for the number of feet in one minute of theta can be determined from tables 15 and 17. Interpolation is necessary under the column for "1 minute of θ in feet", however, it is not necessary to interpolate for Y in the column under Y'.

The exact value of theta can be determined by dividing X' by θ . In example number 41, feet per minute of θ would be computed as follows:

$$\begin{aligned} X' &= 189,746.36 \\ 1' \text{ of } \theta \text{ in ft.} &= 189,746.36 \div 29.7996' \\ 1' \text{ of } \theta \text{ in ft.} &= 6367.4129 \end{aligned}$$

Transforming Oregon Coordinates to Geodetic Coordinates

Oregon coordinates can be converted to geodetic coordinates (latitude and longitude) by the formula:

$$98. \text{ longitude} = \lambda = \text{c.m.} - \Delta\lambda$$

Where:

$$\begin{aligned} \text{c.m.} &= 120^\circ 30' 00.000'' \\ \Delta\lambda &= \theta \div \iota \text{ convert to sexagesimal} \\ \iota &= 0.684 \text{ 14738 South Zone} \\ &= 0.709 \text{ 18602 North Zone} \\ \theta &= \theta \text{ in seconds} \end{aligned}$$

and latitude is determined by solving for:

$$99. R = (R_b - Y) \cos \theta$$

and locating R (in feet) in table 15 (north zone) and 17 (south zone). Latitude will be in the left-hand column adjacent to the value of R. Interpolation is usually required in determining the exact latitude.

Figure 9-52 illustrates the correct format to be used for computing theta, latitude and longitude.

Transforming Geodetic Coordinates into Oregon Coordinates

Often, surveys will tie to U.S.C. & G.S. (now N.O.A.A.) or U.S.G.S. bench marks of known geodetic coordinates. The geodetic coordinates can easily be converted by the formulae:

$$100. X = R \sin \theta + C$$

and

$$101. Y = R_b - R \cos \theta.$$

Grid az = geodetic az - θ + second term; where;

$$\begin{aligned} R &= \text{radius for lat. of station} \\ R_b &= \text{constant for zone, and} \\ \theta &= \text{theta for the long. of sta.} \end{aligned}$$

and

$$C = \text{Value of "X" assigned to the central meridian for a zone.}$$

The second term for the reduction of geodetic — to — grid — azimuth may be neglected for most work. However, for lines five miles in length (or more), if the same degree of accuracy is desired as is obtained by geographic computations, this term should be evaluated and used:

$$102. \text{ 2nd term} = \frac{X_2 - X_1}{2p_0^2 \sin 1''} \left(Y_1 - Y_0 + \frac{Y_2 - Y_1}{3} \right)$$

STATE ZONE <u>South</u>		$\iota =$ <u>0.684 14738</u>	
STATION <u>Spanish Peak 1933 to 1946</u>			
LATITUDE	SOLUTIONS	LONGITUDE	SOLUTIONS
C	-2,000,000.00	R _b	22,888,667.15
X	2,189,746.36	Y	- 999,672.21
X' = X - C	+ 189,746.36	R _b - Y	21,888,994.94
$\tan \theta = X' / (R_b - Y)$	+ 0.00866 85734	θ in secs.	+ 1787.9768"
θ	+ 00° 29' 47.9768"	$\Delta\lambda = \theta \div \iota$	+ 2613.438"
$\cos \theta$	0.99996 24301	$\Delta\lambda$	+ 00° 43' 33.438"
$R = (R_b - Y) \cos \theta$	21,889,817.34	Central Meridian	120° 30' 00"
$\phi = 10^\circ$	44° 24' 25.943"	$\lambda = \text{C.M.} - \Delta\lambda$	119° 46' 26.562"

Figure 9-52

DETERMINING THE SCALE RATIO OF AN AERIAL PHOTO

To use an aerial photograph for checking horizontal measurements between known points, the *scale ratio* (or *scale factor* or *scale number*) must be computed.

If the true distance between two points is known (as from a survey, deed, etc.) and the image of the points can be measured on the aerial photograph, the scale ratio (S) can be found by solving for

$$103. \quad S = \frac{AB}{ab}$$

Where: s = scale ratio⁸

AB = true distance
ab = photo image distance

Numerical Example No. 42. Figure 9-53 illustrates the relationship between true distances on the ground as compared to those on a contact print and negative of an aerial photo. If the distance between AB, on the ground, is 600 feet, and the image measurement is ab 0.20' the scale ratio is.

Use equation 103.

$$\frac{600}{0.20} = 3000$$

This means that ab is 3000 times smaller than AB.

If we wished to know the *approximate true value* of CD, and cd on the photo measured 0.35' the approximate true value of CD would be

$$CD = (0.35)(3000) = 1,050 \text{ ft.}$$

This same principle can be applied to horizontal around photos.

Measurements should never be made outside the effective area of the photo. Point C, in figure 9-53, is definitely outside the effective area; therefore the answer to example 42 would not be as reliable as a measurement in the effective area.

Note: Focal lengths for most aerial photos used by counties will be 6 and 12 inches.

The aerial photo scale can be determined if the photo is of a mapped area, by solving for

$$104. \quad PS = \frac{AB}{ab} \times \text{map scale}$$

Where: PS = photo scale
AB = true distance
ab = image measurement

Note: According to the American Society of Photogrammetry's "Manual of Photogrammetry"

"An aerial photograph ordinarily differs geometrically from a corresponding map to such a degree that accurate maps are not made by merely tracing a photograph or series of photographs."

In other words, an aerial photo is not a map, nor must be considered as "approximate" and should not should it be considered to be of the same degree of control map measurements. Likewise, do not use the accuracy of a map. Measurements made from photos photos for precise acreage computation.

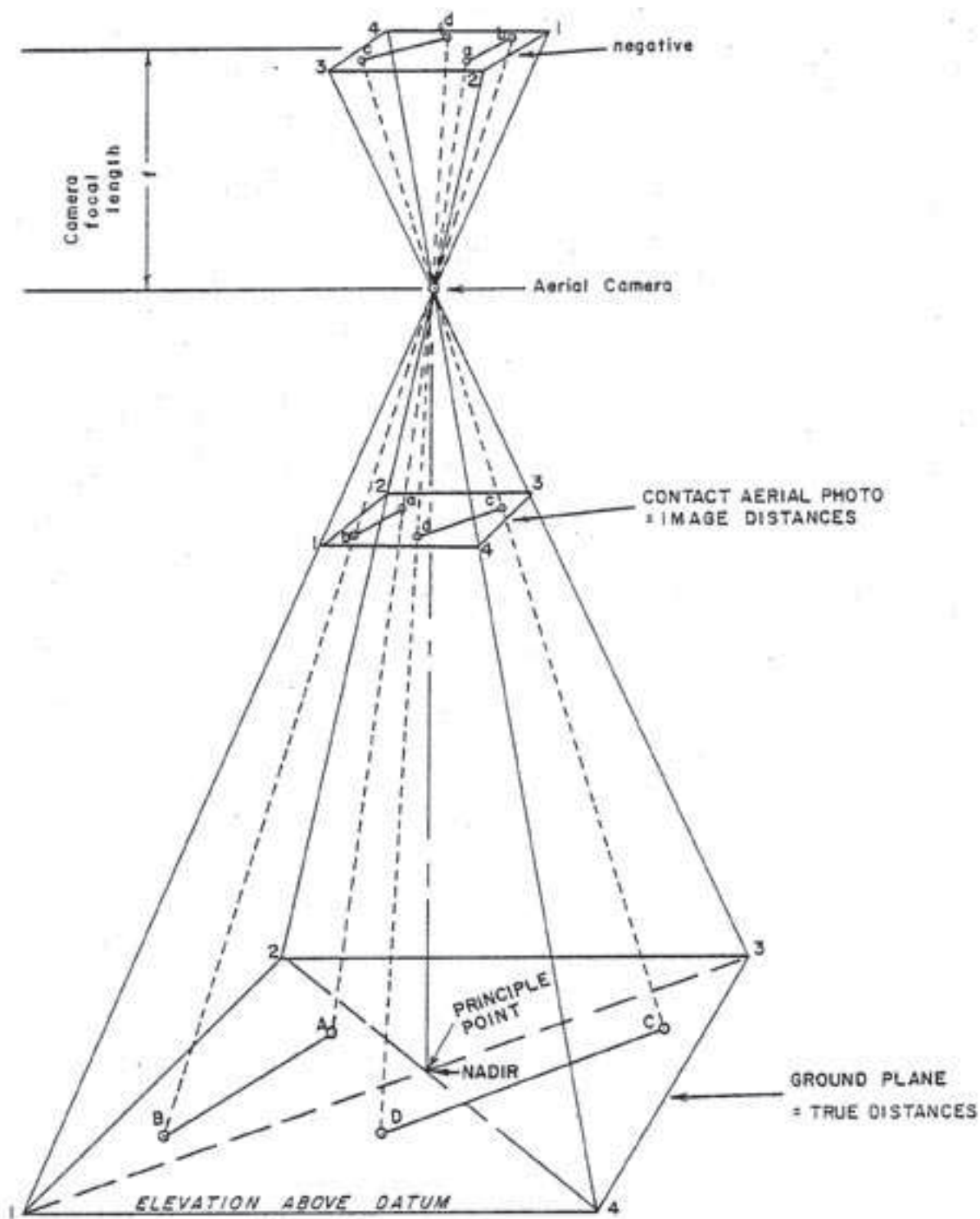
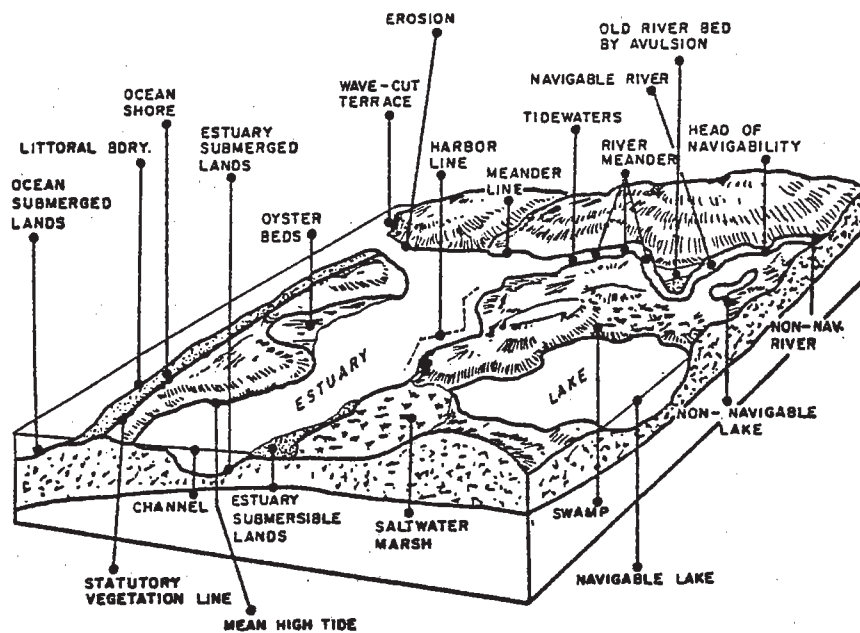


Figure 9-53



CHAPTER 10

RIPARIAN BOUNDARIES AND RIGHTS

Introduction

Unlike the literature relating to the laws of nonriparian real property, the available literature dealing with riparian lands is much less extensive. Most of the published information relates to the laws that are common to *some* states of the U.S. Riparian laws, however, vary *slightly* from state to state; the variance existing in the state statutes. Moreover, much of the information exists in State Supreme Court decisions, U.S. Supreme Court rulings, opinions of the State Department of Justice, and the U.S. Revised Statutes. The purpose of this chapter is to present those principles and laws that are applicable in Oregon.

The information is *only* for the purpose of cadastral mapping, assessment and taxation. It is to provide assessors and cartographers with an appreciation of the complexity of the laws dealing with riparian proprietorship, to show the pitfalls, and to provide precautions and guidelines for determining the boundaries and areas of riparian ownership. *It is not meant as a substitute for legal counseling nor is it to provide for the purpose of offering taxpayers the advice and consultation that MUST be provided by an attorney at law.*

The subject of riparian rights is such as to demand close adherence to the language of the legal references; therefore, much of this chapter is presented in the form of quoted legal opinions, rulings and statutes. The quotation or paraphrasing is acknowledged in the footnotes.

The definitions we have provided are from reliable legal sources. However, legal terms rarely have fixed, indisputable meanings, so they must be used with caution. For example, although in common use the *thread of a stream* is defined as the middle line between the shores, the *weight* of legal authority places the thread of the stream at the *center of the main channel—or middle of the deepest channel when more than one channel exists*. In cadastral cartography this is the legal *middle of a stream*.

The Riparian Problems

Land that *touches* upon a body of water is *riparian land*. This includes the land lying under a body of water. The rights associated with riparian lands are *riparian rights*. They are rapidly becoming the most controversial and valuable of all the rights to real property.

When we study the complexities, confusion and problems associated with riparian lands and rights, it becomes clear as to how much we rely on English

Common Law. When we encounter a legal problem with *nonriparian lands*, we find the roots of the solution in English Common Law. However, the English law only applied to *tidal riparian lands* (the bed of the tidal waters was owned by the Crown); whereas, the United States has many large inland bodies of water and streams that are navigable for hundreds of miles beyond the significant influences of the tide. Therefore, English law provides few solutions to the legal problems associated with most riparian lands; hence, the confusion and controversy.

Most of the riparian rights controversy is over one or more of the following doctrines:

- A. The claim of ownership by the individual;
- B. The claim of ownership by the state;
- C. The claim of ownership by the Federal Government;
- D. The rights of *other* landowners;
- E. The rights of the public; and
- F. The limits of the sovereignty to protect the rights of the public.

To compound the complexity of the problem, apply these doctrines to each of the following classifications and categories of water:

- 1. Bodies of water
 - a. Stationary bodies of water
 - (1) navigable
 - (2) nonnavigable
 - b. Flowing bodies of water
 - (1) navigable
 - (2) nonnavigable
 - c. Springs
 - d. Swamps
 - e. Marshes
 - f. Estuaries
 - g. Tidewaters
 - (1) navigable
 - (2) nonnavigable
- 2. Underground water
- 3. Surface water
 - a. Rain runoff (or melting snow)
 - b. Percolating water

Many of these classifications change, e.g., when a river enters a swamp; or waters overflowing the bank of a stream. Moreover, the boundaries of water not only fluctuate vertically, but horizontally as well. The vertical fluctuations are mirrored in deeds and surveys that call for *the ordinary low water line, mean high water line*, etc. The various levels are usually difficult to determine from surveys and aerial photos—and at times, from field examination.

The lateral displacements create problems that are often impossible to solve; their solution being dependent on the *historical movement* of the water. This element brings into play the principles of *avulsion, revulsion, reliction, dereliction, accretion, erosion*, etc.

One of the best documents dealing with the history of Oregon's riparian ownership and conflicting claims of title was issued by the 1969–1970 Advisory Committee to the (Oregon) State Land Board.¹ The following quotations from the report will illustrate the seriousness of the riparian problem.

"It is unfortunate that the river (Willamette) was not surveyed at the time of statehood. This at least would simplify some of the ownership conflict claims involving (lateral) river changes between 1852 and 1859. We find titles are clouded, we find title insurance companies wary of issuing policies and we find mortgage and lending companies cautious. We find in some instances county boundaries confused, and we find as a pragmatistical solution, 'cross-assessing' practiced."

"In the state's claim to the abandoned (by avulsion) riverbeds, it appears to place considerable confidence in the 1852 (Willamette) channel meander lines as providing the boundaries for the land the state claims. This results in the sale of lands in which the state may have doubtful ownership and perhaps the ignoring of lands that the state may actually own as the result of river changes from the 1852 survey location." (See Figure 10-1.)

Problems relating to conflicting claims of ownership between upland owners and the state involve those created by acts of man as well as acts of nature.

"Conflicting in claims of ownership between the riparian owner and the state over *new lands* created by filling submerged or submersible land subsequent to 1859, developed generally through acts of man, i.e., the new lands created by filling *submerged* and *submersible* land in Oregon." "New land created by filling state-owned submerged land is generally considered to belong to the state.² The act of selling submerged land is subject to question. State-owned submersible land, however, is subject to sale (and provided for by statute) with the 1872 imposed restrictions." This problem is "complicated because of the involvement of the port districts. They, by an act

of the legislature in 1900, expanded in 1907 and reinforced in 1963, have authority over submerged and submersible land equal to that of the state. (Attorney General Opinion 32 OPS Att'y. General 363)."

Adding to the complication of determining ownership is the fact that the 1874 Legislature "granted to the riparian owners the land to the low water mark of the Willamette" River. This only applied to the private Riparian Lands that existed in 1874. In 1876 the Legislature amended the 1874 Act to include the Coos River, Coquille River and the Umpqua River. "Also prior to 1903, the state accepted adverse possession proceedings," but in 1903 the Legislature passed an act precluding the state from accepting further adverse possession proceedings. "However, many lawyers argue that even though the state accepted adverse possession proceedings prior to 1903, there is serious question as to whether or not the state should have done so as it appeared to do violence to common law."

Another factor that complicates the riparian rights problems in Oregon "relates to an 1872 act, called the *Tideland Sales Act*, which provided that a public easement to a common fishery follow the title of all tidelands sold by the state."

"It appears that this restriction was written on the documents of conveyance from 1872 until 1878 and then discontinued as a general practice." This raises some very interesting legal questions which relate to *whether or not navigational servitude ranks the common fishery; what is navigational servitude in application to land fills; and whether a wharf is actually a wharf within the generally accepted legal definition of serving navigational needs*. "There is also an interesting question raised by the Deputy Attorney General who, in testimony before the committee, suggested that owners of riparian land, if when filling submerged and submersible land cause destruction of a common fishery, may be liable to the state for damages."

Another problem relates primarily to conflicting uses rather than ownership; however, riparian ownership is incidentally involved in many problems of navigable waterways. One area where there appears to be conflicting uses is in our estuaries. The major concern relates to preserving aquatic productivity, reconciling this with industrial use and urbanization; recognizing the demands and opportunities for recreational enjoyment of these water resources. Some of our estuaries have a capacity to support multiple uses; others may not.

We are now at a point in history where there is a keen interest in preserving our estuaries; the ocean shore, the lakes and streams. This interest has, and will continue, to cause the various governmental bodies to exert increasing control to protect and conserve

our natural water bodies. Old rules will be revised to meet existing priorities; future legislation will be developed to solve riparian problems; and new court rulings will slowly untangle the riparian conflicts—especially those relating to the extent of the State's responsibilities under the *Public Trust Doctrine*.

The Public Trust Doctrine

Much of the conflict between the state and private riparian owners centers around the intent of the Public Trust Doctrine. The term Public Trust Doctrine is generic—having no fixed or universal meaning; however, the following explanation is generally accepted.

First, a grantee of the state *can take no greater title than the state can alienate*, just as common law tells us that the grantee of land can take no greater title than the grantor can alienate. The question then is *what rights can the state sell or otherwise alienate in its riparian lands?* The restrictions imposed on the state lie in the Public Trust Doctrine.

Second, on its admission into the Union (in 1859) Oregon acquired title to all lands *beneath the navigable waters to the high water mark by virtue of its sovereignty*.³ *The state, as a government entity, held title to the lands as the REPRESENTATIVE OF THE PEOPLE*. In other words, “the state represents the people and the ownership is that of the people in their united sovereignty.” (Gould, §32 at 72.)⁴

What this means, in the most fundamental sense, is the state holds title to these lands for the people to be made use of as the people, through the legislature, decides they should be used. For all intents and purposes the title of the state was burdened *with a trust*, so to speak, to *protect the traditional public rights*. To many, the word *TRUST* connotes a severe restriction on the state to convey its lands.

Although some uncertainty still exists as to the extent of the state's right to convey its lands, it is generally accepted that the state *does* have a right to sell, lease or otherwise alienate its riparian lands.⁵ The restrictions have been accepted as:

1. The Legislature does not have the right to sell or lease state lands beneath navigable waters *in derogation of the public right of use and enjoyment of those waters*.⁶
2. The state cannot sell rights and privileges in *navigation and fishing*.
3. Existing titles taken by a grantee of the state is presumed subject to the public right of navigation and fishery.

In short—any person taking title from the state does so subject to the *traditional public rights* (the rights of navigation, fishery recreation and related purposes) in the navigable waters.

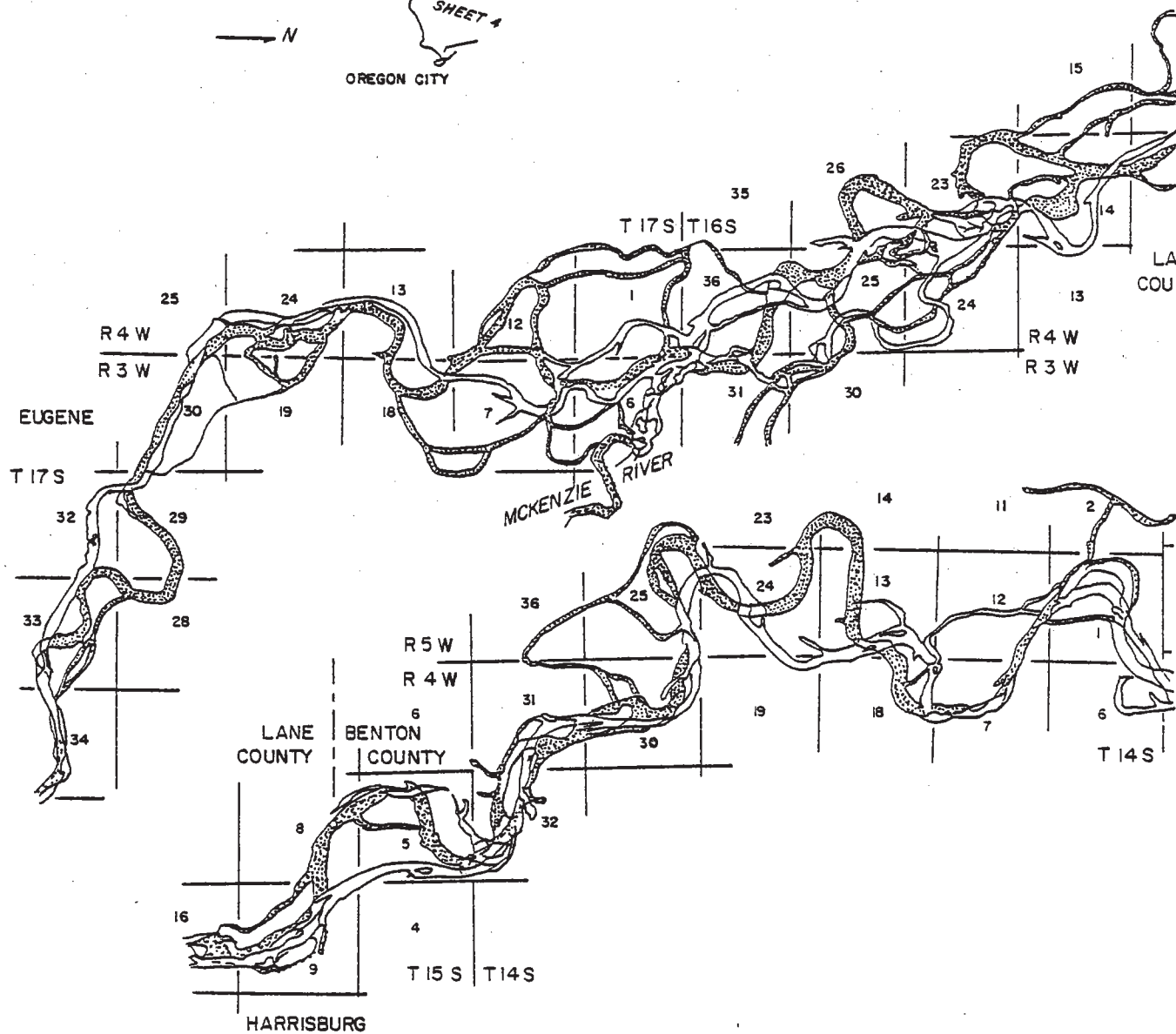
In conclusion, “While the public trust doctrine at common law placed effective limitations on the Crown, these limitations have been somewhat obscured by State Court decisions in the United States. Though some courts have suggested that the public trust place limitations on the power of the Legislature to convey lands beneath navigable waters, this view conflicts with the basic theory of State Government that recognizes plenary power in the State Legislature to the extent that it is not constitutionally limited. The trust theory does, however, place definite restrictions on the state agency authorized to sell and maintain submerged and submersible lands. These restrictions arise from the basic presumption that the Legislature will not intend a conveyance of lands in derogation of the traditional public rights in the use and enjoyment of the waters; a presumption which stems from the inherent importance of free navigability of the waters. Any land conveyed by the State, therefore, is and has been subject to the public right of navigation. However, though the grantee of the State takes subject to the public right of navigation, not every interference with that right will be enjoined *since the test is one of public nuisance* that involves a balancing of the conflicting interests. Hence, the Public Trust Doctrine retains vitality and continues to protect the traditional rights in the navigable waters.”⁷

The Role of the County Assessor Regarding Riparian Ownership and Riparian Rights

Why should the assessor be concerned about riparian ownership and riparian rights? The answer is simple. *In order to properly assess riparian lands he must make an accurate determination of the area. To do this he must know where the legal riparian boundaries SHOULD BE*. It is therefore essential that special care be used in graphically delineating riparian boundaries on the cadastral maps.

Moreover, the extent of the riparian rights directly affects the value of the riparian lands and riparian uplands.

At times, the mapping of riparian lands will generate debate over ownership and boundaries; debate that can spend years in the courts (e.g., the *Corvallis Sand*



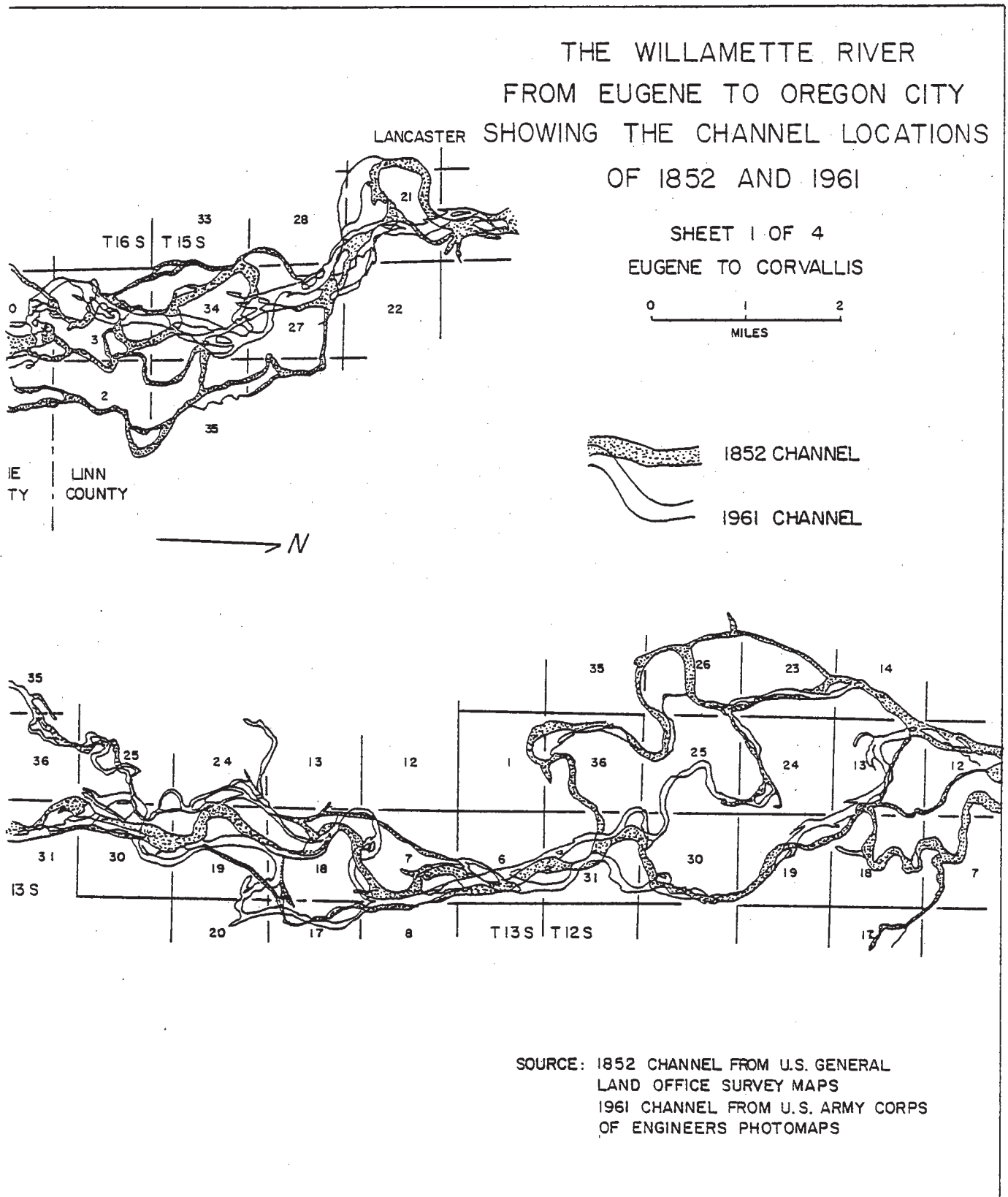


Figure 10-1

and Gravel Co. v. State Land Board). Unfortunately, this cannot always be avoided. Every time the cartographer adds the lines of a body of water to the cadastral map, riparian boundaries are established (graphically—not necessarily legally). It is perhaps comforting to know that the assessor is *NOT RESPONSIBLE FOR SETTling DISPUTES ASSOCIATED WITH RIPARIAN LANDS, NOR IS HE CLOTHED WITH SUCH AUTHORITY*; this must be left for the courts to settle. It is important to make it clear to every map user that *THE ASSESSOR IS NOT RESPONSIBLE FOR ESTABLISHING THE LEGAL BOUNDARIES OF ANY REAL PROPERTY*; therefore, *the riparian lines on cadastral maps are for assessment purposes only and NOT FOR THE PURPOSE OF ESTABLISHING THE LEGALITY OF RIPARIAN BOUNDARIES*.

Riparian Rights

The word *riparian* stems from *ripa*, which means “bank.” To be riparian, lands must abut (touch) the body of water. Therefore, riparian rights are incidental to the ownership of land bordering on water and pass with the transfer of the property (even when not so designated in a deed). They connote the rights and profits to the owner of the upland arising from its connection with the water.⁸ Any intent for riparian rights to be reserved by a grantor *must clearly appear in the conveyance of upland*. If there is a severance of ownership of the land abutting the water, the land that no longer abuts the water ceases to be riparian.

Riparian rights are *natural property rights*; not easements or appurtenances. *They are a part of the soil* (wet or dry) *and go with the soil*. They include the right of access to, and reasonable use of, the water.⁹ They also constitute real property *taxable* under ORS 307.030.¹⁰ This is not to say, however, that riparian rights should be separately assessed and taxed apart from the land.¹¹ Although riparian rights may be conveyed to a nonriparian owner, the conveyance *does not create a separate estate* but results in the creation of a special easement burdening the riparian land, because the rights are inseparably attached.¹² Therefore, if riparian rights are conveyed to a nonriparian owner, or are to be reserved by a riparian owner in a conveyance of a portion of the riparian land, the rights should be considered as any other kind of easement, not *separately assessed*.¹³

Riparian Uplands

*Riparian uplands*¹⁴ are the lands that touch the line of ordinary high water. Therefore, a *riparian upland owner* or *riparian upland proprietor* is one whose prop-

erty lines run to the line of ordinary high water (also known as *mean high water*) of a body of water. Remember, the very definition of riparian pertains to the bank—and not the bed of a navigable stream.

When the state is the owner of the submersible lands on navigable waters and is not using such submersible lands for public purpose, the riparian owner has certain well recognized rights of access—to the navigable waters, including the right to construct proper wharves, piers, piling, etc., in aid of navigation in the submersible and submerged lands in front of his uplands.¹⁵ (Such construction would have to be within federal, state, and local government regulations.)

When the state leases such submersible lands, the lessee becomes the riparian owner and as such acquires all the rights of the former upland owner who failed to utilize his preferential right to lease.¹⁶

Littoral Lands and Rights

The word *littoral* relates to a coastal region and inland seas (lakes). The term *littoral lands* then is used to denote riparian lands along lakes and tidewaters. *Littoral rights* denote the riparian rights along lakes and tidewaters. Littoral rights and riparian rights are terms that are used interchangeably. This is acceptable because the riparian right doctrine is synonymous with that of littoral rights.

When the state has leased or conveyed the tidelands bordering on tidal waters, the littoral rights are lodged in the tidelands owner (or lessee). This includes the right of the littoral owner to build structures¹⁷ on the bed below the low water mark and the right to moor logs on the water.¹⁸ These rights inhere to the exclusion of the former upland owner, the grantee or lessee having the concomitant right to block the right of access to the water of the upland owner.

Laws of the United States

The beds of navigable waters are not part of the public domain and are not subject to survey and disposal by the United States; *the sovereignty is in the individual states*. Under the laws of the U.S., the navigable waters have always been and shall always remain common highways. This includes all tidewater streams and other important permanent bodies of water whose natural and normal condition at the date of admission of a state into the Union was such as to classify the same as navigable water.¹⁹

Tidelands covered by the normal daily overflow are not subject to survey as public land.²⁰

All navigable bodies of water and other rivers and lakes are to be segregated from the public lands at the *mean high water line* (abbreviated MHWL). With respect to public lands bordering on nonnavigable bodies of water, the U.S. Government assumes the position of private owner, and when it parts with title to those lands (without reservation or restriction) the extent of title of the patentee to the lands under water is governed by the laws of the state within which the lands are situated.²¹

Title to beds of nonnavigable bodies of water remains in the United States *until the shore lands have passed into private ownership*.²²

It must be noted that state and private rights are always subject to the paramount power of Congress for the regulation of commerce between the states and foreign nations.

Navigable Waters

The state of Oregon became the owner of the beds of all navigable bodies of water located within its boundaries when it was admitted into the Union in 1859; which ownership is presumed to have continued in the absence of proof to the contrary.

The extent of riparian proprietorship is dependent upon whether or not a body of water is navigable. The title to the submerged *and submersible* lands of the navigable streams and lakes in Oregon is in the state.²³ The riparian lands abutting nonnavigable streams and lakes extend to the middle of the stream channel or lake. (See subsection on “Nonnavigable Streams.”)

Definition of Navigability

One of the most dependable definitions of navigability appears in the *Daniel Ball* case.²⁴ The definition applies to lakes as well as streams.²⁵ In that case the court explained:

“A different test must, therefore, be applied to determine the navigability of our rivers, and that is found in their navigable capacity. Those rivers must be regarded as public navigable rivers in law which are navigable in fact. And they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, *as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water*. They constitute navigable waters of the United States within the meaning of the Acts of Congress, in contradistinction from the navigable waters of the States when they form in their ordinary condition by themselves, or by uniting with other waters, a continued highway over which commerce is or may be carried on with other

states or foreign countries in the customary modes in which such commerce is conducted by water.”

The question of navigability in law, where there may be controversy, is a matter that can only be legally settled by the courts, based on the facts and the conditions in each case (as they prevailed at the date of statehood).

Navigability to be Determined by Division of State Lands

ORS 274.031 provides that “the division shall investigate the issue of navigability of a stream or any portion thereof and, in accordance with ORS 183.310 to 183.500 shall determine prior to July 1, 1981, the *issue of navigability* for such stream or portion upon its own motion or upon the request of any person or state agency affected by the division’s performance of its lawful functions.... Any determination of navigability made by the division under this section shall not be binding upon any person, *but such determination shall be binding upon the division* in the performance of its lawful duties. (Emphasis supplied.)

The Division of State Lands determination under that statute is to give notice to all persons affected of the extent of the state’s claim of title to the stream bed. The determination *is binding on political subdivisions of the state seeking to assert an ownership interest in submerged and submersible lands*. Moreover, although ORS 274.031 limits the binding effect of the determination to the Division of State Lands (both as a legal and as a practical matter), the declaration is *binding on all state and local government agencies* (this includes those of assessment and taxation).²⁶ This is because both the constitution and the statutes have reposed in the Division of State Lands (acting under the policies of the State Land Board) the responsibility of administering for the greatest public good all lands owned by the state.²⁷ “Therefore, an administrative determination by the Division that it asserts no claim of ownership to the bed of a stream above a certain point, because of nonnavigability, necessarily binds the Executive and Administrative branches of government until subsequently modified by judicial determination.”²⁸ Once having made such a determination the state and its agencies could not, thereafter, move the head of navigability further upstream unless the Legislature amends ORS 274.031 to authorize such action.

Often the State of Oregon will make a determination of navigability that differs from the Federal determination; e.g., the state determined the head of navigability of the Umpqua as the head of tidewater near Scottsburg.²⁹ The Federal determination placed the head of navigability as the Interstate 5 highway bridge at Roseburg. *In such cases the state determina-*

tion should be used for cadastral map purposes. The state determination of navigability is based on different criteria and for different purpose than the Federal determination. Whereas the state's determination is to establish ownership of the bed of a stream, the federal determination is for the administration of the stream in a regulatory capacity under direction of Congress.

The criteria used by the United States, in the Umpqua case, was an 1871 trip of the steamer "Swan" to Roseburg. The state, on the other hand, based its determination on historical use of the river for shipping and river traffic.

Statutory Provisions

"Division" in the following Oregon Revised Statutes means the *Division of State Lands*.

ORS 274.005(3) "'Line of ordinary high water' means the line on the bank or shore to which the high water ordinarily rises annually in season."

ORS 274.005(4) "'Line of ordinary low water' means the line on the bank or shore to which the low water ordinarily recedes annually in season."

ORS 274.005(5) "'Land' includes water, water rights, easements of every nature and all appurtenances to land."

ORS 274.005(6) "'Material' includes gravel, rock, sand and silt, but does not include hard minerals subject to ORS 274.611 to 274.645, or oil, gas and sulphur subject to ORS 274.705 to 274.860."

Often surveys are not available to determine the lines of ordinary high or ordinary low water. Moreover, in many cases, the lines cannot be determined by field inspection or survey. In such cases ORS 274.015 provides that annual mean high or mean low water of the preceding year can be used.

ORS 274-029(2) "'Issue of navigability' means, for the purposes of the Division's performance of its lawful functions, whether a stream was *navigable in fact* on February 14, 1859. A stream was *navigable in fact* on that date if it was *susceptible of being used in its ordinary condition as a highway for commerce, trade and travel in the customary modes of trade and travel on water*." Note the comparison between the statutory definition of *navigable in fact* and that of the definition in the *Daniel Ball* case.³⁰

Meander Lines Not the Criteria for Navigability

On early cadastral maps (including some maps prepared by the Department of Revenue) streams were treated as navigable because they were *meandered* in the original U.S. survey of the public land. *That policy*

was incorrect. Meander lines *do not* establish navigability, nor does the lack of meander lines denote non-navigability of a stream.³¹

Many meandered streams are not navigable streams. The meander lines of the original surveys were run merely for the purpose of defining the sinuosities of the bank or shore line, and for ascertaining the approximate quantity of land remaining after segregation of the water area.³²

Special Notes

The appendix includes a list of those streams, sloughs and channels that are considered navigable. It is from the Legislative report on Oregon's submerged and submersible lands,³³ and updated from recent determinations on the statutory *issue of navigability* of some streams. It is reliable for assessment, taxation, and cadastral mapping.

Remember that ORS 274.031 gives the Division of State Lands until July 1, 1981, to determine the issue of navigability of Oregon's streams. Therefore, it is reasonable to expect revisions to the list. Some streams on the list may be deemed unnavigable; others not on the list may be found navigable; and the head of navigability of some streams may be moved.

It is recognized that there will be disagreement over the issue of navigability of a body of water. Any taxpayer questions or complaints about the navigable status of any body of water should be directed to the Division of State Lands. Additional information can be obtained from the U.S. Army Corps of Engineers and the National Oceanic and Atmospheric Administration (abbreviation is NOAA; formerly the U.S. Coast and Geodetic Survey—U.S.G.S.).

U.S. determinations on the issue of *navigability* are seldom revised; according to Thompson, *once a body of water has been declared navigable it will always remain navigable as long as it exists*.³⁴

Special Statutory Provisions

Whenever the United States desires to acquire title to land belonging to this state that is covered by the navigable waters of the United States for the site of an aid to navigation, the Governor may convey the title to the United States and cede to the United States the jurisdiction over the site, subject to ORS 272.015. However, no single tract may contain more than 10 acres.³⁵

ORS 272.036 "Oregon City Canal. Consent is given to the United States to acquire the premises and property described in the preamble of chapter 77, Oregon Laws 1913 (Oregon City Canal Area). The United States may enter upon and use and occupy such lands and premises and shall have the right of exclu-

sive jurisdiction over the lands and premises, subject to ORS 2721.015.” (Formerly ORS 272.090.)

ORS 274.036 Status of channel of Willamette River; approval of dam; state not obligated to maintain river location. The Willamette River at mile 176.5 has been returned to its pre-1971 channel. The Legislative Assembly finds that in the interest of the *state’s ownership in the bed of the Willamette River* and protecting, the public rights of navigation, fisheries, recreation and wildlife habitat, the river at that point should be allowed to remain at its present location. The Legislative Assembly further finds that the construction of the dike at river mile 176.5 which returned the river to its pre-1971 channel is hereby approved as being in accordance with the intent and purposes of ORS 780.010. Nothing in this statute is intended to imply a continuing obligation by the state to maintain the river in any location or waive the requirements of ORS 541.605 to 541.665.” (Chapter 541 relates to *Miscellaneous Provisions on Water Rights, Uses and Protection*.)

ORS 537.110 “All water within the State from all sources of water supply *belongs to the public*.” (Note, this law relates to the *water*—not the riparian lands.)

ORS 780.030 “Channels improved are highways free to navigation.”

Submerged and Submersible Lands

Oregon law defines *submerged lands* as the lands lying below the line of ordinary low water of *all navigable waters* within the state boundaries; whether the waters are tidal or nontidal (except as provided by ORS 274.705, which defines *tidal submerged lands* as lands below the line of *mean low tide* in the beds of all tidal waters within the boundaries of Oregon).³⁶ *Submerged lands* is a legal term that is synonymous with the *bed of a body of water* (defined as the land that is covered by water in its ordinary low stage).

The area between the banks of a body of water includes not only the submerged lands but the *submersible lands* as well. Oregon law defines these lands as the lands lying between the line of ordinary high water and the line of ordinary low water of all navigable waters and all islands, shore lands or other such lands held by or granted to the State.³⁷

Statutory Provisions

ORS 274.025(1) “The title to the submersible and submerged lands of all navigable streams and lakes in this state now existing or which may have been in existence in 1859—when the state was admitted to

the Union, or at any time since admission, and which *has not been vested in any person*, is vested in the State of Oregon. The State of Oregon is the owner of the submersible and submerged lands of such streams and lakes, *and may dispose of the same as provided by law*.” Sections of navigable streams, created by avulsion remain in the original owner. See footnote 23.

The word “vested” does not mean merely the inclusion of the riparian lands on one’s deed. It means that one is clothed with a present, legal, and existing right of alienation. That the title is not subject to being defeated by a condition precedent. In other words, for private title to exist in these lands, the title *must descend from the state*. It is also important to remember that adverse possession of these lands *does not run against any public body*.

ORS 274.025(2) “No person shall acquire any right, title or interest in or to the submersible and submerged lands of such navigable lakes, or any part thereof, by reliction or otherwise, or by reason of the lowering or drainage of the waters of such lakes, except as provided by statute.”

ORS 274.040 provides for the sale or lease of state submersible lands. Under ORS 274.040(2)(c), “*Any owner of lands abutting or fronting on such submersible lands shall have the preference right to purchase such lands for the fair appraised value* provided that the sale of such lands be approved by the State Land Board.” The act of entering into a lease with the state could estop a person from claiming ownership to the land; therefore, ORS 274.040(8) provides that “*The act of any person entering into an agreement with the division under this section or ORS 274.530 for the lease of submersible lands shall not be considered a waiver by such person of any claim of ownership in the submersible lands in the agreement*.”

As stated earlier in this chapter, the state does have the responsibility (under the Public Trust Doctrine) to protect the *traditional public rights*. Therefore, when submersible lands are conveyed to private persons, the lands remain subject to *the easement of the public*, under the provisions and restrictions of the law, *to enter thereon and remove oysters and other shellfish*.³⁸

It should be observed that the riparian owner has the rights to construct structures and install piling on submersible and submerged lands; however, the Legislature can provide for the regulation of the building of wharves or other improvements in the State’s bays, harbors and inlets³⁹ (subject, however, to ORS 780.040—when a landowner may construct a wharf; ORS 780.050—municipality or port may regulate construction of certain structures beyond low-water mark; ORS 780.060—construction may not interfere with oyster production). Also, the federal govern-

ment, acting through the U.S. Corps of Engineers, may require a permit to install, piling below the low-water line. *Most permits do not allow structures or pilings to extend beyond the harbor line.*⁴⁰ This is important to cadastral mapping. The line of wharves and pilings, evidenced on aerial photographs, is reliable as the general location of the harbor line.

The Estuaries

Estuaries are the coastal regions where the waters from the uplands and inlands meet and amalgamate with the salt water from the sea. The estuarine ecosystem, including the estuary natural biological productivity, habitat, diversity, water equality and other special estuarine elements makes the world's estuaries the most productive lands on earth.

Oregon has a short supply of estuaries, and each is unique in itself. This is caused by the difference in the amount of salinity, water temperature, current patterns, soils in their beds and banks, and available supplies of nutrients. Marine scientists contend that the estuaries, because they contain a combination of fresh water and sea water nourished by nutrients from both, are richer than either by itself. This diversity of nutrients and character supports an enormous sea wealth in a wide variety of fish, birds, mammals, and, of course, the supporting animal and plant organisms.

"Many of the creatures found in estuaries are transients enroute to the inland waters or the Pacific. These organisms spend only a short, but important, part of their life cycle in the brackish estuary waters. Other species, however, are permanent residents of the bay and spend their entire lives in the estuary. In addition to being a productive habitat for fish and wildlife, estuaries provide a pleasant productive environment for people."⁴¹

Thousands of Oregonians live on the shores of coastal estuaries. Many live by selling products from the bay or nearby sea or by handling cargo involved in international commerce. Equally as many persons visit estuaries to fish and boat in relative safety of protected bay waters or to just enjoy the beauty and grandeur of the seacoast.⁴²

Because of the interest in the state's estuarine resources, there are many governmental agencies involved in studies, administration and protection of the estuarine elements. For example, the federal government enacted the "Estuary Protection Law" which gave to the Secretary of Interior special authority and responsibilities for studying estuaries and for developing means to protect, conserve and restore them. There now appear to be three layers of

government involved in estuaries: local government through planning and zoning commissions; the State through its federal grants, statutes and policies; and the federal government through the federal laws.

The laws and regulations relating to estuaries should be easy to appreciate when you consider the fact that the intricate and delicately balanced estuarine environment *is all too easily disturbed—or damaged—and poor planning or careless development can destroy an estuary beyond all hope of revitalization in our time.*

Our concern, professionally is the delineation of the estuary littoral boundaries. From the following subsections it will be evident that the control exercised over estuary land is subject to the littoral proprietorship of the land; consequently, the boundaries and areas of every parcel of littoral real estate are crucial, requiring great care in delineation on estuary cadastral maps.

The assessor and cartographer must understand that there are few *generalizations* when dealing with boundaries in estuaries. The laws will show that such terms as *new lands, tidal lands, tidelands, swamp and overflowed lands, salt marshes, oyster plantations, and sea level* have very exact legal meanings. If the laws and legal terminology are adhered to, the assessor will reduce his chances of landing in the middle of violent controversy between the claimants to littoral rights and lands. *Here, it is the assessor's responsibility to show the boundaries by the best cadastral information available (deeds, surveys, and so forth) and in accordance with the laws of this state.*

The appendix includes a chart showing *tidal elevations* and definitions as compared to *sea level datum* using *mean high water* as the zero for sea level. Also included is an estuary profile (based on data from the Division of State Lands) and an ocean shore profile.

Waters of This State

Oregon law provides that the estuaries are legally classified as *waters of this state*.

ORS 506.006(13) "*Waters of this state* are all waters over which the State of Oregon has jurisdiction with any other State or Government, including waters of the Pacific Ocean and all bays, inlets, lakes, rivers and streams within or forming the boundaries of this State."

Tidal Lands and Tidelands

As the general estuary profile shows (see appendix), *tidal lands* includes the *tidal submerged lands* and the *tidelands* of an estuary. In other words, tidal lands are all estuary lands covered by, or alternately uncovered and covered by, the ebb and flow of the tides.

Tidelands are the coastal areas situated above mean low water and below mean high water (or above mean low tide and below mean high tide), particularly as they are alternately uncovered and covered by the ebb and flow of the daily tides. Tidelands are only *part* of the *tidal lands*.

There is a distinct difference between tidelands and *swamp and overflowed* lands. Coastal *salt marshes* that are covered by the daily tide are tidelands and are not subject to U.S. survey. On the other hand, coastal marshes that are not covered by the daily tide are officially termed *swamp and overflowed lands* within the United States grants that are subject to survey.

Under the laws of the United States the navigable waters have always been and shall forever remain common highways. This includes all tidewater streams and other important permanent bodies of water whose natural and normal condition at the date of admission of the State into the Union was such as to classify the same as navigable water.⁴⁴ Tidelands, which are covered by the normal daily overflow, are not subject to survey as public land.⁴⁵

The generally accepted legal basis for the State's ownership of tidelands and navigable waters traces to the original 13 colonies. At the conclusion of the Revolution, the colonies assumed absolute ownership of all lands beneath tidal waters and navigable rivers within their boundaries. Exceptions were such portions thereof, as had been previously granted out by the former sovereign. The original 13 states did not surrender their lands beneath tidal waters and navigable waters to the federal government—either by the federal Constitution or otherwise.

The case of *Pollar v. Hagen*⁴⁶ holds that all states subsequently admitted to the Union became the owners of the lands beneath their tide and navigable waters, equally with the original 13 states. It follows then, with some exceptions, that all of the states of the Union are the *absolute* owners of the lands beneath tidal waters and navigable waters within their respective boundaries excluding, of course, land that the states have sold or granted or that have been ceded, conveyed, or condemned by the United States for purposes of national defense, navigation and conservation.⁴⁷

Statutory Provisions

ORS 274.615 provides for the leasing of navigable bay and river beds for the extraction of minerals.

ORS 274.705(1) defines *filled lands* as including "... submerged and submersible lands reclaimed artificially through raising such lands above the highest probable elevation of the tides to form dry land, by

placement of a fill or deposit of earth, rock, sand or other solid imperishable material."

ORS 274.705(7) "'*Tidal submerged lands*' means lands lying below the line of *mean low tide* in the beds of all tidal waters within the boundaries of this state..."

ORS 274.710 grants the Division of State Lands the jurisdiction over easements, and leases for oil, gas and sulphur in the tidal submerged lands. And ORS 274.885 gives the division the power to lease submerged lands for the purpose of harvesting kelp and other seaweed.

Oregon law defines *new lands* as the lands protruding above the line of ordinary high water, whether or not connected with the adjoining or opposite *upland or riparian* lands on the same side of the body of water, which have been created upon submersible or submerged lands by artificial fill or deposit. New lands does not include bridges, wharves and similar structures constructed upon submersible or submerged lands other than artificial fill or deposits.⁴⁸

ORS 274.915 The Division of State Lands " ... may sell, lease or trade submersible and submerged lands owned by the state and new lands created upon submersible or submerged lands owned by the state ..."

ORS 274.920 No one other than the United States, while engaged in the promotion of navigation, shall artificially create new lands by fill or deposit upon submersible or submerged lands without the approval of the owner of such lands and the owner of the adjoining or opposite upland on the same side of the body of water." ORS 274.925 grants the purchase of new lands to a public body when the abutting lands, opposite uplands or riparian lands on the same side of the river belong to the public body. And ORS 274.929(1) provides "Whenever the United States, while engaged in the promotion of navigation, creates new lands upon submersible or submerged lands owned by the state and the adjoining, or opposite upland or riparian land on the same side of the body of water is owned by other than a public body, the *nonpublic riparian owner* has the right to purchase the new lands as provided in this section."

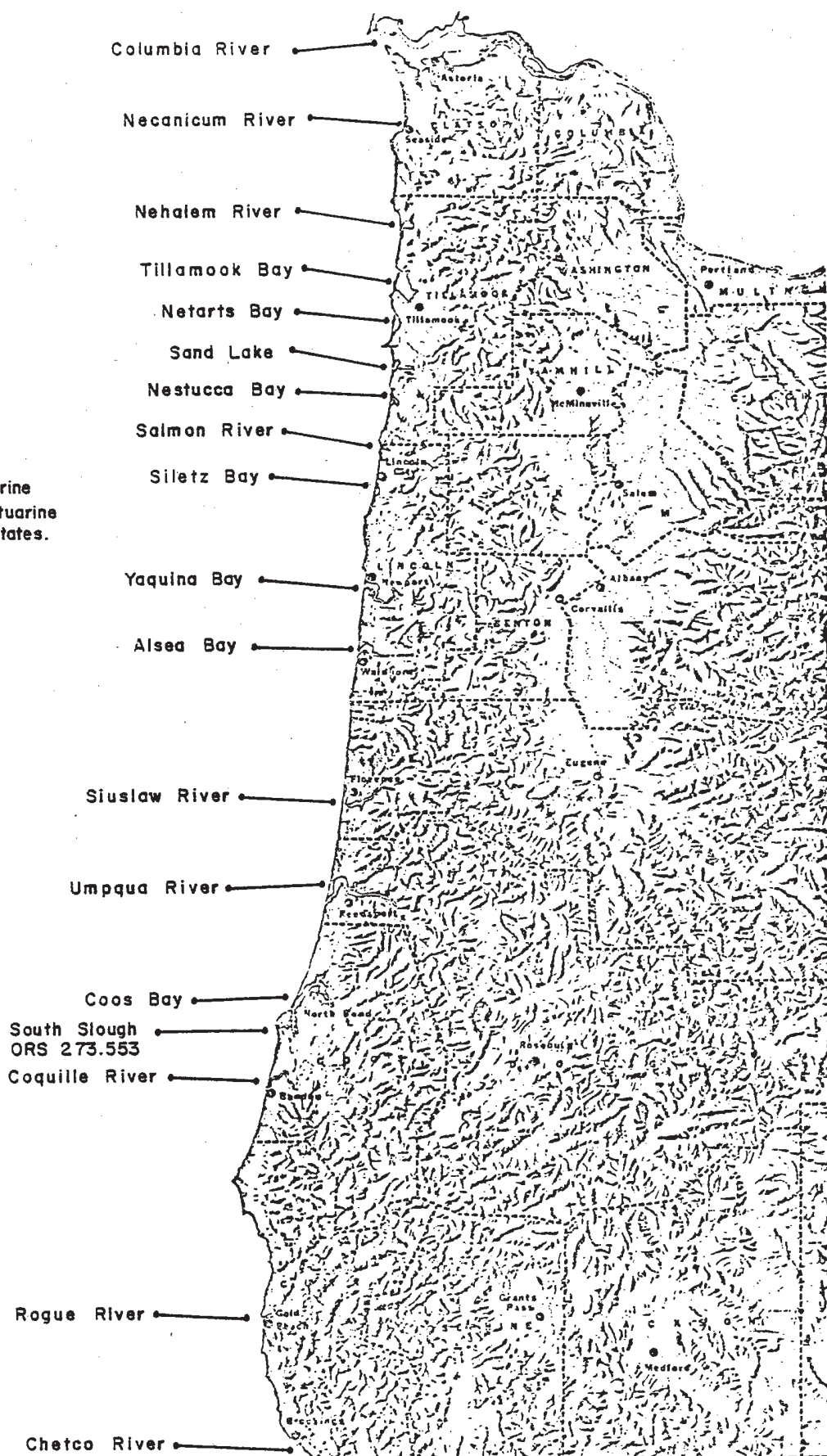
Whenever a public body, other than the United States, creates new lands on submersible or submerged lands owned by the state, the public body has the right to purchase the new lands as provided in ORS 274.932(1).

ORS 274.935 "Whenever new lands are created upon submersible or submerged lands owned by other than a public body, such lands shall be owned by the owner of the submersible or submerged lands upon which the new lands are created."⁴⁹ This provision of the law is not license to create additions to riparian

Figure 10-2

OREGON ESTUARIES

Note: South Slough Estuarine Sanctuary is the first estuarine sanctuary in the United States.



lands by artificial means. The court, in *State of Oregon by and through McKay v. Sause*, ruled that “As long as the upland owner does not encroach on the rights of the state or of any other parties he may make artificial changes in his bank, which will not destroy his title or affect his boundary.” In that same case the court also said, “Gradual artificial accretions go to the upland owner when caused by acts of third persons [subject to Oregon Statutes] and in some cases by the acts of the upland owner himself, but a riparian owner cannot add to his property as against the State of Oregon, by filling in the area adjacent to his property, either on the idea that such a change is sudden and therefore an avulsion, or on the idea that he cannot claim that to which he has no right.”⁵⁰

Whenever an individual creates new lands upon the submersible or submerged lands (in accordance with ORS 274.920) owned by the state, such individual has a right to purchase the new lands as provided by statute.⁵¹

The law also provides for the reservation of new lands from sale, transfer or lease when it has been determined that the public interest requires such lands to be preserved for recreation, conservation of fish and wildlife or the development of navigation. The law provides the adjoining or opposite upland or riparian owner reasonable access across such reserved new lands to the navigable water.⁵²

Oyster Plantations on Public Lands and Private Lands

ORS 509.427 requires that plats and descriptions be filed by July 1970 of all Oyster rights, claims, leases and plantations that existed upon passage of the 1969 Act. The plats and description (accompanied by a map) had to be filed with the State Fish and Wildlife Commission.

Persons using *state lands* in the manner provided for in Chapter 675, Oregon Laws (1969) for cultivating oysters pay annual cultivation fees and use taxes *in lieu of property taxes, lease fees or rental charges*.⁵³ This law pertains to the oyster plantations, on state lands only. The oyster plantations, beds, plats or claims on private lands *are subject to ad valorem taxation*.

The statutes also provide that any plats of oyster lands held by citizens of this state, if distinctly marked out by means which do not obstruct navigation, and not exceeding the extent allowed by regulations, shall be deemed and protected as *private property*. Such plats, however, do not restrict the rights of the public to the use of the waters of this State in the normal and customary manner.⁵⁴ Nothing in ORS 509.425 to 509.455, 509.505 and 511.625 interferes with any rights in, or ownership of any private plantations of oysters or

oyster beds acquired or held under law existing on February 17, 1921.⁵⁵

ORS 509.495 “Transfer by reference to filed oyster plat. Sales, leases, assignments, and other transfers of oyster plantations and claims, or parts thereof, may be made by reference to the plat filed as provided in ORS 509.425 to 509.455. The heirs, successors, assignees and lessees of oyster plats are entitled to continued possession of such plats by compliance with ORS 509.425 to 509.455.”

Nothing in ORS 509.495 invalidates any claim or plat filed prior to June 14, 1939, or invalidates in any manner any transfers, debts or conveyances made prior to June 14, 1939, of oyster claims or lands made reference to in any filed claims or plats.

That portion of Netarts Bay in Tillamook County, lying south of the quarter section line running east and west through the center of Section 19, in T2S.R.10W of the Willamette Meridian, is designated by Oregon Law as *natural oyster beds*. That part of Netarts Bay lying north of such quarter section line is designated and set apart for *artificial plantations of oysters*.⁵⁷

All tidelands and lands under the waters of Tillamook Bay in Tillamook County which are located as oyster claims as provided by law are withdrawn from the lands of the state which may be sold, are designated as oyster lands and are set aside for the location of artificial oyster claims (subject to ORS 509.425 to 509.455).⁵⁸

Tidal Levels vs. Sea Levels

When plotting the riparian boundaries of real property it is important to understand that tidal elevations *are not elevations above sea level datum*. The tidal elevations are based on mean lower low water (abbreviated MLLW) as the datum; approximately four feet below sea level. Elevations above and below sea level (in reference to sea level, not tidal datum) are based on the 1929 (1947 adjusted) North American Datum—this is sea level (or zero on the sea level staff). Sea level is approximately +4 feet on the tidal staff (*mean sea level* on the tidal staff).

Port Powers in Bays and Rivers

By Oregon law, a Port District may improve bays, rivers and harbors within its limits and between its limits and the sea for the width and length and to the depth the port considers necessary or convenient for the use of shipping, etc. It may construct the canals, basins and waterways necessary or convenient for the use of shipping or the extension of the commerce of the port.⁵⁹

ORS 777.116 grants a port the authority to acquire by condemnation or other lawful method, hold, use, enjoy and convey, lease or otherwise dispose of real and personal property, or any interest in real or personal property, necessary or convenient in carrying out its power.

The port's authority over harbors, wharf lines and navigation is provided by ORS 777.120.

When Littoral Rights Are Separated from the Upland Owner

When the State of Oregon is the owner of the tidelands, or submersible lands, and is not using such lands for a public purpose, the littoral owner has certain well recognized rights of access to the navigable waters. However, when the state has leased or conveyed the tidelands *the littoral rights are lodged in the tidelands owner or lessee*,⁶⁰ to the exclusion of the former upland owner. The lessee or grantee has the concomitant right to block the right of access to the water of the former upland owner. (This would *not apply* to the upland owners along the ocean shore.) The converse is also a true; i.e., no other party can block the lessee or grantee from using his submersible lands.

Case in point: through a series of transactions (beginning in 1860), Charles W. Shively became the owner of the uplands fronting the original Astoria tidelands, and John Q. A. Bowlby became the owner of the abutting tidelands—via purchase from the State of Oregon.

In June of 1891 Bowlby initiated a lawsuit that would ultimately result in a landmark decision that is still highly respected today. This is the *Bowlby v. Shively* case.⁶¹ The plaintiff alleged that he was the owner of the tideland abutting Shively's uplands; that the littoral rights vested in the tideland owner and did not automatically attach to the uplands owner. Shively claimed that his title to the DLC (that covers a large part of Astoria) gave him the tidelands and submersible lands in front of the DLC. In other words, as owner of the upland, he automatically became the owner of the littoral and wharfage rights to the main channel of the Columbia River.

Bowlby argued that the state had ownership of the submersible lands and could alienate the land (subject to the public right of navigation). He contended that the Donation Land Claim patent from the United States extended only to the high tide line.

The Oregon Supreme Court held that Bowlby owned the tidelands. The case went to the United States Supreme Court, where that court ruled that the upland owner possessed only those rights to the tidelands that the State alienated; that the State did have the right to sell the tidelands to other than the uplands

owner (subject to the public right of navigation); and that the United States patent included no rights to the abutting tideland between high and low water.⁶²

When the State Tax Commission mapped Clatsop County in the early 1950s, it was unaware of the delicate problems relating to the Astoria waterfront. Cartographers proceeded to map Astoria with little consideration for the filled submersible lands that were *never* sold by the State, without adequate knowledge of the laws and doctrines of riparian and littoral rights, and without adequate reference material to establish the littoral boundaries. Consequently, the mapping unit contributed to the confusion and controversy over the actual ownership of much of Astoria's waterfront.

The Astoria waterfront problem started with the *Bowlby v. Shively* conflict. It seems that Shively dedicated streets to the public (under the *Astoria Sea Wall Charter Act*) that were on Bowlby's tidelands; this prompted the aforementioned *Bowlby v. Shively* case.⁶³

In short, the Astoria Sea Wall Charter Act was "an act to be entitled an Act to authorize the City of Astoria to erect a sea wall and to grade the streets, and construct sewers in connection therewith."⁶⁴ Contrary to Article IV, Section 20 of the Oregon Constitution (stating, that "every act shall embrace but one subject, and matters properly connected therewith, which shall be expressed in the title. But if any subject shall be embraced in an act which shall not be expressed in the title, such act shall be void only as to so much thereof as shall not be expressed in the title") the Sea Wall Act included provisions not properly connected with the law as expressed by the title.

Section 2 of the Act authorized the city to construct a sea wall, to fill behind it, construct sewers and grade streets, and vested the City Council with the necessary powers to implement the Act. Section 4 restricted the manner of sea wall construction, provided for location of Railroad Avenue, granted authority to condemn rights of way for dirt (fill), and provided that persons refusing to dedicate Railroad Avenue would take nothing under a grant. Section 5 declared ownership of the riverbed by the State, dedicated the sea wall as a public highway devoted to railway purpose, and provided authority to the City to grant franchises to railroads for use of Railroad Avenue.

Section 6 appears to be an intent of the Act that was excluded from the title of the law. It granted all state title in submerged lands from low water line to the wharf line to the owners of the wharfage rights, providing the owner or claimant made a dedication, confirmed adverse holders' title (unless a protest was filed in six months), and so on. Section 7 vested the City with the power and duty to construct sewers

perforating the sea wall. Section 11 directed the City to negotiate with owners of real estate on bills for fill material and so forth. The apparent doubtful wording of the Act caused it to be repealed in 1893.

The Astoria and Columbia River Railroad Company⁶⁵ connected its Astoria-Seaside line to Portland via the banks of the Columbia River. The track was constructed on piling that ran the entire length of the Astoria waterfront.

In a speech to the Clatsop County Historical Society (1974), A. R. Panissidi explained that *"In a very short time, piers were extended from the shore and on the river-side of the line [railroad line]. The 1922 fire did not spare the railroad, but it, too, was quickly rebuilt. What had started out as wooden tracks were later replaced by metal. Curiously, when the line was sold, no question was ever raised over the railroad's lack of title from the State to its riverbed right of way. It appears none ever existed, but land was plentiful and cheap and government vigilance over its titles was virtually unheard of."*

*Subdivisions were made on paper; streets, lots and blocks were laid out without regard to the location of river water lines. Occasionally early subdivision plats showed the shoreline and perhaps the pierhead line, but rarely, if ever, was any attention paid to such lines as mean low water or the fact that much of the area platted lay over submerged lands belonging to the State. In consequence many deeds contain descriptions extending purported ownership to the pierhead line."*⁶⁶

The 1969 Legislative Assembly, at the request of the Division of State Lands and the Advisory Committee to the State Land Board, passed Chapter 493 into law. This was the *Astoria Quitclaim Act*. The new law provided a means by which waterfront landowners (whose actual ownership was questionable) could obtain a quitclaim to the lands they possessed from the State via Clatsop County.

Figure 10-3A shows part of the Astoria waterfront as surveyed in December, 1856.⁶⁷ From early paintings of the area it appears as though the mean high water line was at the base of the hill.⁶⁸ Figure 10-3B shows the later Donation Land Claim lines. Note the considerable difference between these and the 1856 lines in McClure's Claim (No. 40). Shively's, however, was in close harmony with the original survey lines.

A 1949 U.S.G.S. survey showed the extent of most of the fill between the D.L.C. and the line by 1943 aerial photography (Figure 10-3C).

The Astoria Quitclaim Act

ORS 273.850(1) provides for the remise, release and quitclaim, to Clatsop County, of all rights, title and interest " . . . that may remain or be vested in the state

with respect to lands described in subsection (2) of this section and any improvements thereon (excluding bridges, wharves, quays, docks, piers, marinas or similar structures protruding above the line of ordinary high water) that are located within the following described area: those portions of sections 12 and 13 of Township 8 north, range 10 west of the Willamette Meridian, and sections 2, 7, 8, 9, 10, 11, 16, 17 and 18, and the south one-half of section 3, of township 8 north, range 9 west of the Willamette Meridian, that are within the boundaries of the City of Astoria as such boundaries existed on June 13, 1969."

ORS 273.850(2) "Subsection (1) of this section applies to lands created before May 28, 1963, by artificial fill or deposit on lands formerly submersible or submerged, if such lands were possessed under *color of title* by a person or government entity, or predecessors in interest of such person or governmental entity, throughout the period beginning when such lands were created and ending on January 1, 1970."

Nothing in ORS 273.850 to 273.890 applies with respect to land that remained submerged or submersible on May 28, 1963.⁶⁹ The lands described in ORS 273.850(1) and (2) are no longer under jurisdiction of the State Land Board.

Subsections (1) and (2) of ORS 273.850 apply to any lands described therein *only when the Board of County Commissioners of Clatsop County executes and delivers a quitclaim deed to a person or government entity that has been found (under ORS 273.855, subsections 3, 4 and 5 and ORS 273.860 to 273.880) to have such possession of the lands as of the time of application for a deed under ORS 273.850 to 273.890 as would bar an action or suit for recovery of the lands by a private person under no disability holding legal title thereto.* However, in the case of lands acquired by Clatsop County through foreclosure for delinquent ad valorem taxes or otherwise, subsections (1) and (2) of ORS 273.850 apply with respect to any lands described therein when it has been found⁷⁰ that Clatsop County or its predecessor in interest with respect to such lands has such possession of the lands as would bar an action or suit for recovery of the lands by a private person under no disability holding legal title thereto.⁷¹

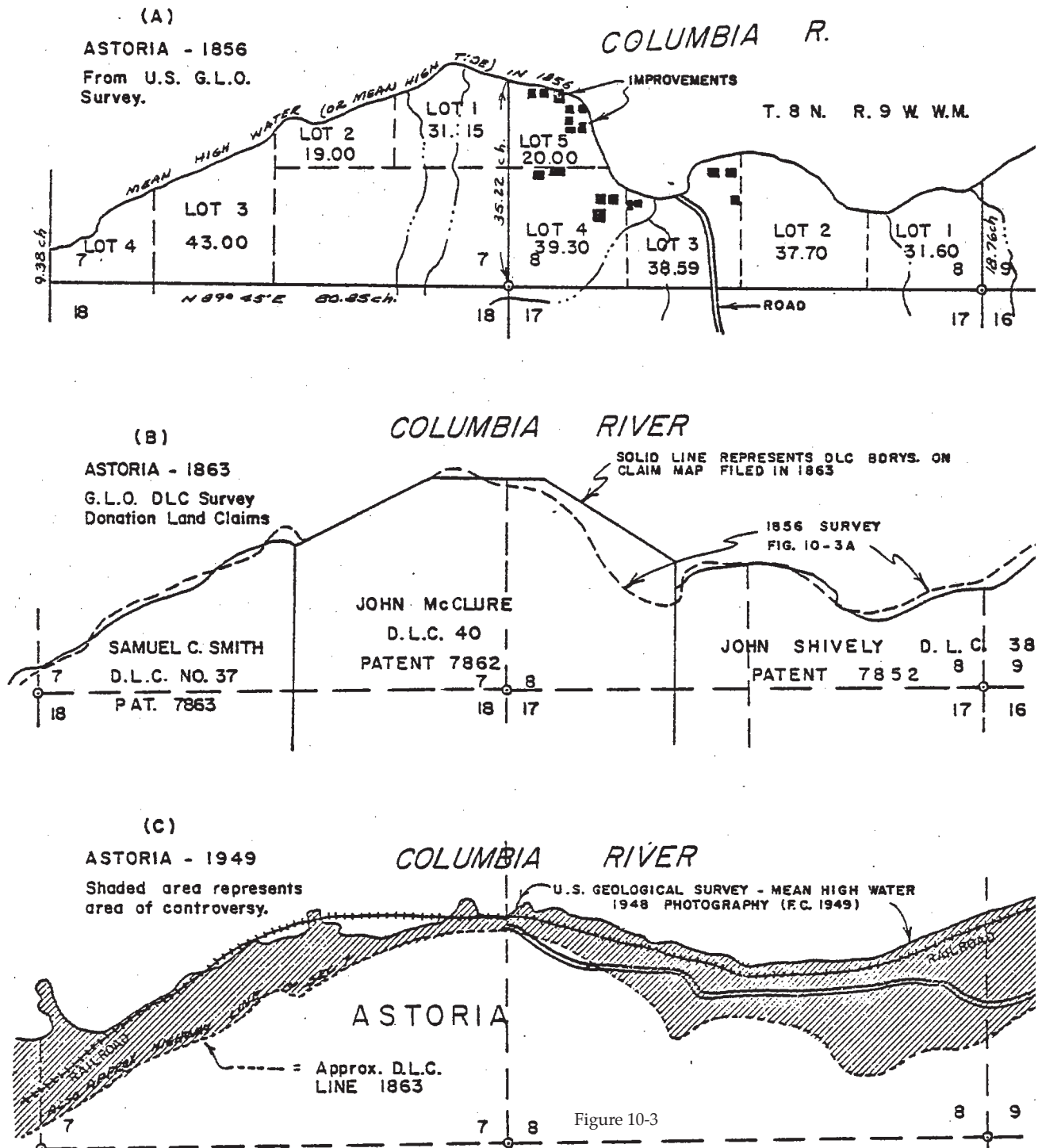
ORS 273.855(2) "A deed executed under this section is intended only to evidence the action of the State of Oregon and Clatsop County in remising, releasing and quitclaiming their rights, title or interest on the recipient of the deed or indicate any judgement of the State of Oregon or Clatsop County with respect to any other rights, title or interest that remain or be vested in the recipient of the deed."

Other statutes relating to the settlement of title to the Astoria lands are: ORS 273.860 Filling fee; use of fees; additional fee to cover costs of investigation.

ORS 273.865 Application for deed; investigation; deadline on application. ORS 273.870 Notice of deed application; protest; hearing; dual applications.

ORS 273.875 Findings of board; notice; rehearing procedure. ORS 273.880 Judicial review procedure.

ORS 273.885 State prohibited from questioning certain titles. And ORS 273.890 Application of ORS 273.850 to 273.890 to certain lands; tax refunds prohibited. " ... (2) no ad valorem taxes paid or owing with respect to lands described in subsection (1) of ORS 273.850 shall be refunded or cancelled on the ground that the State of Oregon may have been the legal owner of such lands before January 1, 1970.



Mapping the Estuaries

At this point it should be evident that great care must be employed when mapping estuaries. As we have pointed out, upland owners are not always the owners of the abutting tidelands or oyster beds. And often the State of Oregon owns the tidelands adjacent to riparian upland property owned by private persons. To complicate matters the deeds and other instruments of conveyance are often incomplete or ambiguous; a situation characteristic of riparian and littoral lands. This is why it is helpful to at least have a feeling for the legal concepts that govern most situations.

How could the knowledge of riparian and littoral rights have benefited the cartographer in the Astoria case? The answer should be in two parts: (1) legal and (2) cartographic.

- (1) **Legal.** If the cartographers were aware of the littoral laws that affect the Astoria tideland, it would have been evident that many of the titles in Astoria were *in color only* (see color of title in the glossary), and that most *appeared* faulty. The Department of Justice should have been consulted for the legal guidelines.
- (2) **Cartographic.** If the cartographers had been aware of the laws, they would have understood the need to display the *original meander lines*, *original DLC lines*, and the historic lateral positions of *mean high water* and *mean low water* from every document that at least appeared to confirm the location of these lines. Most of the lines, however, were omitted from the maps as if no problem existed.

Actually, the cartographers⁷² assumed the new lands to be by accretion, thus attaching to the uplands. Where they were aware of the filling in of submersible lands, the cartographers assumed *color of title* and *possession* to suffice. For the most part, these assumptions were in error. The cartographers placed themselves in the position of passing judgment on the ownership of the filled Astoria submersible lands, thus drawing criticism to the cadastral maps. If the Department of Justice had been consulted for legal guidelines, a great deal of criticism could have been avoided.

Reliable information as to the lateral location of riparian boundaries could have been available at the time of mapping (1955, 1956, ...) that is no longer available (with each passing year we lose some valuable historical data). The recording of the historic riparian boundaries on the cadastral map has the affect of preserving information that may be otherwise lost to the public. Not only is this information valuable in the map maintenance function, it will be important to historians, courts, attorneys, title insurance compa-

nies, and the various governmental agencies dealing with riparian and littoral lands.

Situations similar to the case of the Astoria tidelands could develop in other estuaries if local, state and federal agencies are negligent in administering the riparian lands and laws. The cartographer is not clothed with the power to prevent such situations from developing, but he does have the authority to call attention to problems as they develop. Moreover, the cartographer is professionally obligated to keep cartographic records on the lateral displacements (and dates) as they occur (within reason, of course).

When mapping the littoral boundaries, remember: *the division between the uplands and tidelands is the mean high water line (or the mean high tide line). NO OTHER TIDAL BOUNDARY WILL SUFFICE AS THE LITTORAL BOUNDARY BETWEEN THE UPLANDS AND TIDELANDS.*

The mean high water line, or mean high tide line, can be obtained from National Oceanic Survey (NOS) charts or from *official* state or local governmental maps or charts; e.g., those distributed by the Division of State Lands (see Figure 10-6). In some cases the elevations could be interpolated from U.S.G.S. quadrangle maps. To be accurate, however, the slope of the tidelands must be known.

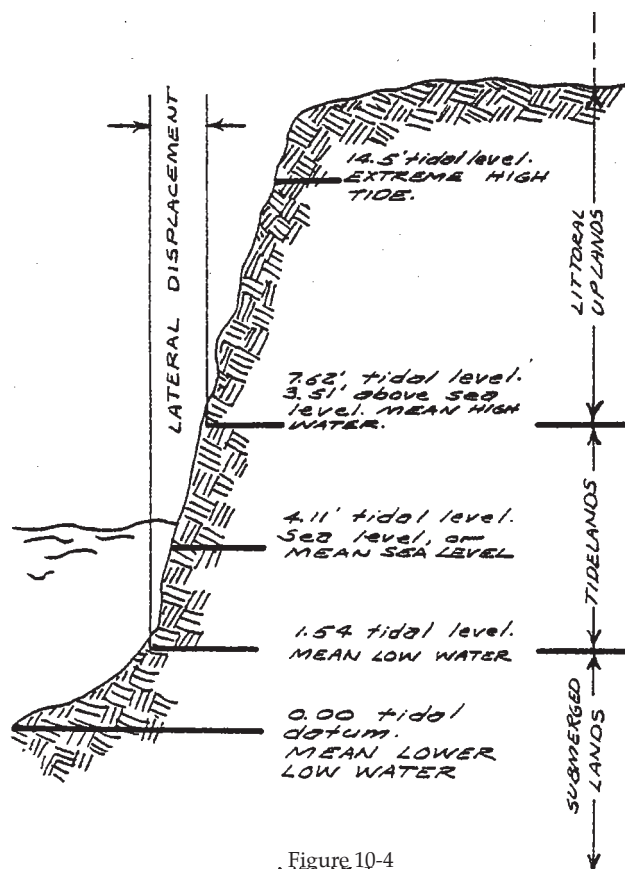


Figure 10-4

For areas where there are vertical, or near vertical, banks there will be little change in the lateral distance between mean high tide and mean low tide (see example of Figure 10-4). In such cases, the aerial photo waterline could be reliable for cadastral mapping.

Caution will have to be used when employing aerial photos in areas where the lateral displacement between mean low water and mean high water is relatively great. In such cases it is doubtful that any aerial photograph (vertical or oblique) will display the statutory boundaries between submerged and submersible lands. However, often the photo will be useful to establish the approximate boundary between the submersible lands and the Littoral uplands.

For example, the oblique aerial photo of the Sand Lake estuary (Figure 10-5) clearly shows the submerged and submersible areas blending together as tidal lands. Without knowledge of the tidal elevation at the time of the photography, it is impossible to define the line between the submerged and submersible lands. Here, a one foot rise in the tide could amount to 50 feet (or more) laterally. We can only make four reliable assumptions:

- (1) We know the exact sinuosities of the estuary channels in June of 1977. This could be safely classified as at least part of the *submerged lands*,
- (2) We can define the uplands;
- (3) We can define the tidal lands; and

Figure 10-5 (See hard copy)

- (4) We can define the approximate mean high water line (the division between the uplands and tidelands).

*Note: Sand Lake drains 14 square miles of timber and valley land. The small area yields an insignificant fresh water discharge compared to the cyclic ebb and flood of tidal waters passing through the mouth. Consequently, tidal flow is largely responsible for Sand Lake's shape and depth. This estuary is one of the few remaining in a natural state.*⁷³

Division of State Lands Charts

The State of Oregon is one of the major landowners in Oregon's estuaries. The State, acting through the Division of State Lands, owns all submerged lands in the estuaries (as none of these lands were ever conveyed by the State to private individuals). Moreover, the Division exercises authority over the publicly owned tidelands or submersible lands which have not been alienated into private ownership.

As part of the administration of the State lands, the Division issues maps showing State, private, port, county, federal and city ownership's in the estuary tidelands, such as the chart of the Necanicum River in Figure 10-6.

Validating Statutes

ORS 273.900 provides that "...the titles to all tidelands within this state, and all tide flats not adjacent to the shore in the waters of the state, which have heretofore sold to purchasers by the State of Oregon, where the purchaser has, in good faith, actually paid to the state the purchase price, and the same has been received by the state, and the purchaser has not purchased from the state to exceed 320 acres of that character or class of land, are hereby confirmed to all such purchasers and grantees of the state, their heirs, successors or assigns, when such tide lands have not been fraudulently obtained, and without reference to the amount of any other character of lands purchased by such purchaser theretofore from the state."⁷⁴ (Formerly ORS 274.050.)

The Ocean Shore

Oregon law defines the *ocean shore* as the land lying between extreme low tide of the Pacific Ocean and the line of vegetation as established and described in ORS 390.770.⁷⁵ This definition is in harmony with the United States definition: the space between the margin of the water at its lowest stage and the banks of the high water mark. The U.S.B.L.M. manual of surveying instructions describes the *high water mark* as: "... the line which the water impresses on the soil by covering it for suf-

ficient periods to deprive it of vegetation..." (In other words—the vegetation line.)

The vegetation line is a line described in ORS 390.770. The line is described according to the Oregon Coordinate System as defined by ORS 93.330. ORS 390.755 directs the State Highway Engineer to periodically reexamine the line of vegetation for the purpose of obtaining information and material suitable for reevaluation and redefinition to preserve private and public rights and interest in the ocean shore.

Ownership of the shore between ordinary high tide and extreme low tide, and from the Oregon-Washington State line on the north to the Oregon-California State line on the south, *except such portions as may have been disposed of by the state prior to July 5, 1947, is vested in the State of Oregon, and is declared to be a state recreation area. No portion of such ocean shore shall be alienated by any of the agencies of the state except as provided by law.*⁷⁶

The land lying west of the statutory vegetation line is exempt from taxation; however, any improvements on the land remain subject to ad valorem taxation.⁷⁷ Therefore, private lands extending seaward of the vegetation line *must carry a separate tax lot number from that part lying upland of the vegetation line.* This provides assurance, to the taxpayer, that the land on the ocean shore is not being taxed. And, it reduces the chance of it being accidentally taxed in the future.

Note: "Exempt from taxation" means totally exempt from taxation. It does not require a nominal or token tax to retain ownership of the land.

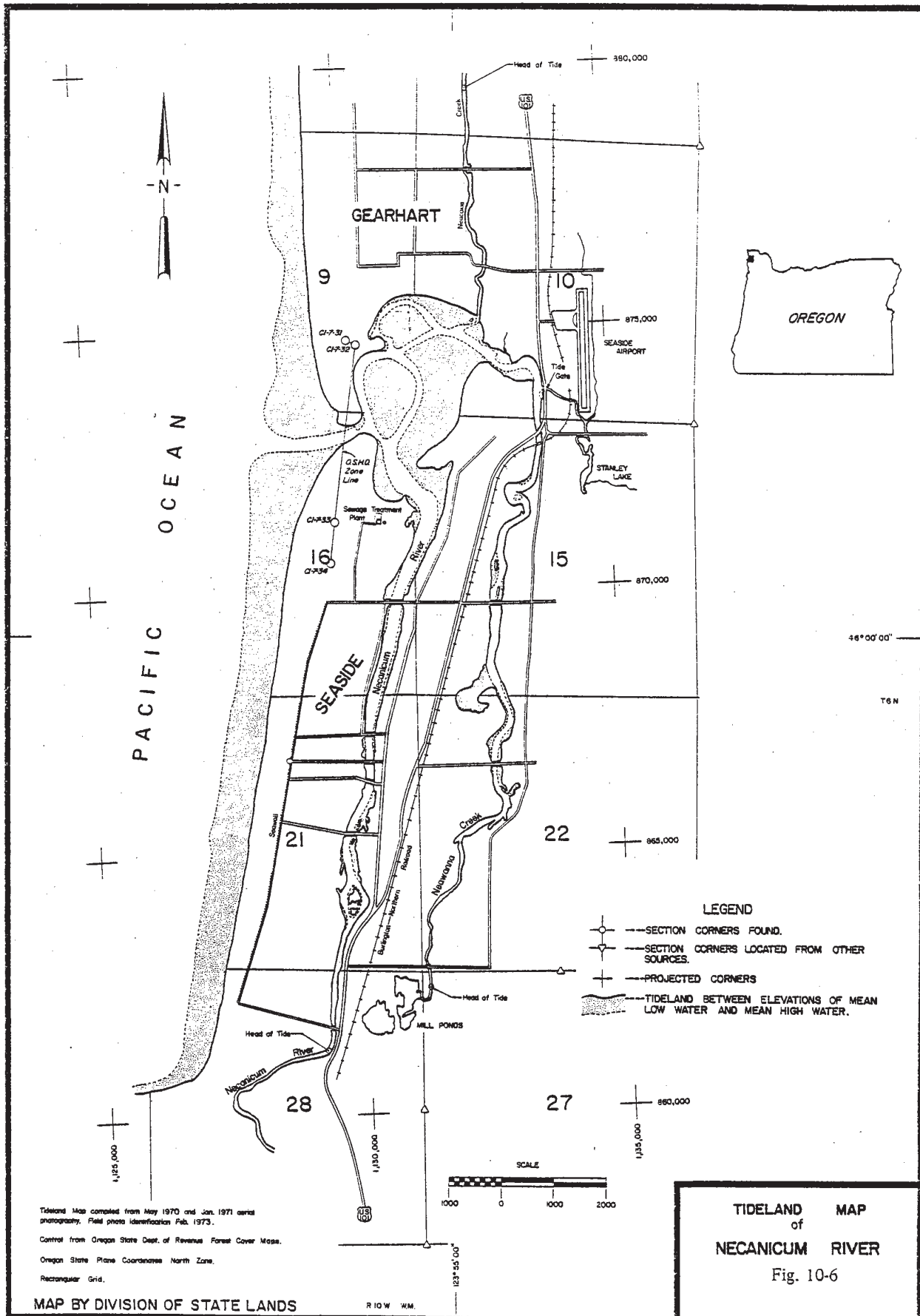
Any private improvement lying on the ocean shore is taxable and should, therefore, be assigned an *improvement only* tax lot number.

Example. In Figure 10-7, the James P. Smith property extends seaward of the vegetation line described in ORS 390.770. It is, therefore, on the ocean shore and exempt from taxation. A separate number has been assigned the exempt part of Smith's property (601), and his beach home has been assigned an improvement only number (601A1); this is the taxable interest.

Note: The meander line has no significant bearing on the ownership or tax lotting of this land.

Many private parcels of land are described to various points extending into and beyond the ocean shore tidelands. Although the ownership of these lands may be considered questionable, the best procedure is to adhere to the deed when plotting the ownership boundaries on the map. The question of ownership must be left to the courts.

Ocean water lines are in a constant state of fluctuation (vertically and laterally); therefore, the water lines on



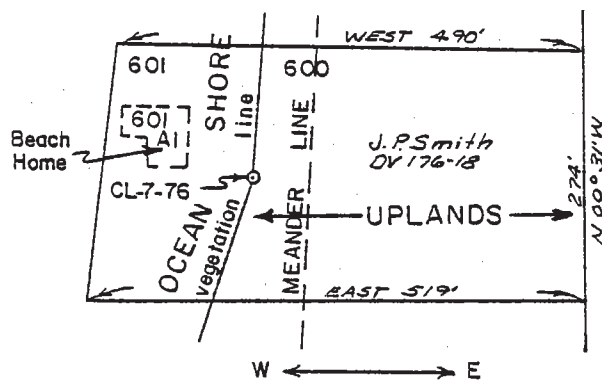


Figure 10-7

aerial photography do not represent any meaningful riparian reference point. Hence, unless the water line is along a vertical (or near vertical) cliff, as illustrated in Figure 10-4, where there is minimum lateral displacement for the different levels of the tide, the water line of the photo should *not* be displayed on the cadastral map. Instead, we recommend showing the 5.7 foot elevation contour line from the Department of Transportation aerial photos of the ocean shore. This treatment will at least provide a reference point that is seaward of the vegetation line.

Note: The vegetation line on the Department of Transportation photos is labeled "ZONE LINE." For this reason the vegetation line (at approximately 16 foot elevation) is often referred to as the Beach Zone Line.

The appendix includes an ocean shore profile. Be sure to label the vegetation line as recommended by the profile.

Ocean Shore Meander Line

The subsection on meander lines and meandering pertains to tidal lands and the ocean shore as well as lakes, rivers, and so forth.

Miscellaneous Statutory Provisions

ORS 390.620—Pacific shore not to be alienated; judicial confirmation.

ORS 390.630—Acquisition along the ocean shore for state recreation areas or access.

ORS 390.635—Jurisdiction of the Department of Transportation over recreation areas.

ORS 390.640—Permit required for improvements on ocean shore; exceptions.

ORS 390.650—Improvement permit procedure.

ORS 390.655—Standards for improvement permits.

ORS 390.658—Judicial review of engineer's decision on improvement permit application.

ORS 390.660—Regulation of use of lands adjoining ocean shore.

ORS 390.690—"Nothing in ORS 390.690, 390.620 to 390.660, 390.690 and 390.705 to 390.770 shall be construed to relinquish, impair or limit the sovereign title or rights of the State of Oregon in the shores of the Pacific Ocean as the same may exist before or after July 6, 1967."

ORS 390.755—Periodical reexamination of vegetation line by Highway Engineer; recommending adjustments.

ORS 390.760—Exceptions from vegetation line. ORS 390.760 does not apply to any state-owned lands or to headlands and other lands located at an elevation of more than 16 feet and seaward of a line running between the following designated and numbered points (being the traverse points defined in this statute) which are more particularly described by ORS 390.770. The elevation mentioned in this section of the law refers to the U.S.C.G.S. Sea Level Datum of 1929 through the Pacific Northwest Supplementary Adjustment of 1947.

Rivers

It is important to read the section of this chapter on *Navigable Waters* in order to understand the reasoning behind the cartographic specifications defined in this section.

Navigable Rivers or Streams

As the section on navigable waters explains, *the State of Oregon is the owner of beds of all navigable rivers and streams, to the mean high water mark* (Except those lands of the Willamette River, Coos River, Coquille River and Umpqua River, between mean low water and mean high water as granted by the 1874 and 1876 Legislative Assembly, and the lands granted private owners by adverse possession proceeding prior to 1903. Contact the Division of State Lands for the location of these lands.) Most of the lands affected by the 1874 and 1876 laws would be those acquired under the Donation Land Law (DLC). See footnote 23.

Therefore, for the most part the beds of the navigable rivers and streams would be in state ownership and exempt from ad valorem taxation. Here, private riparian boundaries would be the *mean high water line*. (Not the meander line unless that line, in the deed, is specifically and unequivocally defined as the same meander line as surveyed by the United States Public Land Survey. Remember, the word *meander* is not synonymous with the term *meander line*; and the term *meander line* is not always synonymous with the meander line of the United States Survey.)

Left Bank and Right Bank Defined

Facing *downstream*, the bank on the left hand is termed the left bank, and that on the right hand is the *right bank*. These terms are universally used to distinguish the two banks of a river, stream, channel, bayous, and so forth.

Mouth of River Defined

The *mouth* of any river emptying into the Pacific Ocean, including the bay or tidal area formed by each such river, is the seaward end of the jetty or jetties of each such river. If no jetties exist, the extension of the Pacific Ocean shoreline high watermark across the river, bay or tidal area is the *mouth* of such river.⁷⁸

In inland waters it is the point where the river empties into another body of water at mean low water or mean low tide.

Nonnavigable Rivers and Streams

If a stream is not navigable, as navigability is determined by the courts, the title to the bed of the stream is in the private ownership of the owners of lands fronting upon that stream, unless specific reservations are indicated in the instrument of conveyance of title. When different riparian owners occupy the left and right banks of a stream, their ownership extends to the middle of the stream, or the *thread of the stream*. (Affirmed by ORS 93.310)

The beds of nonnavigable rivers or streams are assessable when the abutting uplands are assessable. *The acreage of riparian lands along nonnavigable rivers or streams must include submerged and submersible lands to the thread of the stream* (if the ownership extends to the thread). IN SUCH CASES, LOT ACREAGES OF THE UNITED STATES PUBLIC LAND SURVEYS MUST BE DISREGARDED.

A call “to the river” in a deed conveys the land to the thread of the river.^{77a} Even though the thread (or middle, or center) is not mentioned as the boundary, if a call was made to the river, the thread of the river is the monument and, therefore, controls.⁷⁹ River calls are of the highest order of importance and they take precedence over courses and distances and area recitals.

Titles to the beds of nonnavigable rivers and streams remain in the United States until the shore lands have passed to private ownership.⁸⁰ The government’s conveyance of title to a fractional subdivision-of-section, fronting upon a nonnavigable body of water, carries ownership to the middle (thread) of the bed *in front* of the basic holding (subject, however, to the reservations in the patent).⁸¹

Thread of Stream Defined

There is some disagreement on the definition of the term *the thread of a stream* (or river). Some authorities define the thread of a river as the *middle line between the shores, irrespective of the depth of the channel, taking them in the natural and ordinary stage of the water at medium heights, neither swollen by freshets or shrunk by droughts*.⁸²

The problem with that decision is that it does not give the riparian owners, on each side of the river (or stream), access to water at its lowest stage. Therefore, the courts usually rely on the following definition:

The thread of a river or stream is the center of the main channel; the middle line between the shores of the main channel at its lowest flow NOT AT THE TIME OF MEAN HIGH WATER. Thus, the thread represents a line which would give the owners, on each side of the river or stream, access to water; whatever its stage might be, and particularly at its lowest flow.

In nonnavigable streams the riparian owners own islands that lie in the bed of the stream between the bank and the thread of the stream. Unless specifically reserved in an instrument of conveyance. However, if an island slowly forms in the bed of a stream, and is split by the thread of that stream, it belongs in severalty to the proprietors on each side of the thread (the former thread being the division line of the ownerships).

Note: If a point on one side of a river is cut off forming, an island, the island belongs to the original owner (assuming the change was avulsive).

Meander, Meanders, Meander Line, Meandering, Meander Line Traverse

The margin of a permanent body of water is legally termed a *meander line*. Technically, a survey traverse of the margin of water is a *meander line traverse*, e.g., the meander line traverse of the U.S. Public Land Survey. Often, the traverses are generally referred to as just *meander lines*; thus, the term meander line in deeds often appears ambiguous. However, meander lines run by the surveyor are *artificial monuments* and they must yield to the natural monument.⁸³

The general rule to be used in construing descriptions containing the term *meander line* is: *property lines should always run to the margin of a navigable body of water* (the mean high water line the mean low water line if the state has alienated its rights to the submersible lands and subject to rights of others in the submersible lands) unless the language of the description clearly limits ownership to the meander line traverse.

Note: Probably less than 1 percent of riparian lands bordering Oregon’s rivers and streams will run only to the me-

ander. Most will extend to mean high water on navigable streams, and the thread on nonnavigable streams.

Most courts would probably rule in favor of the following descriptions meaning: to the margin of a navigable body of water:

1. "Thence to the river; thence up said river . . ."
2. "Bounded by the river."
3. "Thence to the meander line of the river; thence following said meander line to a point . . ."
(In example No. 3, nothing in the description says unequivocally that the meander line is the same line as the meander located in U.S. Public Lands Survey or any other survey.)
4. "Thence running along said river."
5. "Thence to the meander of the river."

All of the above would, of course, be subject to the rights of others in and to the submersible lands. The following wording *might* be construed as limiting property ownership to the original meander line of the U.S. Public Land Survey:

1. "Thence to the meander line as surveyed in the U.S. Public Land Survey (or, the U.S. Survey; or the U.S. Rectangular Survey, etc.); thence following said meander line . . ."
(In the above example the second call is important. If it would have read "thence up said river" there is an excellent chance that the ownership would extend to the margin of the navigable stream, rather than the meander line.)
2. "As bounded by the meander line of the U.S. Survey . . ."
3. "Except: all land lying between the meander line as surveyed by the U.S. and the mean high water line (or margin of the river)."

Of course, the above rules are rebuttable presumptions, and could be overcome by evidence to the contrary. They do point out to one very important fact about meander lines.

In the original surveys, the meander lines were run for the purpose of defining the sinuosities of the bank or shoreline, and for ascertaining the quantity of land remaining after segregation of the water area.⁸⁴ Numerous decisions in the United States Supreme Court assert those principles; moreover, they confirm the principle that MEANDER LINES ARE NOT BOUNDARIES DEFINING THE AREA OF OWNERSHIP OF LANDS ADJACENT TO THE WATER. The stream, or other body of water, and NOT THE MEANDER LINE as actually run on the ground, is the boundary.⁸⁵

In other words the meander line traverse does not mark the ownership boundary; however, as the last three examples illustrate, the intent of the parties govern.

According to the U.S. surveying regulations, *all navigable bodies of water and other important rivers and lakes are to be segregated from the public lands at mean high water.*⁸⁶

The cartographer should be careful not to confuse the term meander line with the word meander; they are not synonymous. A meander of a stream is a line following a winding, or flexuous, course of the stream;⁸⁷ and the courts have held that the meander generally follows the middle (not always the thread) of a stream. Hence, meanders, like meander lines, will rarely represent property boundaries.

The mere fact that an irregular line, or sinuous line, is run (e.g., a reservation line) does not entitle it to be called a meander line unless it closely follows the course of a stream or lake. The legal riparian rights connected with meander lines do not apply to other irregular lines, as the latter are strict boundaries.

1869 Rules for Surveying Meanders

1. Standing with the face looking *down* stream, the bank on the *left* hand is termed the 'left bank,' and that on the *right* hand, the 'right bank.' These terms are to be universally used to distinguish the two banks of a river or stream.
2. Both banks of *navigable* rivers are to be meandered by taking the courses and distances of their sinuosities, and the same are entered in the field book.

At those points where either the township or section lines intersect the banks of a navigable stream, *posts*, or, where necessary, *mounds of earth* or *stone*, are to be established at the time of running these lines. These are called 'meander corners'; and in meandering, you are to commence at one of these corners on the township line, coursing the banks, and measuring the distance of each course from your commencing corner to the next 'meander corner,' upon the same or another boundary of the same township, carefully noticing your intersection with all intermediate meander corners. By the same method you are to meander the opposite bank of the same river.

The crossing distance *between the meander corners* on same line is to be ascertained by triangulation, in order that the river may be protracted with entire accuracy. The particulars to be given in the field notes.

3. You are also to meander, in manner aforesaid, all lakes and deep ponds of the area of twenty-five acres and upward; also navigable bayous. *Shallow* ponds, readily to be drained, or likely to dry up, are not to be meandered.

You will notice all streams of water falling into the river, lake, or bayou you are surveying, stating the width of the same at their mouth; also all springs, noting the size thereof and depth, and whether the water to be pure or mineral; also the head and mouth of all bayous; and all islands, rapids and bars are to be noticed, with intersections to their upper and lower points to establish their exact situation. You will also note the elevation of the banks of rivers and streams, the heights of falls and cascades, and the length of rapids."⁸⁸

Excerpts from 1973 U.S.B.L.M. Regulations on Meanders

"Low-water mark is the point to which a river or other body of water recedes, under ordinary conditions, at its lowest stage. High-water mark is the line, which the water impresses on the soil by covering it for sufficient periods to deprive it of vegetation. The shore is the space between the margin of the water at its lowest stage and the banks at high-water mark."⁸⁹

No meander monument should be placed in a position exposed to the beating of waves and the action of ice and severe weather. In such cases a *witness corner* should be established on the line at a secure point near the true point for the meander corner.

In as much as it is not practicable in public-land surveys to meander in such a way as to follow and reproduce all the minute windings of the high-water line, the United States Supreme Court has given the principles governing the use and *purpose* of meandering shores in its decision in a noted case as follows:

*Meander lines are run in surveying fractional portions of the public lands bordering on navigable rivers, not as boundaries of the tract, but for the purpose of defining the sinuosities of the banks of the stream, and as the means of ascertaining the quantity of land in the fraction subject to sale, which is to be paid for by the purchaser. In preparing the official plat from the field notes, the meander line is represented as the border line of the stream; this shows to demonstrate that the water course, and not the meander line as actually run on the land, is the boundary.*⁹⁰

Navigable rivers and bayous, as well as all rivers not navigable, the right-angle width of which is 3 chains and upwards, are meandered on both banks, at the *ordinary mean high-water mark*, by taking the general

courses of their sinuosities. Rivers *not classified as navigable* are not meandered above the point where the average right-angle width is less than 3 chains, except when duly authorized.⁹¹

Shallow streams and intermittent streams, without well defined channels or banks are not meandered, even when more than 3 chains wide. Tidewater streams are meandered at ordinary mean high tide as far as navigable, even when less than 3 chains wide. Tidewater inlets and bayous are recorded, and are meandered if more than 3 chains in width, but when nonnavigable are not meandered when less than 3 chains wide.

The meander line of an island is surveyed in harmony with the above rules.

All lakes of the area of 50 acres and upwards are meandered."

"Artificial lakes and reservoirs are not segregated, from the public lands, unless specifically provided in the instructions, but the true position and extent of such bodies of water are determined in the field and shown on the plat.

Other exceptions to the general rule are shallow or poorly defined 'lakes' which are actually pools that collect because of permafrost and lack of drainage or which are ephemeral desert *playas* formed seasonally or in wet years. These lakes should not be meandered even when larger than 50 acres."⁹²

Mapping Navigable Rivers or Streams

One major problem will always exist in mapping the navigable rivers (including navigable streams). That is the graphic delineation of the boundaries of the submersible lands.

Where the mean high water line is the boundary, the mapping solution is not so difficult. Practically all inland bodies of water pass through an annual cycle of changes between the extremes of which will be found the mean high water line. In regions of broken topography, especially where bodies of water are bounded by sharply sloping lands (like that of Figure 10-4), the lateral distance between the margins of the various water elevations is comparatively slight. In such cases the cartographer should experience little difficulty in determining the horizontal position of mean high water level on aerial photographs.

However, where the meanderable bodies of water are bordered by relatively flat lands, the horizontal distance between the successive levels is relatively great. The most reliable indication of the mean high water line⁹³ is the evidence made by the water's action at its various stages, which are generally marked on the

soil and usually evident on the aerial photographs. That is, mean high water elevation is found at the margin of the water for the greater portion of each average year. At this level a definite escarpment in the soil is generally traceable on photographs. When locating the mean high water mark on photography, the cartographer must be careful not to confuse the mean high water mark with the (often pronounced) mark on the soil that is the result of the action of a storm or flood waters (this will, of course be above mean high water).

Another, less evident, escarpment is often found at the average low water level (especially of lakes), the lower escarpment being separated from mean high water by the normal beach or shore. The only option open to the cartographer (where a cadastral survey does not exist) when an ownership boundary extends to the boundary between submerged and submersible lands, is to show the ordinary mean high water line as the boundary between the uplands and submersible lands and the low water mark evidenced by map or photo as the approximate boundary between submerged and submersible lands. The low water mark, in this case, will define only an *approximate riparian boundary* of submerged lands. At best, it will show that submersible lands do exist.

Islands

According to the B.L.M. survey instructions, every island above the mean high water elevation of any meanderable body of water is located by triangulation or direct measurement, and is meandered and shown upon the official plat (except islands formed in navigable bodies of water, in continuous existence since the date of the admission of the state into the Union).

Even though the United States has parted with its title to the adjoining mainland, an island in a meandered body of water, navigable or nonnavigable, in continuous existence since the date of admission into the Union, and omitted from the original survey, remains *public land* of the United States; the island therefore being subject to U.S. survey. This is because such islands were not a part of the *bed* of the stream at the date of statehood (1859), and therefore their title remained in the U.S., subject to survey and disposal when identified.

The riparian right that attaches to the lottings along the meander line of the mainland pertains only to the submersible and submerged lands abutting the mainland, and to such islands as may form within the bed subsequent to the disposal of title. The proof of the time of the formation of islands (such as those in the Columbia that slowly move downstream) is often difficult. It is therefore important to make a careful

examination of the history of an island in relation to the question of its legal ownership.

In the case of *Freytag v. Vitas*⁹⁴ it was held that "Where an island is formed in a portion of the bed of a river which is owned by the State, title to such an island is in the State." The *Freytag* case will show that the cited rule is true even though the island eventually connects to land belonging to another. The application of the above rule is not affected by the fact that the new island is situated on a portion of the bed of the river, which was occupied by private land prior to erosion.

Where an island forms as an accretion to the bed of a navigable river, the State acquires title (not withstanding the previous erosion of private land).⁹⁵ Where an accretion is entirely to an island, the accretions belong to the owner of the island. And where an island, owned by a party different from that of the mainland, becomes attached to the mainland by accretion, the mainland owner is not entitled to the island as an accretion to his land. In one such case,⁹⁶ *Clark*⁹⁷ says the alluvial deposits should be divided between the mainland and island owners.

Any township boundary or section line which will intersect an island is extended as nearly in accordance with the plan of regular surveys as conditions permit (or permitted), and the usual township, section, quarter-section, and meander corners are established on the island. If the island is large enough to be subdivided, the subdivision is accomplished by the protraction of suitable subdivision-of-section lines in their correct theoretical position.

Under special circumstances where administration or disposal requires no subdivision, the U.S. may assign the island a tract number within the township. In such cases, section lines are seldom extended to the island.

Submerged Lands and New Lands of Reservoirs

Who owns the land above the former line of ordinary high water now inundated by construction of the Bonneville Dam? The State of Oregon or the former private owner? The answer is *the State of Oregon*.⁹⁸

Discussion: The Oregon State Highway Department planned to remove slide waste material adjacent to the Columbia River Highway and deposit it in the waters above Bonneville Dam.⁹⁹ The fill would create new lands over permanently submerged lands which prior to the construction of the dam was private property contiguous to the level of ordinary high water. The determination of the *present ownership* of this area will establish ownership of the new lands.

There is no doubt that the State of Oregon owned the bed of the Columbia River to the line of ordinary high water prior to the construction of the Bonneville Dam.

It appears that prior to inundation, the private owner had not expressly conveyed any interest to the State of Oregon although the owner did convey a *flowage easement* to the United States for use of the Army Corps of Engineers. Ordinarily the owner of the lands which became submerged would retain ownership to such land and would be vested in any newly created lands rising above the surface.¹⁰⁰

However, in the case of navigable waters certain exceptions have been recognized. For example, the use of the bed of a navigable stream is subject to control by the federal government in the regulation of navigation.¹⁰¹ (Of course, conveyance of a flowage easement does not pass fee title to the U.S. nor would such easement *alone* convey any additional rights beyond those naturally inherent in its power to control navigation.)¹⁰² Indeed, the doctrine of the submergence of lands beneath navigable waters has been extended to vest ownership of the submerged land in the state. While there are no Oregon cases in point, there are two cases from another jurisdiction which are applicable and persuasive.

In *Pewaukee v. Savoy*,¹⁰³ the defendants contended they owned the bed of the lake above the line of the original water level which land had been submerged by the artificial raising of the level of the water some twenty years previously by the construction of a dam.

The court found that the submergence of the former upland resulted in the vesting of the title of the bed of the lake in the state. The court stated:

*"When we say that the new level of the lake has become its natural level, we say that the title to all the submerged lands in the present condition of things is in the State; that the entire body of water is subject to the common right of fishing and navigation and to other incidents of navigable waters, and that the title to lands bordering on the lake stops at precisely the same line that would govern if the water, in a state of nature, reached to the height of its artificial condition."*¹⁰⁴

The court reasoned in the *Pewaukee* case, *supra*, that the public had a right to use the waters as any navigable water and that by the continued submergence of the land the title to the lands is vested in the state to the same extent as that of lands constituting the original natural bed of the lake.

In the other case,¹⁰⁵ the defendant's lakefront property was submerged as a result of construction of a dam. The court stated:

"It is indisputably established that the land in the area in question became submerged by the raising of the water

*by the Menasha Dam, and that the waters thereon are an extension of Poygan Lake, and hence the title to the submerged land under the navigable waters is in the state, and the rights of the public to enjoy this easement are correspondingly extended to embrace all the navigable waters within it."*¹⁰⁶

Based on the foregoing, the Oregon Department of Justice held that the raising of navigable waters behind Bonneville Dam, that were formerly in private ownership, is vested in the State of Oregon subject to the control of navigation by the United States. Thus, *any new lands created by fill thereon will be owned by the State of Oregon.*¹⁰⁷

Lakes, Marshes and Swamps

*A meandered lake is, by law, a lake wholly or partially within this state that has been meandered by the U.S. Public Land Survey.*¹⁰⁸

ORS 274.430 provides that *all meandered lakes are declared to be navigable and public waters*. The title to the submersible and submerged lands of the meandered lakes, which are not included in the valid terms of a grant or conveyance from the state, *is vested in the State of Oregon.*

ORS 274.430 to 274.450 does not apply to any *non-navigable lakes* lying within the boundaries of any incorporated drainage district in existence on January 1, 1921.¹⁰⁹

ORS 274.430(3) *"Nothing in this section impairs the title to any upland or riparian owner to or any vested rights in land which was added prior to May 25, 1921, by natural accretion or reliction to the lands of such upland owner."*

Regardless of ORS 274.430, government surveyors have no power to determine navigability. *The meandering of a lake or stream does not settle the question of its navigability, since the establishment of meander lines by government surveyors is mainly for the purpose of determining the quantity of land which is to be paid for by the prospective purchaser.*¹¹⁰ Thus, the Oregon Supreme Court said:

"The navigability of bodies of water is a question of fact and not of law and the running of lines along the banks of a river, in order to ascertain the area of a subdivision of the upland, cannot make such stream navigable when in its natural state it, is not adapted to bearing on its surface boats and vessels engaged in commerce. NAVIGABILITY IN LAW CAN NEVER EXIST INDEPENDENT OF NAVIGABILITY IN FACT, and the fitness of a river in its original condition for the transportation of freight and

passengers by power or sailing craft can never be settled by fiat or by meandering the banks of a stream.”¹¹¹

Therefore rivers and lakes are navigable in fact when they are used, *or are susceptible of being used*, in their ordinary condition, as highways for commerce over which trade and travel are *or may be* conducted in the customary modes of trade and travel on the water.¹¹²

Hence, the fact that a lake in Oregon was *not meandered* (as in the Tenmile Lake case)¹¹³ does not mean it is nonnavigable. The crucial questions are (1) the *susceptibility* of the lake, in its natural condition, to be used as a highway of commerce, and (2) the *evidence of actual use* of the lake for commercial purposes (both before and after the date of the state’s admission to the Union).

The Oregon Department of Justice held that both Tenmile Lake and North Tenmile Lake are navigable bodies of water with titles to the beds (submerged and submersible lands) vested in the State of Oregon (at least until such time there is an adjudication to the contrary).¹¹⁴ The evidence supplied to confirm this position is:

1. During the 1930’s and 1940’s tugboats towed log rafts for a lumber company operating a shoreside mill on the lake. In addition, another sawmill was operated about 1.5 miles north from Lakeside on the east side of the North Lake arm. That mill used logs towed in rafts by tugboats.
2. There was an operative commercial fishery on Tenmile Creek and on the lake until about 1926.
3. The U.S. Mail is currently delivered by boat to residents on the lake.
4. School boats hauled children daily during the period 1936 to 1949.
5. Supply boats hauled supplies to and picked up cream from farmers in a 27-foot launch operated by Oscar Erickson during the 1930’s and 1940’s.
6. During 1964 to 1967, a cruise boat 60-feet long with a 5-foot draft plied these waters.

Statutory Provisions—Lakes

ORS 274.440(1) “There are no vested rights in or to any future accretion or reliction to the lands of any upland or riparian owner on *any meandered lake*. No person shall acquire any right, title or interest in or to the submerged or *submersible* lands of any such lakes, or any part thereof by *reliction, accretion* or otherwise, or by reason of the lowering or drainage of the waters of such lakes, except as provided by statute.”

ORS 274.440(2) “Upon drainage of meandered lakes, the title of owners of land riparian to such lakes

drained under any law shall extend to so much of the submersible and submerged lands reclaimed by such drainage as is required to *fill out the least fractional subdivision or subdivisions of any section owned by such riparian owners and which is rendered fractional by the meander line of such lake*; and the title of such owners shall be so limited when the receding lake waters, because of the drainage, uncover the submersible and submerged lands. Where by reason of natural accretion or reliction such fractional subdivision or subdivisions of such upland owners were filled out thereby prior to May 25, 1921, such upland owners shall hold to the line of such lands as extended by the natural accretion or reliction.¹¹⁵

ORS 274.440(3) “Submersible and submerged lands covered at ordinary high water at ordinarily recurring seasons by the waters of meandered lakes, or from which the waters of any such lakes have not at ordinarily high water permanently receded, are not considered to be accreted or relicited lands, but the same and all accretions and relicitions occurring or forming over any of the lands of the State of Oregon, as provided by ORS 274.430, are the property of the State of Oregon, and may be by it leased, sold or managed in the manner provided it by law. (Amended by 1967 c. 421 subsection 133.)”

ORS 274.450 grants the Division of State Lands the authority to acquire riparian rights in any upland or riparian owner on any meandered lakes.

ORS 274.460 provides for settler’s and riparian owner’s preferential right to purchase land within the meander lines.

ORS 274.470 provides for settler’s right to deed to land within meander lines; preferential right to additional land; and taking by successive settlers.

ORS 274.480 “The owners of lands riparian to Malheur and Mud Lakes, in Harney County, Oregon, shall be granted title to so much of the lands within the meander lines of such lakes as is required to fill out the least fractional subdivision or subdivisions of any section owned by such upland owners and which is rendered fractional by the meander line of such lakes, in addition to the rights recognized by ORS 274.430 to 274.460 to any natural accretion or reliction added to the lands of such upland owners prior to May 24, 1923. Owners of any upland bordering upon such meander lines shall have a preferential right to purchase, in addition, 160 acres of such state lands, chiefly valuable for agricultural purposes.”

ORS 274.480 provides for the settlement of conflicting preferential rights.

ORS 274.510(1) “If the Federal Government claims title or interest in any lands referred to in ORS 274.470 or

274.480 the same shall not be conveyed or otherwise disposed of, or preferential right therein accrue until such claim is settled. The division may enter into such agreements with the Federal Government affecting such lands as it deems best in the interest of the public, and make such deeds and conveyances to the United States in consideration of the issuance of such patents by the United States to the State of Oregon of such lands within the meander lines of any such lake as the division and the Federal Government agree.”

ORS 274.510(2) “Nothing in this section is a recognition of any title or interest in the United States within the meander lines of any meandered lake to any lands or waters of any such lake prior to the execution and delivery of a deed or conveyance from the State of Oregon as provided for in this section.”

ORS 274.520 “Any person who elects to take any deed from the State of Oregon under ORS 274.430 to 274.520 to any lands within the meander lines of a lake takes the same in lieu of any claim to any other lands within the meander line of such lake in which such deeded lands lie, and shall not thereafter maintain in any court any claim to any lands inside the meander line of such lake other than to the lands conveyed to such person by deed from the state under ORS 274.430 to 274.520 or which such person acquires in good faith from a grantee or purchaser from the State of Oregon under such statutes.”

Note: Legislation by the state cannot affect the title of the United States.¹¹⁶

Swamp and Overflowed Lands

The act of March 2, 1849 (9 Stat. 352), granted to the State of Louisiana all swamp and overflowed lands within the limits of the State for the purpose of aiding in the reclamation of said lands; the Act of September 28, 1850 (9 Stat. 519), extended the grant to other public land states then in the Union. The grant was also extended to the States of Minnesota and Oregon by the Act of March 12, 1860 (12 Stat. 3). These various swampland grants were carried over into R.S. Sec. 2479 (43 U.S.C. Sec. 982).

The provision of the above grants apply to the elevations situated below the uplands. Wherein the lands are of such character that without the construction of levees or drainage canals the areas would be wet and unfit for agriculture. The grants apply to all swamp and overflowed lands within the states which were unappropriated at the dates of the granting acts, and whose character at that time would bring them within the provisions of the grant. These lands are not conveyed without U.S. survey, selection, or patent. They are surveyed as public lands and are subject to classification at that time.

Swamp lands include marshes and intermittent ponds which do not have effective natural drainage, particularly where such conditions are long continued.

Coastal salt marshes that are covered by the daily tide are not subject to U.S. Survey. On the other hand, coastal marshes that are not covered by the daily tide are swamp and overflowed lands within the meaning of the U.S. grants, and are subject to U.S. survey.

Meander lines are usually not established between the upland and the swamp and overflowed lands. Riparian rights, which are applicable within the beds of streams, tidal waters, and lakes, are *not* enforceable over the swamp and overflowed lands granted to Oregon. The survey of meander lines at the margin of the swamps, in the past, has been an important cause of the omission of lands from surveys.

U.S. Revised Code 2481 (43 U.S.C. 984) requires that any legal subdivision, the greater part of which is wet and unfit for cultivation, shall be included in the category of *swamp and overflowed lands*. When the greater part of the subdivision is not of that character, the whole of it is usually excluded; the legal subdivision referred to is the $\frac{1}{4}$ $\frac{1}{4}$ section or comparable lot.

The selection of swamp and overflowed lands in Oregon is based upon investigation by the State and the B.L.M. The drainage of submersible and submerged lands and the sale of drained or reclaimed lands is provided for by ORS 274.210.

Lateral Changes in Bodies of Water and Their Banks

The lateral changes in the size and location of bodies of water, caused by the forces of the natural elements, create some of the most complex problems in cadastral cartography. For example, through the centuries the Willamette River has abandoned old beds, created new beds, leaving sloughs in its wake which often fill with sedimentation, leaving a dry riverbed. These lateral displacements create conflicting claims of ownership and constitute the crux of the riverbed ownership problem.

This section will provide reliable guidance to solving many of the problems caused by *avulsion*, *revulsion*, *accretion*, *reliction* or *dereliction*, and *erosion*. The courts have promulgated many excellent and equitable rules for solving such problems. These rules must be regarded—BUT NOT FOLLOWED BLINDLY—and it must be remembered that when dealing with legal opinions and judicial rulings *the contrary may be shown*.

It is, of course, impossible to present solutions to every problem relating to lateral shifts in water. When

dealing with riparian conflicts it could be said that there are as many variables as there are problems. Whenever there is a reasonable doubt—request a legal opinion.

Avulsion—Revulsion

If there is any discernible difference between the words *avulsion* and *revulsion*, it is not obvious in law books, text books, and surveying manuals. The only key difference between the two words in *Webster's Dictionary*¹¹⁷ is that *avulsion* is directly related to the sudden change in a stream, but the change in a stream is not associated with the word *revulsion*. Webster defines avulsion as:

"A pulling or tearing from or asunder; a rending or forcible separation; that part which is torn away; in law, a sudden removal of soil from the land of one and its deposit or addition to the land of another by the violent action of water, or a sudden change in the course of a stream."

Revulsion is defined as: "A drawing, or holding back or away from; violent separation; a sudden and violent change, particularly of feeling."

The word *avulsion*, then, would appear to be the more appropriate of the two, and will be used for the remainder of this chapter to describe the sudden and perceptible action of a stream that *always* results in separating an owner's land, and sometimes deposits it onto the land of another.

In considering the problem of avulsion, it is necessary to differentiate between navigable and nonnavigable streams, for reasons that will subsequently become apparent.

PRINCIPLE—Where a change takes place suddenly and perceptibly, as where a stream from any cause suddenly abandons its old and seeks a new bed, such a change works no change in boundaries or ownerships.¹¹⁸

Thus, where a change in the bed or course of a stream is sudden and perceptible, the boundaries of landowners bordering on the stream remain the same as they were prior to the sudden change. In this connection it becomes necessary to determine who would own any land in the bed of the river as located before the avulsion.

In this chapter we have established the fact that in the State of Oregon, riparian upland owners take title to the thread of a nonnavigable stream. The effect of an avulsion upon the boundaries of landowners having land contiguous to a nonnavigable stream (that is, riparian upland owners) is stated in the case of *Wyckoff et al. v. Mayfield*, cited supra, at p. 690, to the following effect:

" . . . where the change is sudden and violent, the boundary remains the same, that is, the thread of the stream as it was originally surveyed."

In the event the course of the stream is changed by avulsive action, with the result that dry land is formed where the stream formerly ran, the boundary of that dry land, as between riparian upland owners, is the place where the thread of the stream was located prior to its sudden change.¹¹⁹

As noted earlier in this chapter, the beds of navigable bodies of water belong to the State of Oregon. It would therefore follow that if there was an avulsive change in the course of a navigable stream, so that the old bed became dry land, the state would continue to have title to the bed converted to dry land by avulsion. The boundaries of the upland owners would remain as they were prior to the avulsive change.

PRINCIPLE—When avulsive action has caused a navigable stream to change in location, the State of Oregon claims the bed of the river as it existed before the change.

That principle is based on the authority of the Federal Grant of the beds and banks of all navigable waterways.

Note: Many of the dry navigable river beds have been conveyed, by the state, to private persons. Dry bed ownership can be obtained from the Division of State Lands.

An example of an avulsive change of a nonnavigable stream is illustrated in Figure 10-8.

In this example, parcel 600 went to the thread of the channel of the river, prior to avulsion; and parcel 700 also owned to that thread. After avulsion the boundaries between parcels 600 and 700 remained the same; however, the dry land of parcel 700 was separated by the new channel, but the bed of the new channel

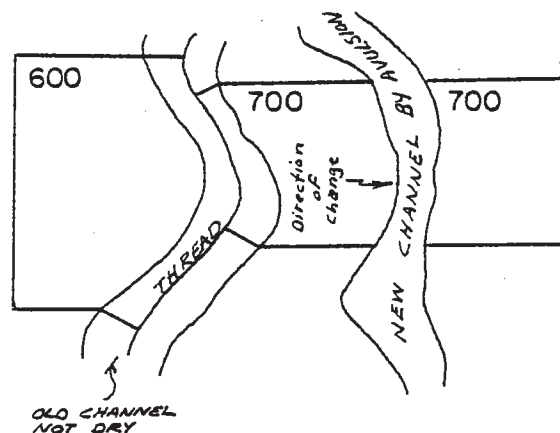


Figure 10-8

remained in 700. In this situation acreage would *not* change, as the boundaries did not change.

The lines approximately at right angles to the stream somewhat indicate how a nonnavigable stream is distributed between upland owners; however, the exact methods of distribution will be described later in this chapter.

If the old channel in Figure 10-8 was dry land after the avulsion, the right and left banks of that channel would be shown by dash lines rather than solid lines.

An example of an avulsive change of a navigable stream is illustrated in Figure 10-9.

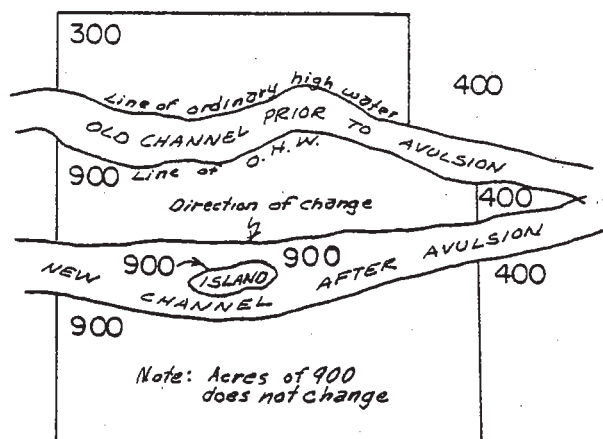


Figure 10-9

In the above illustration, parcel 300 went to the north ordinary high water line, and parcel 900 went to the south ordinary high water line of the old channel. After the avulsive change to the new south channel, the boundaries of parcels 300 and 900 remained unchanged. The State still retains the old channel between the former lines of ordinary high water. Although the new river location is navigable, the submerged and submersible lands of the new channel remain in the owner of parcel 900. Keep in mind this is for *avulsive* river changes—not changes resulting from accretion. The burden of proof for claiming the change was avulsive is in the owner (in this case the owner of 900). See legal reference of footnote 23. The term avulsion also applies to the rapid lateral change of the thread or channel of a body of water.

Where the waters of the sea, or a navigable river, *rapidly subsides*, it is an avulsive act and the derelict land is vested in the state.

State, county and city boundaries are not changed by avulsive acts.

Whether a change in the course of a stream is by a gradual or avulsive acts as a question of fact.¹²⁰ And that fact is whether or not the change was sudden and perceptible (violent is not a mandatory element).

It was held in the case of *Anderson-Tully Co. v. Wine-man*¹²¹ that "movement of a river covering a period of nine years was not avulsion."

Perceptible, in connection with avulsion, must be understood as *perceptible in its progress*, not perceptible after a long lapse of time.

Land Gained by Accretion

The word *accretion* has been defined in 56 Am. Jur., page 891, as follows:

"Accretion is the increase of riparian land by the gradual deposit, by water, of solid materials whether mud, sand, or sediment, so as to cause that to become dry land which was before covered by water."

One of the prime elements of accretion is that the land formed by that process must be formed gradually and imperceptibly.¹²² To this effect, the following statement was made in the case of *Kingsley v. Jacobs*:¹²³

"If by gradual and imperceptible action, accretions have been formed, each party is the owner of those attached to the bank on his side of the stream, irrespective of where the center or thread may have been."

Certain statutes in Oregon provide exceptions to the foregoing rule, specifically: ORS 274.025(2), 274.440(1), under the section in this chapter on *Navigable Waters*. Also, review ORS 274.430(2) and (3).

It is a general principle of the law that the owner of land which is *actually contiguous* to a body of water is the owner of additions to his land made by the process of accretion. However, in order that this person be considered the owner of lands so formed, it must be stressed that his land must be riparian; mere proximity to riparian land is insufficient.¹²⁴ Thus, it is necessary to make the determination that the owner's land is riparian.

If the meander line of a body of water is defined to be the extent of a parcel of land, the body of water is defined to be the extent of that parcel of land (subject to tidelands or other submersible lands, and subject to statutory laws), and thus the land is riparian.

If, for example, the submersible land of a river is owned by a person other than the uplands owner, accretions to the submersible lands are vested in the owner of the submersible lands, as he is the true riparian proprietor, not the uplands owner.¹²⁵ (Where extensive submersible lands exist, alluvium is generally deposited onto the submersible lands rather than the uplands.)

Another important rule of the doctrine of accretion is that accretion in a navigable body of water can only be formed from the land towards the water. Should an

island form in the river, and then connect to the upland of the body of water, the owner of the riparian upland is not generally considered as the owner of the former island.¹²⁶ Review the subsection on islands.

If a body of water is entirely obliterated by accretions occurring on the banks of both sides of the water, the line where such accretions meet would become the boundary of the upland estates.¹²⁷

Where the land of a riparian owner is completely lost by erosion, and a nonriparian upland owner is made riparian, latter accretions are generally vested to the new riparian owner, even though they cross what had been the original boundary.¹²⁸ However, for the former riparian owner to have lost the rights to those accretions, his land must be lost for a lapse of time that would be sufficient to destroy the original identity of his land.

The doctrine of accretions applies to the riparian uplands of the land bordering on subdivisions, and it applies to lots within the subdivisions.

PRINCIPLE—Where the water line is the boundary of a given lot, that line remains the boundary even though it gradually shifts; and a deed describing the lot by a number conveys the land up to such shifting water line; so that in view of accretion, the water line, if named as the boundary, continues to be the boundary, and a deed of the lot carries all land up to the water line.

That rule would apply to government lots as well as subdivision lots.

Accretion is a means of vesting title.¹²⁹ The right to future accretions is a vested right. The accretions to the land are appurtenances to the land and they pass to the riparian owner even though not mentioned in a deed.

The doctrine of accretion is applicable to nations, states, counties, and cities, as well as private individuals; and it applies to both navigable and non-navigable streams.¹³⁰

Artificial Additions to Riparian Lands

Generally, additions to riparian lands caused by artificial means *are not accretions*. To be accretions they must be *natural* as well as *gradual* and *imperceptible*. Such artificial additions such as dumping soil, gravel, etc., are called *new lands* and *filled lands* in Oregon law. The law provides guidelines for new and filled lands; specifically, ORS 274.705(1); 274.905(1), 274.920; 274.925; 274.935; and 274.960.

Extension of an island by pumping sand by government engaged in dredging accrues to the riparian owners as accretion.¹³¹

Erosion

Erosion is the *gradual* removal of soil by current, tides, wind or glacial ice; specifically, by current and tides along bodies of water. Unlike accretion, erosion can be perceptible from year to year.

In general, erosion is governed by the same principals as that of accretion, and the accepted rule is that erosions and accretions attach to the land on which they fall.

If the bank of a navigable stream is washed away by erosion, the riparian upland owner loses and the state acquires title to the land submerged.¹³²

The State of Oregon owns land submerged by the gradual advance of the sea.¹³³

Where the gradual shifting of a river submerged that part of the shore to which plaintiff claimed title by purchase from the state as tideland, the title to such land became revested in the state, and the plaintiff had no dominion over the water covering such land or the fish in it.¹³⁴

Where land conveyed to the University of Oregon by the United States was partly washed away through the process of erosion, the said grantee was divested of title to lands below high water mark.¹³⁵

The title to the land of riparian upland owners on non-navigable streams is not divested because of erosion to the banks of that stream; except where a change in the thread of the original stream is accompanied by accretions to the opposite bank which in turn causes a shift in the thread of the nonnavigable stream.

Where land is completely lost by erosion and a nonriparian upland owner is made riparian, later accretions belong to the new riparian proprietor, even though they cross what had been the original boundary.

Dereliction—Reliction

Dereliction is used to denote land uncovered by the gradual and imperceptible recession of water. *Reliction* is a word that denotes an increase of land caused by the gradual and imperceptible recession of a river or the sea. In effect, the words are synonymous and reliction is the generally accepted term.

The rules of accretion apply, in general, to reliction.¹³⁶ Where recession is gradual, title is usually vested in the riparian owner; however, if submersible lands are owned separately from riparian uplands, the submersible land proprietor would be vested in lands created by reliction (subject, however, to statute), not the upland proprietor.

The seasonal recession of water is not reliction; to be reliction, the subsidence must be of a rather permanent nature.

Reliction is *imperceptible* within the rule relating to acquisition of title, when it is not discernible in its progress, even though there has been an increase perceptible year by year or at shorter intervals.

The withdrawal of water, on a nonnavigable stream, does not affect tide; however, if title extends across the water to the other bank, then it is affected by reliction (and for that matter, it is affected by accretion to, the opposite bank).

The doctrine of reliction does not apply to land reclaimed by the governmental drainage in a reclamation project.

Land gained by reliction can be lost by erosion or by the return of water to its prior level.

Certain guidelines relevant to reliction are contained in the Oregon Revised Statutes; specifically: ORS 274.480, 274.260, 274.460, 274.025, 274.430, and 274.440.

Delineation of Riparian Boundaries

It is important to correctly delineate lines that represent the limits of ownership between the opposite banks of a stream, especially in nonnavigable streams. In nonnavigable waters, the common property line is usually the *median line*.

Median Line

As defined in the United Nations "Convention on the Territorial Sea and the Contiguous Zone," held in Geneva in 1958 a *median line* is a "line every point of which is equidistant from the nearest points on the baseline, but the definition may be made applicable to inland submerged land boundaries by substituting "line of ordinary high water" for "baseline."¹³⁷ It can therefore be stated that the median line is a continuous line, formed by a series of intersecting straight line segments or a combination of curved line and straight line segments, every point of which is equidistant from and the nearest point on the opposite shores.

The simplest method of determining the median line is by use of *salient points*.

Salient Points—B.L.M. Method

A *salient point* is any point on the shore that has an effect on the location of the medient line. Along smooth

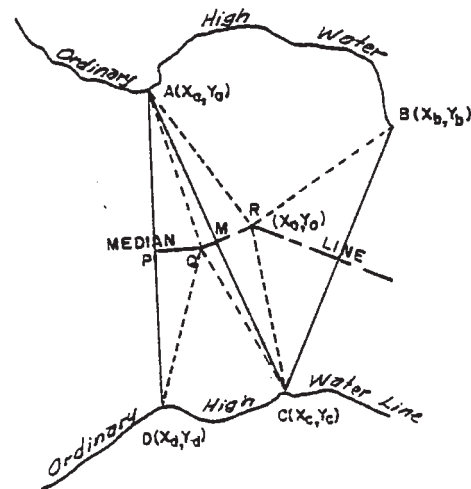


Figure 10-10

shore lines the number of salient points becomes infinite, and a mathematical solution to the problem is impractical. But the system can be used where there are sharp changes in the shore, and where coordinates can be analytically applied.

The angle points of the median line are first approximated graphically on suitably controlled aerial photographs or a reliable cadastral base control map. The coordinates of the points are then determined analytically with values placing them truly equidistant from the nearest salient points. *The analysis treats the salient points as lying on the circumference of a circle with radii extending from an angle point of the median line.*

In Figure 10-10 the median line has been initiated at point P midway between salient points A and D. The median line must pass through point P and be perpendicular to the line connecting A and D.

The coordinates of a point on the median line has been initiated at point P midway between salient points A and D.

The coordinates of a point on the median line exactly between two salient points, such as point P are:

$$X_p = \frac{X_a + X_d}{2}$$

and

$$Y_p = \frac{Y_a + Y_d}{2}$$

Line segment QR represents a portion of the line every point of which is equidistant from salient points A and C, one on each opposite shore. The median line passes through point M midway between salient points A and C, and is perpendicular to line AC.

Angle points on the median line occur at the intersection of adjacent straight line segments. At an angle point such as point R, the median line is equidistant from three salient points, one of which must be located on the shore opposite the other two.

The coordinates (Xo, Yo) of point R are determined from the equations

$$Y_o = \frac{Hb^2(Xb - Xa) - Ha^2(Xc - Xa)}{2G}$$

and

$$X_o = \frac{Ha^2 - 2Y_o - (Yb - Ya)}{2(Xb - Xa)}$$

in which:

$$\begin{aligned} G &= (Yc - Ya)(Xb - Xa) - (Yd - Ya)(Xc - Xa) \\ Ha^2 &= Xb^2 + Yb^2 - Xa^2 - Ya^2 \\ Hb^2 &= Xc^2 + Yc^2 - Xa^2 - Ya^2 \\ Xa &= \text{the X coordinate of point A,} \\ Yb &= \text{the Y coordinate of point B, etc.} \end{aligned}$$

If the angle point is equidistant from more than three salient points, any three points can be used in determining the coordinates of the angle point. The three points selected should form the strongest possible geometric figure; that is, most nearly from the vertices of an equilateral triangle.

Definition Between Meander Lines

When the original meander line defines the true shore, the points on the median line may be considered as the centers of circles tangent to the meander course on either shore or coincident with one or more angle points of the meander line. The resulting median line is made up of intersecting straight line and curved line segments.

Straight line segments represent those portions of the median line every point of which is equidistant from straight line segments of the two meander lines, one on each opposite shore and more or less parallel to one another. Straight line segments also occur under certain conditions when the median line passes between two meander line angle points on opposite shores.

Angle points occur at points of intersection between adjacent straight line segments of the median line. At angle points the median line is equidistant from three or more straight line segments of the two meander lines, one segment which must be located on the shore opposite the others. Median line angle points usually occur in the vicinity of a meander line angle point when one shoreline is concave toward the median line and the opposite shoreline is straight.

Curved line segments of the median line occur whenever the median line is equidistant from an angle point on the meander line on one shore and a straight meander course on the opposite shore. The meander line at the angle point is convex toward the median line.

Cadastral Procedure

The discussion on the salient point approach to locating a median line establishes the *equidistant* concept upon which the median line is based. The mathematical salient point method is ideal for problem areas where the median line is a point of conjecture; or where an exact solution has been requested, but that method is time consuming and should not be used in regular cadastral work.

For general mapping purposes, the approximate location of a median line can be established from aerial photography or accurate planimetric maps.

By keeping the equidistant concept in mind, and by careful photo or map interpretation, the cartographer can eyeball the approximate median line of a nonnavigable stream. This will satisfy assessment requirements, and if located with some degree of accuracy, it should provide very close acreages.

If the median line is included in a survey, that information must be included on the cadastral map.

Partition Lines

Where accretions have taken place, it is necessary to establish the partition lines running across the accreted lands. Partition lines must also be determined where property boundaries extend into a nonnavigable stream.

In the case of *Oregon Coal and Nav. v. Anderson*,¹³⁸ the court ruled "tide line boundaries must be extended out from the shore at right angles to the shoreline or the line of navigable water, instead of extending the course of the upland division lines." This principle is illustrated in Figure 10-11. Right angle partition lines are represented by lines AB and CD. See 1980 annotations for procedure on sideline boundaries of tideland grants from State of Oregon.

If, however, there has been established an official bulkhead line, harbor line, or pierhead line extended out into the river for improvements for wharfage purposes, etc., a few cases have apportioned the river area by drawing partition lines (division lines) perpendicular to such officially prescribed lines extending along the river.¹³⁹

It is therefore evident that the mere extension of property lines, in the direction of their last course, is not sufficient for determining partition lines.

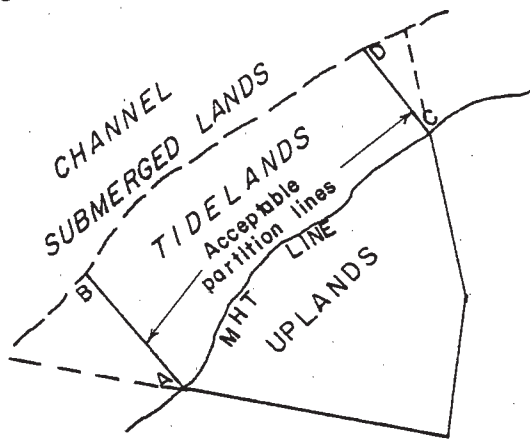


Figure 10-11

A third alternative, as set out in the case of *Montgomery v. Shaver*,¹⁴⁰ is to so divide the river bed (or accretions), between two tracts fronting the same bank, so that each tract will have an extended frontage in the river based on and proportionate to the length of each tract's frontage on the shore. This has been determined to be the most equitable solution.

Instructions for surveying partition lines (which should be suitable for cadastral purposes) are found in 50 L.D. 216 (1923), in the syllabus:

"In establishing the side, boundaries of claims of riparian proprietors to the area between the original meander line on the north and the medial line of the Red River in Oklahoma in accordance with the Supreme Court in the case of *Oklahoma v. Texas*, lines should be run from points representing the limits of frontage of the original claims on the meander line to points on the medial line at distances thereon proportionate to the lengths of frontage of the respective abutting owners."

This is an adoption of the rule outlined in the case of *Johnston v. Jones*.¹⁴¹ By that rule the new frontage along the water boundary of an accreted area was apportioned in the same ratio as the frontage along the ancient bank. In applying the rule, if the shore has deep indentations or sharp projections, the general shoreline, not the actual length, should be taken in setting the ratio. Normal lines are extended to the median line, above and below the area to be apportioned, at points where the river's course is straight, or nearly so. The intermediate distance along the median line is then prorated according to the frontage.

An alternate method is to run each partition line *normal* to the median line. This method awards to each riparian lot the area immediately in front of it. Where a winding stream course causes the normals to deflect rapidly, more than one normal can sometimes be extended from a single point on the shore, or perhaps

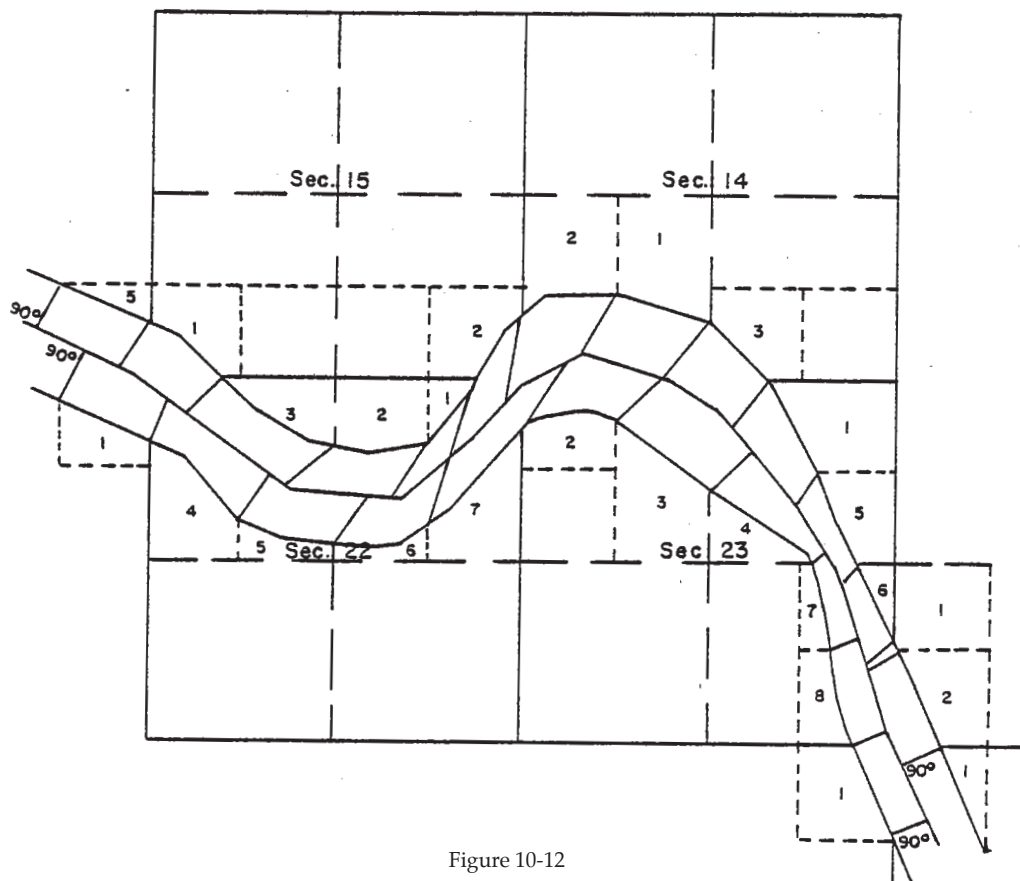


Figure 10-12

no suitable normal can be drawn. The B.L.M. suggests that a combination of methods may then have to be used to obtain equitable results, as illustrated in Figure 10-12. For instance, normals might be drawn to the median line at straight parts of the river, and the intermediate parts apportioned along the median line.

In Figure 10-12, points were selected above and below the bend from which normals were extended to the median line. The intervals along the median line were determined by proportionate measurement. In this case, the results are not as satisfactory as those obtained by the alternate method shown in Figure 10-13 where normals were extended to the median line.

Cadastral Procedures— Apportionment

ORS 308.245 requires the assessor of each county to maintain a set of maps upon which are outlined the boundaries of each land parcel subject to separate assessment within the county. Therefore, the assessor is responsible for ascertaining partition lines and the distribution of accretions (for assessment purposes only). We have discussed several accepted methods for establishing partition lines between existing *shorelines*; however, this does not provide the solution for distribution of upland accretions.

According to Department of Justice opinion OF 149-V, 12-29-1955, the accretions should be distributed as follows:

The accretions should be apportioned to give the riparian upland owners new river frontage proportionate to that of the older river frontage. If the shoreline is straight, and the new and older shore lines are about the same length, the partition lines should be perpendicular to the older shore from the points of division between the upland owners to the new shoreline.¹⁴²

The older shoreline will seldom be straight. When it is irregular, the newer shoreline must be divided among the riparian upland owners in proportion to the old shoreline. In such cases it is advisable to ignore pronounced changes in the shoreline by following the general meander of the river.¹⁴³

Lakes

The method of procedure for establishing partition lines depends on the shape of the shoreline. The courts have generally held that the bed of a round lake should be divided among the riparian owners by ascertaining the center point and connecting that point by straight lines to the boundary corners on the shore.

When a lake is long in comparison with the width, the methods applied to streams, with converging

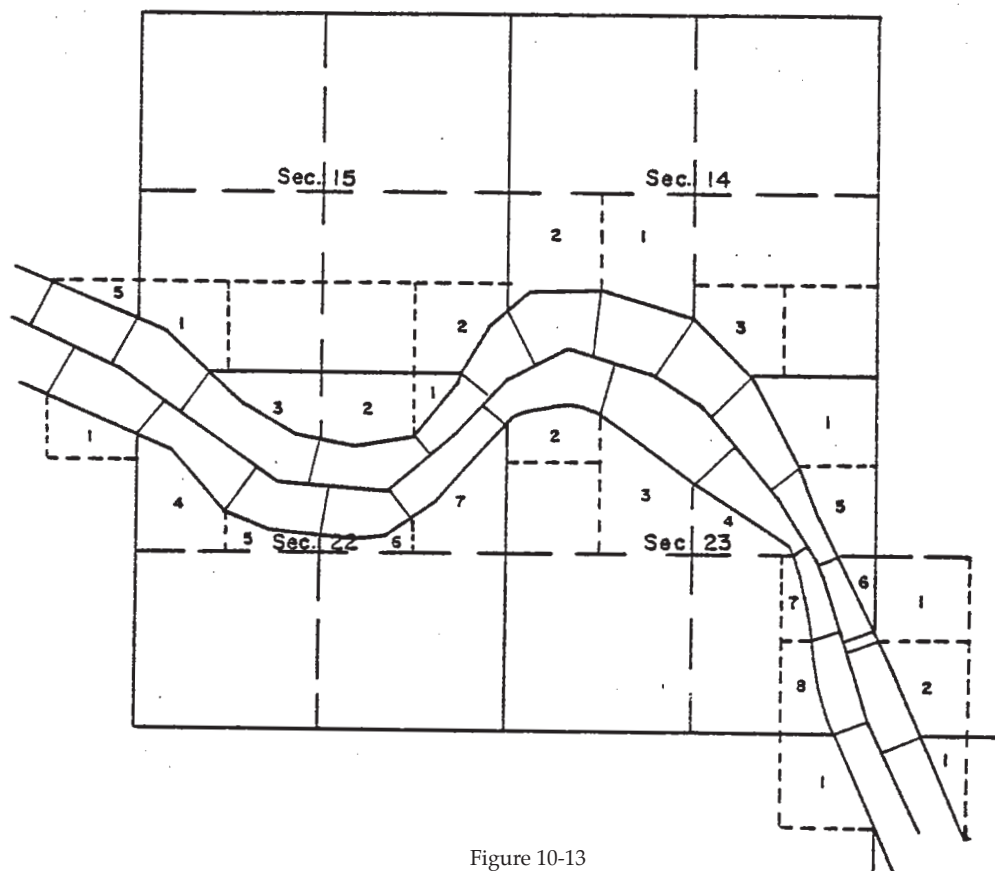


Figure 10-13

lines only at the ends, make the best division. In Figure 10-14, the ends of the lake have been treated as arcs of a circle; the remainder of the bed has been divided by use of proportionate measurement along the median line. In this case, normals to the median line would have resulted in the encroachment of some lots in front of others, and two normals could have been projected from several points as indicated by the dashed lines.

Meandered Lakes

It has been stressed, in this chapter, that the statutory provisions will override the common law principles. This is the case with meandered lakes in Oregon. The statutes printed earlier in this chapter provide the special laws dealing with accretions and relictions inside of the surveyed meander lines of Oregon's navigable lakes. The cartographer must therefore approach the problem of the apportionment of accreted or relicted lake lands with caution.

The best policy is to first make certain that the upland owner is entitled to accretions. Second, he should check to see if the partition lines have been determined by the Division of State Lands, courts, or the B.L.M. If, after extensive research, the cartographer is certain that the uplands owner is entitled to accreted or relicted lands, and no previous partition has been determined, he may proceed as instructed under the rules for apportioning lakes. However, it is important to always keep in mind that the cartographic solution is, at best, only one possible solution—not the legal solution. That is always left to legal and judicial expertise.

Reliction, in eastern Oregon lakes, is more common than accretion. Often, reliction is so great as to cause resurvey by the B.L.M. to protract section lines, establish lottings and determine apportionment. The following figures illustrate the progressive reliction that occurred in Warner Lake in Lake County, as reflected in the U.S. surveys. The surveys are in chronological order beginning with 1875 and ending in 1948.

Figure 10-15 is the 1875 survey that shows Warner Lake as one lake occupying a great part of the western and northern part of T.35S R.25E W.M.

By 1887, waters had receded to the point that Warner Lake became two major lakes, Warner and Anderson, in addition to several smaller lakes, Mugwamp being the larger of those lakes. A 1897 survey showed little change from the above survey.

By 1928, the waters of Anderson Lake had receded to the point that it became two lakes, Jones Lake and Anderson Lake. Warner Lake is shown smaller and was renamed Flagstaff Lake. Mugwamp Lake was lotted.

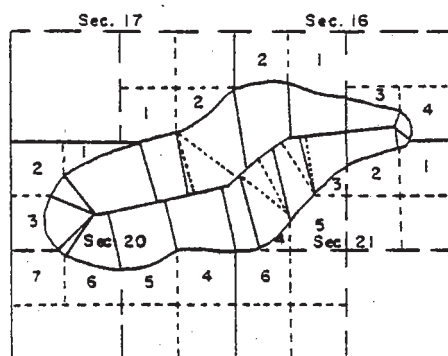


Figure 10-14

By 1948, Flagstaff Lake had receded from T.35S R.25E W.M., as reflected in the lottings designated by the U.S. survey.

Many of the relicted lands of Warner, and subsequently Anderson and Flagstaff Lakes, were retained by the State of Oregon.

Many of the eastern Oregon lakes have been known to begin to fill up after a long period of drying up. When this happens (on a permanent basis) the submerged lands become the property of the State of Oregon.

The Warner Lake case would be far too complex for cadastral determination by the cartographer. When future relictions occur, as in Warner Lake, the cartographer must seek a solution based upon the B.L.M. survey, Division of State Land records, court rulings, or Department of Justice opinions.



Figure 10-15

State and County Boundaries

The doctrines of avulsion, accretion, erosion, and reliction, discussed in this chapter, apply to state and county boundaries.

If a county boundary, for example, follows the meandering of a river, and the river makes an avulsive change, the boundary remains as it was prior to the

change. But if the change was due to accretion, erosion or reliction the boundary line would change with the river.

49 Am. Jur. "States, Territories, and Dependencies," Subsection 21, "Changes in Channel as Affecting Boundary," page 242, states in part as follows:

"The effect upon boundaries of a state, where such boundaries are fixed by the main channel of a river, by changes in that channel through processes of accretion and avulsion is dependent upon the gradualness or suddenness of the change. When the course of the river and its channel

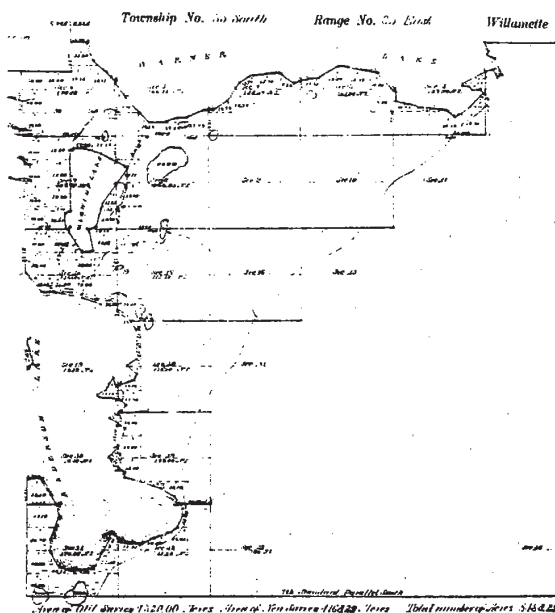


Figure 10-16 (1887)

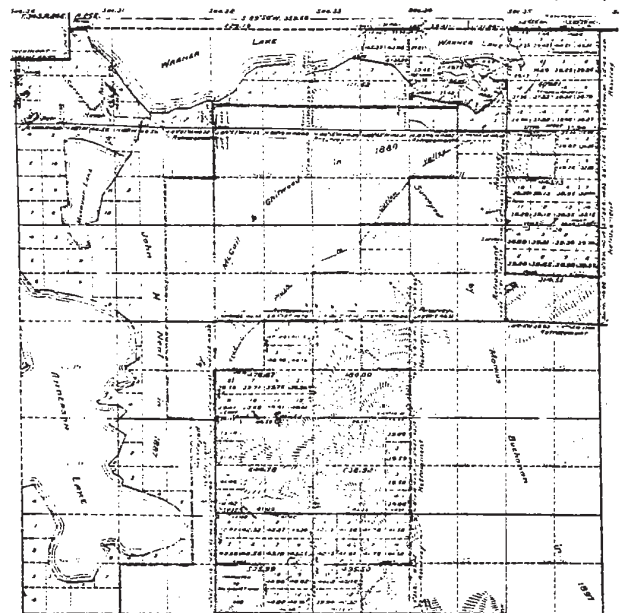


Figure 10-17 (1914)

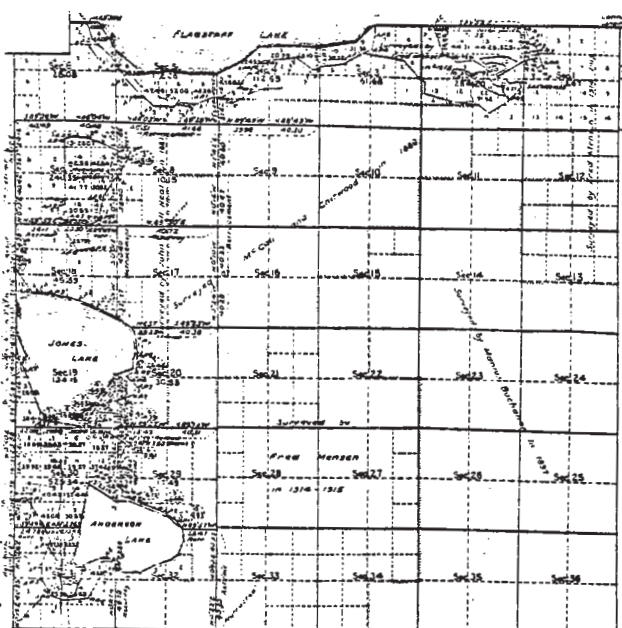


Figure 10-18 (1928)

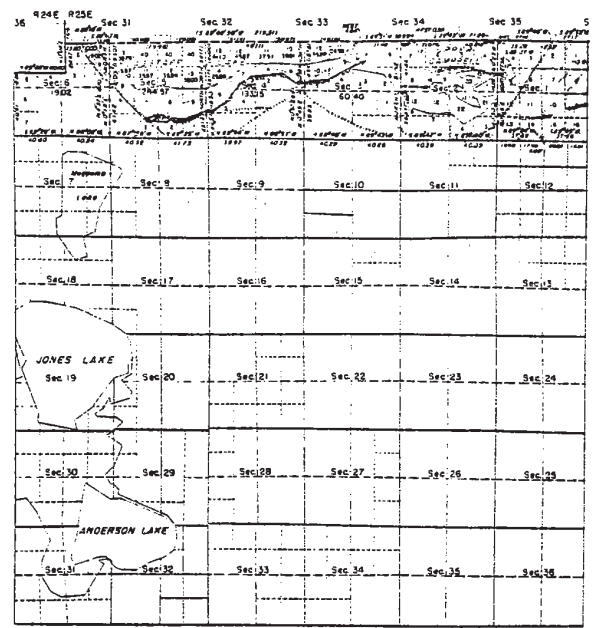


Figure 10-19 (1948)

changes gradually, the boundary follows the channel, but if the river suddenly changes its course or deserts its natural channel, the boundary remains where it was before, that is, the middle of the altered or deserted river bed . . ."

The following footnote to the foregoing appears on page 243, 49 Am. Jur. "States, Territories, and Dependencies," Subsection 21:

*"The middle of the north ship channel of the Columbia River, described as the boundary between Oregon and Washington in the Act of February 14, 1859 (11 Stat at L383, chap 33), admitting Oregon into the Union, remains the boundary, subject to the changes in it which come by accretion, and is not moved to the other channel because the latter, in the course of years, becomes the more important and is properly called the main channel of the river."*¹⁴⁴

If counties cannot agree on the matter of the common boundary, it can only be resolved in a court of law; the cartographer cannot or should not try to make the determination.

Miscellaneous Provisions

According to Section 7-65 of the U.S.B.L.M. "Manual, of Surveying Instructions":

*"The title and rights of riparian ownership in areas below the line of mean high water of navigable bodies of water are governed by State law rather than Federal law."*¹⁴⁵

The general question of whether federal or state law controls as to ownership of accretion was considered in *Hughes v. State of Washington*.¹⁴⁶ The Supreme Court ruled:

"The question for decision is whether federal or state law controls the ownership of land, called accretion, gradually deposited by the ocean on adjoining upland property conveyed by the United States prior to statehood . . .

We hold that this question is governed by Federal, not State, law and that under Federal law Mrs. Hughes, who traces her title to a federal grant prior to statehood, is the owner of these accretions . . .

This brings us to the question of what the Federal rule is. The State has not attempted to argue that Federal law gives it title to these accretions, and it seems clear to us that it could not. A long and unbroken line of decisions of this Court establishes that the grantee of land bounded by a body of navigable water acquires a right to any natural and gradual accretion formed along the shore . . .

We therefore hold that petitioner is entitled to the accretion that has been gradually formed along her property by the ocean."

It is therefore settled that wherever the U.S. retains title to the original subdivisions along a body of

water, either navigable or nonnavigable, the government may subdivide the lands formed by accretion or by reliction, since these, too, are public lands.

Accretion Prior to Entry

Occasionally, subsequent to U.S. survey, but before entry, a large body of land has formed by accretion between the meander line and the high water line. As outlined in B.L.M. instructions, if such land had formed after entry, it would merely attach to the riparian holdings. If the land had been *in place* before the survey and at all subsequent times, it would fall in the class of *omitted land*, to be treated as designated by B.L.M. instructions. But, in this, special case, the meander line is treated as the boundary line of the grants, and patent is construed to convey only the lands within the meander line.¹⁴⁷

The lands accreted after survey, but before entry, are not usually surveyed as would be ordinarily accreted lands. Instead, the regular rectangular survey is extended to the body of water (as in the Warner Lake example). The same procedure would be followed in surveying regular accreted lands only if none of the riparian lots had been patented and it was desired to extend the survey.

In determining what constitutes a *substantial* accretion, to which the rule in *Madison v. Basart* is applicable, the area of accretion should be compared quantitatively with the riparian lots to which it attached. Some consideration is also given to the total area accreted. Accretion to a small lot might be large in proportion but negligible in absolute size. From the standpoint of *size and relative size*, the area in question can be weighted as in the case of omitted lands.

Avulsion—B.L.M. Instructions

An avulsive change cannot be assumed to have occurred without *positive evidence*. When no such showing can be made, it must be presumed that the changes have been caused by gradual erosion and accretion.

A study of historic documents, especially maps and aerial photographs, will help in determining what process has taken place. As a general rule the abandoned channel is easily identifiable where an avulsive action has occurred.

Erroneously Omitted Areas

Lands exposed by changes in water level or accreted subsequent to survey are not *erroneously omitted lands*. This title is applied to lands, not shown on the plat of the original U.S. survey, which were excluded from the survey by some gross discrepancy in the location

of a meander line. The unsurveyed land typically lies between the actual bank of a lake, stream, or tidewater and the record meander line.

In some older surveys, temporarily flooded lands, or swamp and overflowed lands, were meandered as if they were permanent bodies of water. In a few cases, meander lines were recorded, in the U.S. surveys, where no body of water ever existed in fact. In still other instances, several lakes had been surveyed as one lake. All are treated the same way as where the discrepancy is a grossly erroneous position of the record meander line.

Marginal discrepancies between the meander lines and the water, at the time of the survey, fall into two classes, those that constitute erroneous omission, and those that are merely technical differences. The guidelines for determining the class of a particular case are laid down in court and B.L.M. decisions.

If land is to be regarded as erroneously omitted from survey, it must first be shown affirmatively that the area was *land in place* at the date of the original subdivision of the township. Then, if the land is similar to the surveyed lands, the usual inference that the official survey was correct may be set aside, and the conclusion may be substituted that the land should have been covered by that survey. However, a convincing showing is needed that representations of the original plat and field notes are grossly in error.

No proof is required to show why a meander line is in error, but only that the line as run and as represented on the plat and in the field notes is in effect grossly in error. This rule is concisely stated in “John McClenen”:¹⁴⁸

“It is not necessary to search for the source of the error. The result is the same whether such error arose from mistake, inadvertence, incompetency or fraud on the part of the men who made the former survey.”

If the cartographer encounters a situation involving erroneously omitted areas that have not been brought to the attention of the B.L.M., or that have not been settled by court action, the first step is to seek legal advice from the State Department of Justice. The Department can then provide a solution that should suffice until the B.L.M. or courts take action.

Submersible and Swamp Lands

By law, the Division of State Lands ascertains the amount of land to which it is entitled under the Acts of Congress relative to submersible and swamp lands, and they acquire title to those lands and enter into contracts for drainage and reclamation in order that the lands are available for drainage and settlement.¹⁴⁹ The object is to ascertain and determine the

title of the State of Oregon to the beds of shallow and dry lakes and the lands around lakes exposed to reliction or otherwise.¹⁵⁰

Rights of Way for Railroads

ORS 273.751 grants to all persons constructing railways built after February 21, 1891, within the boundaries of the state, and to their successors and assigns: (4) The right to construct and maintain railroad bridges over any navigable waters in this state; subject to regulations, restrictions and compensation as may be fixed by the Division of State Lands, and are to be constructed as not to interfere with navigation.

Confirmation of Title to Swamp and Overflow Lands

ORS 273.902. (1) All rights and title of the state to the swamp and overflowed lands claimed by persons who have settled on these lands, or who may hereafter *completed* settlement under provision of the pre-emption or homestead laws of the U.S., and have obtained a patent or certificate of final proof thereafter, hereby are granted and confirmed into such claimant, his heirs or assigns, respectively. (2) Upon application of any such claimant to the Division of State Lands, with proof of claim evidenced by the U.S. patent or final certificate of proof of settlement and payment, issued from the U.S. Land Office, the Division shall execute and deliver to such claimant a quitclaim deed of the State’s right and title to the lands so claimed. See also ORS 2.73.903 (Title of certain swamp lands not to be questioned by the Division of State Lands; and prohibiting the sale of certain swamp lands).

Release of Claims Under Pre-1947 Deeds Reserving Right-of-Way

ORS 273.915. The State of Oregon hereby remises, releases and forever quitclaims unto the grantees therein, the heirs and assigns, all rights, titles and interest that may have remained or vested in the State of Oregon under deeds executed prior to July 5, 1947, by the State Land Board wherein there was attempted to be reserved a “ . . . right-of-way for ditches, canals and reservoir sites for irrigation purposes, constructed, or which may be constructed, by authority of the U.S.”

Miscellaneous Validating Statutes

Refer to ORS 273.905 for information concerning the confirmation of State land deed prior to 1891.

Refer to ORS 273.910 for information concerning confirmation of title to State lands purchased before 1918.

Columbia River Gorge

ORS 390.415 was enacted to maintain the scenic splendor of the Columbia River Gorge. The description of the boundaries of the Gorge is defined in ORS 390.460.

Willamette Greenway

ORS 390.310 to 390.368 was enacted to preserve the natural, scenic and recreational qualities of lands along the Willamette River, and to preserve and restore historical sites, structures, facilities and objects on lands along the Willamette River. Land acquisition laws are contained in ORS 390.332 to 390.338.^{151A}

Ferries

ORS 384.105 through 384.145 deals with the operation of ferries by the Department of Transportation; and the construction and maintenance of approaches, ramps, docks, wharves and ferry slips.

ORS 384.205 and 384.210 speaks of the operation and maintenance of ferries by the counties.

ORS 384.305 to 384.365 deals with the interstate ferries operated by the Department of Transportation, counties, cities, towns and ports. ORS 384.340 deals specifically with eminent domain proceedings.

ORS 384.405 to 384.445 contains provisions for the Oregon-Washington interstate ferries. ORS 384.425 establishes these ferries as part of the state highway system.

Fort Stevens—Clatsop Spit

ORS 390.230. The right title and interest of all state agencies, other than the state Fish and Wildlife Commission and political subdivisions, in the lands described in this section of the laws, are transferred to the Department of Transportation. (See 390.230 for the property description.)

Scenic Waterways—Scenic Easements

ORS 390.803. *Scenic waterway* means a river or segment of river that has been designated as such in accordance with ORS 390.805 to 390.925 or any subsequent act, and includes related adjacent land.

Related adjacent land means all land within .25 mile of the bank on *each side* of a river or segment of river within a scenic waterway, except land that, in the Department's (of Transportation) judgment, does not affect the view from the waters within a scenic waterway.¹⁵¹

Scenic easement means the right to control the use of related adjacent land, including the air space above such land, for the purpose of protecting the scenic view from waters within a scenic waterway; but such control does not affect, without the owner's consent, any regular use exercised *prior* to the acquisition of the easement (1971), and the landowner retains the right to uses of the land not specifically restricted by the easement. ORS 271.750 does not apply to any acquisition of such a scenic easement under ORS 390.805 to 390.925.¹⁵²

The following rivers, or segments of rivers, and related adjacent land, are designated as scenic waterways:¹⁵³

1. The segment of the Rogue River extending from the confluence with the Applegate River downstream a distance of approximately 88 miles to Lobster Creek Bridge.
2. That segment of the Illinois River from the confluence with Deer Creek downstream approximately 46 miles to the Rogue River.
3. That segment of the Deschutes River from immediately below the existing Pelton Dam downstream approximately 100 miles to the Columbia R., excluding City of Maupin as its boundaries are constituted on October 4, 1977.
4. The entire Minam River from Minam Lake to the Wallowa River.
5. The South Fork Owyhee River in Malheur County from the Oregon-Idaho border, downstream approximately 25 miles to Three Forks; and the main stem of the Owyhee from Crooked Creek (six miles below Rome) downstream 45 miles to the mouth of Birch Creek.
6. That segment of the main stem of the John Day River from Service Creek Bridge (at river mile 157) downstream 147 miles to Turnwater Falls (at river mile 10).
7. That segment of the Clackamas River from the River Mill. Dam below Estacada downstream 12 miles to the bridge at Carver.

ORS 390.915. *For the purpose of assessing property for taxation, real property that is subject to a scenic easement shall be assessed on the basis of the true cash value of the property less any reduction in value caused by the scenic easement. The easement shall be exempt from assessment and taxation the same as any other property owned by the state.*

Assessors should review ORS 390.835 and 390.845 for regulations and restrictions on the real property contained in the scenic waterway.

Water Rights

The term *water rights* is not synonymous with *riparian rights*. Riparian rights usually (but not always) carry with them the water rights; however, water rights do not include riparian rights. The terms *water rights*, *existing water rights*, *vested water rights* or words of similar import include inchoate rights to the use of water. Although water rights are appurtenant to the land, they may be sold and transferred separately from the land.

Water rights are real property¹⁵⁴ and, as such, are *subject to assessment*.¹⁵⁵ However, the water rights *should not be assessed separately*, but should be assessed in connection with the land to which they are appurtenant.¹⁵⁶

Because water rights can be alienated separately from the land, it is possible that the number of acres of land and the number of acres of water rights will not be the same. For example, one may own five acres of land, but only have three acres of water rights. The three acres would have the water rights; and if the two acres of non-irrigated land (without the water rights) were sold separately, the new owner would acquire *no* water rights.¹⁵⁷

Water rights are appurtenant to the land, and in the view of the courts they pass under a deed (even though not expressly mentioned in the deed) unless expressly reserved. Thus, when the land is sold, the water rights appurtenant to the land also pass.

Ditches, Canals and Flumes

All ditches, canals and flumes permanently affixed to the soil, constructed under the provisions of the Act of 1891, pages 52 to 60, Oregon Laws 1891, *are declared to be real estate*, and the same or any interest therein shall be transferred *by deed only*. The vendee of the deed, or any interest therein, at any stage shall succeed to all the rights of his vendor, and shall be subject to the same liabilities during his ownership.¹⁵⁸

Summation

In addition to specific laws dealing with *riparian rights* we have attempted to state some broad principles that should govern the assessment and mapping of riparian lands (and should be helpful when appraising these lands). However, it sometimes happens that specific facts and conditions may call for the application of specific principles of law *that may be at variance with some of the general principles stated*. In the event that such a special situation arises, the District

Attorney or the Department of Justice should be consulted for specific determination.

We barely touched on the water laws of Oregon; they are too extensive to be covered in this chapter. However, most of the laws dealing with water resources, irrigation, drainage, flood control, the appropriation of water, special municipal and county water rights, distribution of water, transfer and abandonment of water rights, water districts, water companies, dams, hydroelectric power projects, irrigation districts, drainage districts, diking districts, water improvement districts, and so forth may be found in ORS chapters 537 through 538.

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Handbook of the Law of Real Property, by William E. Burby; West Publishing Co., St. Paul, Minn. (1965). See Chapter 6 on water rights.

An Inventory of Filled Lands in the Coos Bay Estuary, (1973) Advisory Committee to the State Land Board.

Meandered Lakes of Oregon, Advisory committee to the State Land Board. An extensive report that includes the location and size of each lake; when meandering was completed; name of the government or private surveyor; location of the surveyor's notes in the public survey volumes in the BLM office; pertinent comments by the surveyor. The lakes are geographically divided into basins (except for Warner and Sauvies Island lakes). The report includes the lake's location relative to nearby towns and highways. For example, Devils Lake in the mid-coast basins "located in T.7S.R.11W.W.M. This lake covers 629 acres. It is located just east of Lincoln City and Highway 101. The northern part of the lake was meandered by Meldrum in 1872 (contract 166, Vol. 112, page 557-561). The area covered by the remainder of the lake was first surveyed in 1901 by Derrick. The remainder of the lake was meandered at this time (contract 738, Vol. 456, page 453-8)." Copies of this report available from Robert Mead, Department of Revenue.

The Mystic of Water Boundaries, by A.R. Panissidi, 1970. Division of State Lands.

General Laws of Oregon, 1943-1872. Matthew P. Deady and Lafayette Lane.

Shore and Sea Boundaries, by Shalowitz, Aaron L. U.S. Dept. of Commerce, U.S.C. & G.S. (1960) Pub. 10-1, 1962, U.S. Government Printing Office, Wash. D.C.

1980 Annotations

The following are the rules governing the sale of all tidelands by the State as established in the April 4, 1881 minutes of the State Board of Land Commissioners:

- "1. No application will be entertained or considered for the purchase of tide lands fronting or abutting upon tidelands over which the U.S. survey have not been extended.
- "2. An application to purchase any of the tide land in front of any smallest legal subdivision must include all the tide land fronting or abutting said smallest legal subdivision which may be unsold at the date of application. No application for the purchase of a part only of the tide land in front of any smallest legal subdivision will be entertained or considered except it be for tidelands lying in front of any regularly an legally liaid (sic) out town or city in which case the land applied for shall conform to the survey of the lots and blocks of said town or city.

- "3. All lines of the survey bounding any tract of tide land applied for except the meander lines of high and low water mark shall be East and West and North and South."

The Division of State Lands is of the opinion the above rules are still in effect.

The rule for apportioning tidelands outlined by the court in *Oregon Coal and Nav. v. Anderson* (illustrated in figure 10-11. See footnote 138 on page 289) must give way to rule 3 (above) when establishing the boundaries of tideland tracts conveyed by the State. This is illustrated in figure 10-20. Here E. Cook purchased, from the State of Oregon, the tidelands abutting and fronting lots 2, 3 and 4 of section 12. The side boundary lines of the tidelands are established by using rule 3, i.e. by extending the North line of lot 2 "East" to the line of mean low water, and by extending the West line of lot 4 "South" to mean low water.

To apportion lands within the tidelands of figure 10-20, the method cited in *Oregon Coal & Nav. v. Anderson* must be used. That is, "tide line boundaries must be extended out from shore at right angles to the shoreline or the line of navigable angles to the shoreline or the line of navigable water, instead of extending the course of the upland division lines." If Cook sold the tidelands fronting and abutting lot 3 of section 12, the boundaries of the tidelands would extend from points A and B (figure 10-20) at right angles to the shoreline as indicated by the arrows. See figure 10-11, page 289.

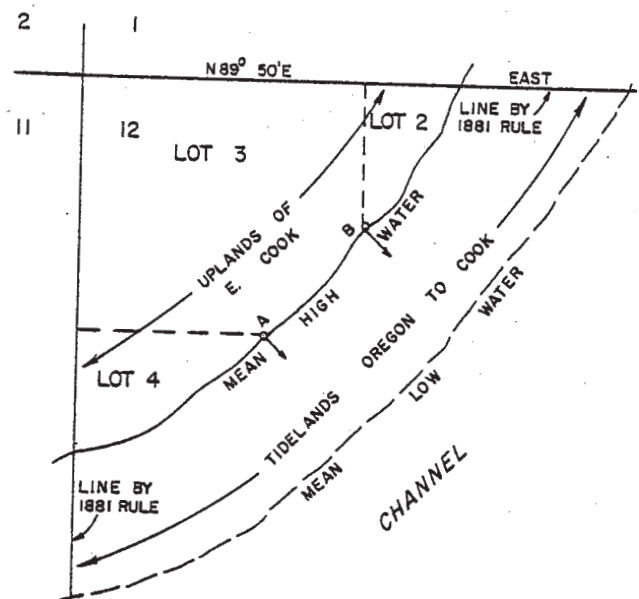


Figure 10-20

WHAT ARE TIDELANDS? The mapping of Coos Bay generated controversy over the use of mean high water (or mean high tide) and mean low water (or mean low tide) as the boundaries of the tidelands. One argument against the use of the mean water levels was that only the U.S. Government could designate the tidal levels to be used for tideland boundaries.

In *Mann v. Tacoma Land Co.*, 153 U.S. 273,284, the court said that tidal lands do not come under jurisdiction of the U.S. The fact is, Oregon was vested with full control over its tidal lands upon admission into the Union. In other words, all tidal lands not sold by the U.S. prior to statehood became the property of the State of Oregon. *Hinman v. Warren*, (1877) 6 Or 408, 411; *Hogg v. Davis*, (1892) 22 Or 428; *Astoria Exchange Co. v. Shively*, (1895) 27 Or 104, 39 P398, 40 p92; *Corvallis & Eastern R. Co. v. Benson*; (1912) 61 Or 359 121 p418; *Shively v. Welch*, (1884) 20 Fed 28.

Land between ordinary high and ordinary low water mark, along a tidal stream, belongs to the State of Oregon. *Muckle v. Good*, (1904) 45 Or 230, 77 p743; *Guilliams v. Baker Lake Club*, 90 Or 13, 175 Pac. 437, 28 Arizona L. Review 267.

Affirmation of the mean of the tides as correct boundary) *U.S v. State of Washington*, 9 Cir 1961, 294 F. 2d 830.

The Oregon Legislature choose the mean of the high and the mean of the low waters as the boundaries of tidelands; citing the case of *Borax Consolidated, Ltd. et al v. Los Angeles*, U.S. 10 80 L ed 9 56 Sup. Ct. 23. The word "ordinary" was used in the statutes instead of "mean" because this was the terminology of the court in the Borax case. The definition of "ordinary high water," supplied by the court, is the definition of mean high water. That is, "ordinary high water is the line marked by the average height of all high waters over a considerable period of time," i.e. the Metonic Cycle. *Knight v. U.S. Land Assn.*, 142 U.S. 161.

The Supreme Court, in the Borax case, affirmed the methodology of the U.S. Coast and Geodetic Survey (now the National Ocean Survey, NOA) for making mean high water determinations. The ruling is known as the "Law of Mean High Water Boundaries." This law confirms the ordinary high water mark as the proper boundary between uplands and tidelands. The court rejected the concept of establishing the boundary by neap tides or spring tides and vegetation analysis.

The court, in the Borax case, based its conclusions on the English case of *Attorney General v. Chambers*, 4 De G.M. & G. 206 (43 Eng. Rep. 486, Ch 1854). In that case the judges rejected spring tides and the nepe (sic) tides because they fluctuated over lands that were, for the most part, "dry and maniorable." It was

held that the average of the "medium tides" in each quarter of a lunar revolution during the year "fixed the limit of the shore." They found the same reason excluding the highest high tides of the month also excluded the lowest high tides (the neap tides).

The conclusions of the English case, and subsequently the Borax case, set a precedence for using mean low tide as the boundary between submerged lands and tidelands.

The use of the word "ordinary" to define the mean tides (or mean water levels) is an outgrowth of English Common Law and the employment of the word in court cases dealing with littoral lands of the Atlantic shore of the United States. The tides on the Atlantic shore are composed of two nearly equal high waters and two nearly equal low waters; so alike they were, at one time, considered one (ordinary) high tide and one (ordinary) low tide. The Pacific shore, on the other hand, has tides similar to the semidiurnal tides of the Atlantic, except there is a marked difference in the height of the two high tides and the two low tides. They are not "ordinary," and any reference to just high tide or low tide is meaningless. "Ordinary" in Oregon riparian law is specifically designated in reference to the lines where the water ordinarily rises or ordinarily recedes annually in season, i.e. the mean tide levels.

In *Andrus v. Knott*, 1855 12 Or 501, 8 p763, the court ruled the term "tidelands" applied to the lands covered and uncovered by the "ordinary" tides, which the state owned by virtue of its sovereignty, and corresponds with the shore or beach which, at common law, is the land lying between ordinary high and ordinary low water. Tideland must be such land as is alternately covered and left dry by the flux and reflux of the tides. Land adjacent to navigable waters, where the tide flows and reflows, come within that description; however, it does not apply to lands which are covered by water three-fourths of the year. See *McConnaughy v. Wiley*, (1888) 13 Sawy 148, 33 Fed 449 and *Strasbaugh v. Babler Bros. Inc.*, (1960) 220 Or 35, 348 P2d 448.

A sandbar not uncovered by the mean lower low water, but sometimes exposed when the tide falls below zero line, because of strong winds or abnormal barometric conditions, are not tidelands. *Van Dusen Inv. Co. v. Western Fishing Co.*, (1912) 63 Or 7, 124 p677, 126 p604. A sandbar several miles from the shore, exposed only at low tide and covered by the water at high tide, is not tideland. *Elliott v. Stewart*, (1887) 15 Or 259, 14 p416. In *Katz v. Patterson*, (1931) 135 Or 449, 296 p54, the court held that evidence showed that a sandbar (separated from the shore by water) was not an accretion to tideland, but constituted a separate

island formed on the bed of the Columbia River, and was property of the State of Oregon.

Accretions to a river island, which although covered by water to a depth of four to six feet for a large part of the day, lay between low and high tide in the river could reasonably be inferred to be tidelands within the meaning of ORS 274.010 (now ORS 274.885). *Taylor Sands Fishing Co. v. State Land Board*, (1910) 56 Or 157, 108 p126. The grantee of tide flats, constituting a tideland island, is entitled to the accretion lodging thereon, though the island as originally granted has moved, so none of it remains in its location at the time of the grant (Note: this is common to many Columbia River tideland islands). *Van Dusen Inv. Co. v. W Fishing Co.*, (1912) 63 Or 7, 124 p677, 126 p604.

ORS 93.310(5) provides "When tidewater is the boundary the rights of the grantor to low water mark are included in the conveyance, and also the right of this state between high and low watermark." The statute is the fifth rule, of ORS 03.310, for construing a description when the construction of that description is doubtful, "and there are no other sufficient circumstances to determine it." This subsection of the statute is ambiguous because high watermark and low watermark are meaningless terms. The statute must be interpreted together with the statutes that define the limits of tidelands. Moreover, 93.310(5) is not a grant on the part of the State of Oregon. That is, to be owned by private persons, the title to tidelands must descend from the state. See *Astoria Exch. Co. v. Shively*, (1895) 27 Or 104, 109, 39 p398, 40 p92; and *McAdam v. Smith*, (1960) 221 Or 48, 350 P2d 698; *Robinson v. Laurer*, (1895) 27 Or 315, 40 p1012; *Christenson v. Simmons*, (1905) 47 Or 184, 82 p805; *Cawfield v. Smyth*, (1914) 69 Or 41, 138 p227; *Oregon Home Builders v. Eisman*, (1918) 88 Or 611, 172 p114; *McBee v. Sch. Dist. 48*, (1939) 163 Or 121, 69 P2d 207; Attorney General opinion 1948-50, p193. Moreover, this statute grants no rights to a grantee that were not the rights of the grantor. For example, the tidelands abutting lot 1 of a certain section were never patented or granted by the state; however, at some time in the history of the title to lot 1, the tidelands were added to a deed description. This was probably done under an assumption that the tidelands ran with the uplands, or possibly under an assumption that they were acquired through adverse possession. The tidelands were included on all of the subsequent conveyances to present. The fact that the later deeds described the tidelands (or even imply ownership of the tidelands as in ORS 93.310) does not make it so. If the state did not grant the lands, they remain the property of the state.

RIGHTS OF THE STATE TO ITS TIDELANDS. The rights of the State of Oregon to its tidelands was affirmed in *Shively v. Bowlby*, (1893) 152 U.S. 1, 38 L Ed

331, affirming *Bowlby v. Shively*, (1892) 22 Or 410, 30 p154. The State of Oregon is the owner of its tidelands and has the right to dispose of them and convey private interests therein, except such as the state saw fit to give the adjacent owners and to acknowledge in them and their grantees when they had dealt with such tidelands as private property (by grant) subject to the paramount right of navigation secured by the public.

In the title of the state to tidelands there were two elements, the *jus privatum* (the private right) and the *jus publicum* (the public right). Like any other owners, the state had the right to transfer its tidelands as far as the *jus privatum* was concerned, but subject to the *jus publicum* which could never be granted and which the state prevented any use of them which would materially interfere with navigation or commerce on the bordering waters. *Corvallis & Eastern R. Co. v. Benson*, (1912) 61 Or 359, 121 p418.

Regarding ORS 273.265, the state had the right to sell and convey tidelands to anyone, free of any right in the proprietor of the upland, and subject to the paramount right of navigation inherent in the public. *Parker v. Taylor* (1879) 7 Or 436, 446; *Shively v. Bowlby*. Pursuant to its power to control and dispose of its tidelands, the state provided for their disposition by passage of 1872 p129 amended (1874) p76. *Shively v. Welch*, (1884) 20 Fed. 28.

When the shore to which one had title to the tidebed, by deed from the state, becomes submerged by the gradual shifting of the river, he loses title thereto and it becomes revested in the state. *Wilson v. Shively*, (1884) 11 Or 215, 4 p324; *Hume v. Rogue River Packing Co.*, (1908) 51 Or 237, 83 p391, 92 p1065, 96 p865, 131 Am St. Rep 732, 31 LRA (NS) 396.

In English Common Law the king (or sovereignty) held the tidelands. Upon conclusion of the Revolutionary War in the U.S., the 13 colonies, as sovereign states, acquired the tidelands. In 1789, when the new Federal Government was created, the states were careful to not grant the tidelands to the U.S. Government. New states admitted to the Union held title to the tidelands in the same manner as the 13 original states. See "equal footing doctrine" in these annotations.

See Attorney General opinions: 1924 p50 (state title to tidelands of the Columbia R.), 1924-26 p244 (authority of the State Land Board to sell tidelands in the Rogue River), 1930-32, p42 (ownership of lands between the ordinary high water mark and low water mark on the Oregon side of the Columbia River), 1946-48, p102 (the authority of the State Land Board to sell natural oyster bed land owned by the state), 1950-52, p274 (the power of the State Land Board to convey tide and overflow lands to other government agencies), 1950-52, p406 (regarding the ownership of tide and overflowed

lands of the Millicoma River as affected by 1876 p.70), 1960-62, p104 (State Land Board's authority to grant an easement or permit to tide and overflowed lands), 1962-64, p64 (an easement for an airport over tidelands or submerged lands).

OCEAN SHORE (ORS 390.640). The public, by custom, has a right superior to the right of the owner of record, to use the dry sand area of the beach, *State ex rel Thornton v. Hay*, (1969) 254 Or 584, 462 P2d 671.

LAKES. Regarding ORS 274.010. The title of meander land on the shore of a navigable lake purchased from the State of Oregon is subject to the right of the riparians to access. *Darling v. Christensen*, (1941) 166 Or 17, 109 P2d 585. Distinguished in *McCarthy v. Coos Head Timber Co.*, (1956) 208 Or 371, 302 P2d 238.

Regarding ORS 274.440. In case of the drainage of a navigable lake, the riparian owners have the right to fill out the least fractional subdivision or subdivisions of any section owned by such riparian owners and which is rendered fractional by the meander line of such lake or lakes. It follows that such an owner is not liable for breach of warranty when the strip of land uncovered as a result of the drainage would not fill out the subdivision rendered fractional by the meander of the lake; and where in consequence the title to such land was vested in him at the time of execution of his deed. *Luscher v. Reynolds*, (1936) 153 Or 625, 56 P2d 1158.

See Attorney General opinions: 1924-26, p213 (authority of the State Land Board to sell an unsurveyed lake bed); 1938-40, p.405 (control by Game Commission over Eel Lake); 1942-44, p.50 (leasing the bed of a lake, which has been drained for agricultural purposes, to a private party).

A certain inland lake, one mile long & one-eighth mile wide is not navigable. *Luscher v. Reynolds*, (1936) 153 Or 625, 56 P2d 1158.

RIVERS. Use for commerce or capability of use for commerce as the test for navigability. *U.S. v. Appalachian Electric Power Co.*, (1940) 311 U.S. 377, 61 S. Ct 291, 85 L ed. 243.

Lands below the high water mark of a navigable river belongs to the state. *Shively v. Bowlby*, affirming *Bowlby v. Shively*, (1892) 22 Or 410, 30 p154; *State v. McVey*, (1942) 168 Or 337, 121 P2d 461, 126 P2d 181. (Except the lands sold by the state as authorized by the 1874 and 1876 Legislature.)

The State of Oregon, upon its admission to the Union, became the owner of the bed and banks of the Willamette River up to the line of ordinary high water, subject only to the paramount right of navigation and the right of Congress to regulate commerce between

the states. *Pacific Elevator Co. v. Portland*, (1913) 65 Or 349, 133 P72, 46 LRA (NS) 363.

Regarding ORS 93.310. A grant describing the land as extending to the banks of a non-navigable stream or lake, thence with its meanders, conveys title to the center of the stream or lake. *Michelli v. Andrus*, (1912) 61 Or 78, 120 p737; *Luscher v. Reynolds*, (1936) 153 Or 625, 56 P2d 1158; *Kingsley v. Jacobs*, (1944) 174 Or 514, 149 P2d 950. Where a party conveys a parcel of land bounded by water, although it lies in shallow water and is intended to be reclaimed by filling, it will never be presumed that he reserves to himself proprietary rights in front of the land conveyed. *Rasmussen v. Walker Whse. Co.*, (1913) 68 Or 316, 136 p661. Since the bed of a navigable stream constitutes a separate tract of land, the conveyance "to the bank" of the river by a party owning to the low watermark is resumed to convey only to the (mean) high water mark. *Richards v. Page Inv. Co.*, (1924) 112 Or 507, 228 P937.

The fact that a man-made condition has caused a non-navigable stream to be navigable does not mean that public rights attach to the bed. *Haase v. Kingston Co-op. Creamery Association*, (1932) 212 Wis 585, 250 N.W. 444.

See *Minnesota Law Review*, (24) 305, 306 (1940) on title, points and lines in lakes and streams.

The term "navigable waters" connotes a use of a commercial nature. *Home Real Estate Loan & Ins. Co. v. Parmele*, (1938) 214 N.C. 63, 197 S.E. 714, 717.

Willamette Greenway and State's rights, and navigation of the Coast Fork of the Willamette River. *Dept. of Justice opinion* 7729, 3-9-1979.

The shore is not subject to adverse possession. *People v. Kerber* (1908) 152 Cal. 731, 93

Patented lands along a non-navigable stream are not marked or confined by a meander line. *Nordale v. Waxberg*, 84 Fed. Supp. 1004; *State v. Brace*, 76 N. Dak. 314, 36 N.W. (2d) 330.

See Attorney General opinions: 1934-36, p.200 (ownership of an island in the Willamette River, and the right of the State Land Board to lease the island); 1946-48, p.256 (the ownership of the river bed lands in the Willamette River in Lane County); 1952-54 p.167 (the effect of dredging on the title of riparian owners); 1960-62, p.452 (the ownership and regulation of water and land in a port district).

EQUAL FOOTING DOCTRINE. The equal footing doctrine is a constitutional doctrine which holds that a new state, upon admission to the Union, has exactly the same sovereignty as the original thirteen states. In *U.S. v. Texas*, 339 U.S. 707, 716 70 S Ct 918, 94 L Ed 1221 (1949), Mr. Justice Douglas explained the equal

footing concept in the context of state ownership of the beds of navigable waters.

“The question early arose in controversies between the Federal Government and the states as to the ownership of the shores of navigable waters and the soils under them. It was consistently held that to deny to the states, admitted subsequent to the formation of the Union, ownership of this property would deny then admission on an equal footing with the original states, since the original states did not grant these properties to the United States but reserved them to themselves. See *Pollards Lessee v. Hagan*, (U.S.) 3 How 212, 228, 229, 11 L ed 565, 573, 574; *Mumford v. Wardell*, (U.S.) 6 Wall 423, 436, 18 L ed 756, 761; *Weber v. State Harbor Comrs.*, (U.S.) 18 Wall 57, 65, 66, 21 L ed 798, 801, 802; *Knight v. United Land Assoc.*, 142 U.S. 161, 183, 35 L ed 974, 981, 12 S Ct 258; *Shively v. Bowlby*, 152 U.S. 1, 26, 38 L ed 331, 341, 14 S Ct 548; *United States v. Mission Rock Co.*, 189 U.S. 391, 404, 47 L ed 865, 869 23 S Ct 606.”

Justice Douglas, continuing, noted that the theory of these decisions was aptly summarized by Mr. Justice Stone in *United States v. Oregon*, 295 US 1, 14, 54 S Ct 610, 79 L Ed 1267 (1934), as follows:

“Dominion over navigable waters and property in the soil under them are so identified with the sovereign power of government that a presumption against their separation from sovereignty must be indulged in construing either grants by the sovereign of the lands to be held in private ownership or transfer of sovereignty itself. See *Massachusetts v. New York*, 271 U.S. 65, 89. For that reason, upon admission of a state to the Union, the title of the united States to lands underlying navigable waters within the states passes to it, as incident to the transfer to the state of local sovereignty, and is subject only to the paramount power of the United States to control such waters for purposes of navigation in interstate and foreign commerce,” *Arthur Johnson v. Dept. of Revenue*, (1981) Oregon Tax Court opinion no. 1334, p5, 6, 7. See also *Shively v. Bowlby*, 152 US 1, 14 S Ct 548, 38 L Ed 331 (1894). The most recent statement in Oregon respecting this doctrine is found in *State Land Board v. Corvallis Sand & Gravel Co.*, supra, overruling *Bonelli Cattle Co. v. Arizona*, 414 U.S. 313, 94 S Ct 517, 38 L Ed 2d 526(1973)

Endnotes

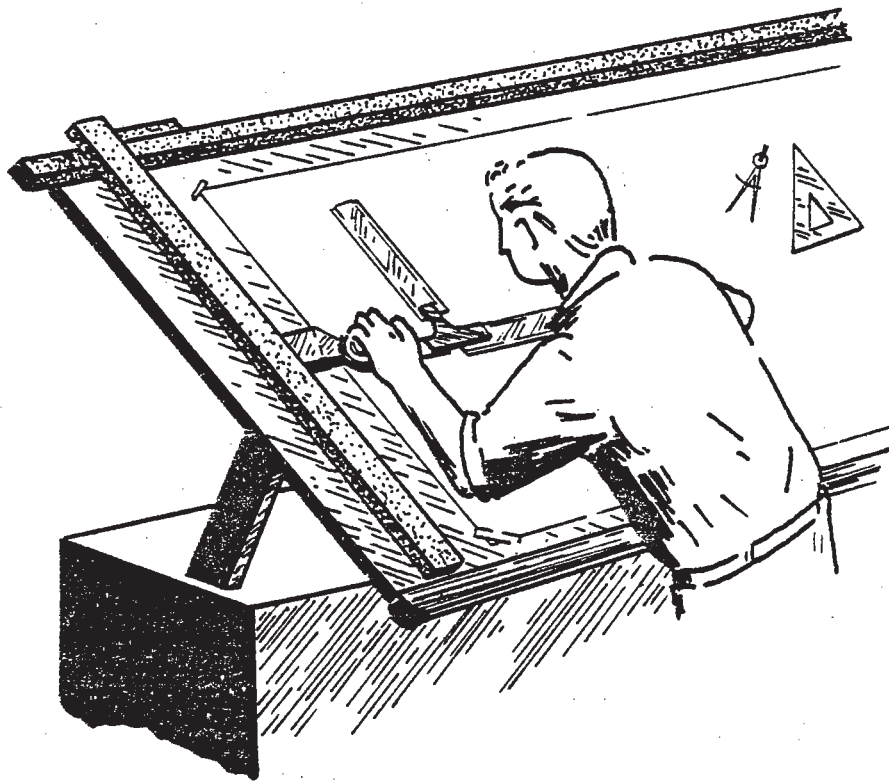
1. Oregon's Submerged and Submersible Lands. (Aided through a Federal grant from the Water Research Act of 1964.)
2. *Winston Bros. v. State Tax Commission* (1957) 156 Or. 505, 62 P.2d 7.

3. *U. S. v. Oregon*, 295 U. S. 1 (1954).
4. *Martin v. Waddell*, 41 U. S. (16 Pct.) 367, 410-411 (1842).
5. *Bowlby v. Shively*, 22 Or. 410, 30 P. 154 (1892); *Port of Portland v. Reeder*, 203 Or. 369, 280 P.2d 324 (1955). *Corvallis Sand & Gravel Co. v. State Land Board* 244 Or. 184, 439 P.2d 515 (1967).
6. See footnote 5; also *Columbia River Fisherman's Protective Union v. City of St. Helens*, 160 Ore. 654, 87 P.2d 195 (1939).
7. *The Public Trust Doctrine in Oregon* by Paul J. Speck, special research, assist. to the '69-'70 Legislative Assembly Committee to the Oregon State Land Board. Contained in Committee report to 56th Legislative Assembly.
8. In re. *West 205th Street*, 240 N.Y. 68, 147 N.E. 361; "Thompson's on Real Property" section 3078.
9. *Hanson v. Thornton*, 91 Ore. 585, 591, 179 P 494 (1919).
10. ORS 307.010(1).
11. Dept. of Justice LSV-1150.
12. *Fitzstephens v. Watson*, 218 Ore., 185, 202, 344 p2d 221 (1959).
13. Dept. of Justice LSV-1150.
14. *Uplands* are all lands not classified as submersible, submerged, marshland or swamp; the lands considered as not part of any body of water.
15. *State Land Board v. Sause et al*, 217 Or. 52, 342 P2d 803 (1959).
16. *Smith Tug and Barge Co. v. Columbia Pacific Towing Corp.*, supra, 443 P2d 205, 86 Adv.Sh 913 (1968).
17. Subject to Federal, State and local laws.
18. *Smith Tug and Barge Co. v. Columbia Pacific Towing Corp.* See footnote 16.
19. U.S.R.S. section 2476.
20. U.S. Code, Sections 530, 531, 532.
21. Section 512, U.S.B.L.M. regulations.
22. *U.S. v. Oregon*, 295 U.S. 1 (1935); and Section 512, Chapter 7 of the U.S.B.L.M. regulations. (Unless the beds of the bodies of water were expressly reserved in the U.S. patent.)
23. ORS 274.025(1). (Except for the submerged and submersible sections of navigable streams created by avulsion prior to 1967 (*State ex rel State Land Board v. Corvallis Sand & Gravel Co.*, 283 Or 147, 1978).)
24. *The Daniel Ball*, 77 U.S. 557, 19 L. ed.
25. *U.S. v. Holt State Bank*, 270 U.S. 49 (1926).
26. Department of Justice, No. 7311, 1976.

27. Article VIII, subsection 5(2), Oregon Constitution; ORS 273.031, 273.041 and ORS Chapter 274.
28. Department of Justice, No. 7311, 1976.
29. Admin. Order LB 41, 12-14-76.
30. See footnote 24.
31. U.S.B.L.M. *Manual of Surveying Instructions*, 1973 Edition, Sec 3-115.
32. *Ibid*.
33. *Oregon's Submerged and Submersible Lands*. 1969–70 Advisory Committee to the State Land Board. *Out of print*.
34. *Thompson on Real Property*, Section 3074, page 702, volume 6 of the 1962 replacement to the Permanent Edition.
35. ORS 272.020.
36. ORS 274.005(7) (amended in 1961).
37. ORS 274.005(8) (amended in 1961).
38. ORS 274.060(2) (amended in 1967).
39. ORS 274.060(1) (amended in 1967).
40. *Montgomery v. City of Portland*, 23 S. Ct. 735, 190 U.S. 89, 47, L. ed. 965.
41. *Oregon Estuaries*. Division of State Lands. June 1973.
42. *Ibid*.
43. P.L. 90-454 [See ORS 273.553 which creates the South Slough Estuarine Sanctuary as part of P.L. 92-583, the Coastal Zone Management Act].
44. U.S.R.S. Section 2476.
45. U.S.R.S. Sections 530, 531, 532.
46. *Polar v. Hagen* (1845) 3 How. (44 U.S.)(212, 228).
47. *Oregon's Submerged & Submersible Lands* by the Advisory Committee to the State Land Board (1969-1970).
48. ORS 274.905.
49. ORS 274.935.
50. *State of Oregon via McKay v. Sause*. 342 P.2d 803, 217 Or. 50
51. ORS 274.937.
52. ORS 274.940.
53. ORS 509.441 (1969 c.675).
54. ORS 509.455.
55. ORS 569.470 (amended 1965).
56. ORS 509.500.
57. ORS 511.625 (amended 1969).
58. ORS 511.640 (amended 1969).
59. ORS 777.105 (amended 1971).
60. *Smith Tug & Barge Co. v. Columbia Pacific Towing Corp.*, 443 P.2d. 86 Or.
61. *Bowlby v. Shively*, 22 Or. 410, 30 P 154 (18922). See also *Shively v. Bowlby*, 152 U.S. 1 (1893).
62. *Shively v. Bowlby*, 152 U.S. 1 (1893). (See footnote 61.)
63. *Ibid*.
64. HB 67, Feb. 18, 1891. 1891 Special laws p. 594.
65. Later to become the S.P. and S railroad line.
66. A. P. Panissidi, Division of State Lands. Much of the data of this subsection was based on information supplied by Mr. Panissidi.
67. B.L.M. plat of the original U.S. survey of the public lands.
68. *Finn Town, Astoria, Oregon*. Painting by Cleveland Rockwell (1889), Assistant Chief Surveyor U.S.G.S.; Surveyed Columbia River at Astoria in 1889.
69. ORS 273.850(3).
70. Found “under subsection 3, 4 and 5 of ORS 273.855, and ORS 273.860 to 273.880.”
71. ORS 273.885(1).
72. State Tax Commission cartographers assigned to the Clatsop County map contract.
73. *Oregon Estuaries*. Division of State Lands, 1973. *Out-of-print*.
74. 1872 p. 129, as amended by 1874 p. 76 and 1876 p. 69, (subsequently repealed by 1878 p. 41 subsection 34) *provided: the title of this State to tide or overflowed lands upon said Willamette, Coquille, Coos and Umpqua rivers is hereby granted and confirmed to the owners of the adjacent lands, or when any such tide or overflowed lands have been sold, then in that case, to the purchaser or purchasers of such tide or overflowed lands from such owner of such adjacent lands, or some previous owner thereof, as the case may be.*
75. ORS 390.605(3).
76. See ORS 390.615 and 390.620.
77. ORS 307.450 (effective after 12-31-69).
- 77a. Provided for in ORS 93.310.

78. ORS 511.011.
79. See *McAdam v. Smith*, 221 Or. 48, 350 Pac. (2d) 689. *Shively v. Bowlby*, 15.2 U.S. 1, 38 L. ed. 331. 14 Sup. ct. 548, per Gray, J. (the land covered by fresh water streams non-navigable is prima facie the property of the riparian proprietors, usque ad filum aque). "Thompson's on Real Property" Chapter 3075, vol. 6 of 1962 replacement.
80. *U.S. v. Oregon*, 295 U.S. 1 (1935).
81. *Oklahoma v. Texas*, 261 U.S. 345.
82. Citing *State v. Muncie Pulp Co.*, 119 Tenn. 47 104 S.W. 437.
83. *Curtis v. Upton*, 175 Cal. 322; *Barnhart v. Erhart*, 33. Oreg. 274, 54 Pac. 195.
84. *B.L.M. Manual of Survey Instructions*; 1973 edition, section 3-115.
85. *Minto v. Delaney*, 7 Ore. 337; *Weiss v. Oregon Iron & Steel Co.*, 13 Ore. 496, 11 Pac. 255.
86. *B.L.M. Manual of Survey Instructions*; 1973 edition, section 3-115. This statement supports the principle that the running of meander lines does not always denote navigability of a river.
87. The word *meander* is derived from a winding river in Phrygia called the Mederiz River, known in classic history as the *Meander River*.
88. *U.S. General Land Office instructions for the Survey of the Public Lands*, September 1869, pages 523 and 524. Note: the use of the word "bayous" suffices to include the Western "estuary."
89. *Alabama v. Georgia*, 64 U.S. 505 (1859).
90. *Railroad Co. v. Schurmeir*, 74 U.S. 272 (1868).
91. Which means that some are meandered above that point.
92. *U.S.B.L.M. System of Rectangular Surveys*, 1973 edition, chapter 3, subsections 3-115, 3-116, 3-118, 3-120, 3-121, and 3-122. P. 94 to 98.
93. That is, other than a cadastral survey.
94. *Freytag v. Vitas*, (1958) 213 Or. 462, 336 P. (2d) 110. Also, *State v. Imlah et al.*, (1931) 135 Or. 66, 294 P 1046.
95. *Gubser v. Vitas*, (1954) supra; *Payne v. Hall*, (1921) 185 N.W. 912, 192 Ia. 780.
96. Citing *Bigelow v. Hoover*, 85 IOWA 161, 52 N.W. 124, 39 Am. St. 296.
97. *Clark on Surveying & Boundaries*. Second Ed. by Frank Emerson Clark; published by the Bobbs-Merrill, Co.
98. *Dept. of Justice* op No. 6665, 11-4-69.
99. *State v. McVey*, 168 Or. 337 (1942). See Atty Gen Op 324 (1949).
100. ORS 274.935.
101. *U.S. v. Rands*, 389 U.S. 121 (1967).
102. *Atkinson v. State Tax Commission*, 303 U.S. 20 (1938), affirming 156 Or. 461 (1937).
103. *Pewaukee v. Savoy*, 103 Wis. 271, 79 N.W. 436 (1899).
104. 79 N.W. at 437.
105. *Attorney General v. Bay Boom Wild Rice & Fur Farm*, 172 Wis. 178 N.W. 569 (1920).
106. 178 N.W. at 513.
107. *Dept. of Justice*, op No. 6665 (1969).
108. ORS 274.425.
109. ORS 274.430(2).
110. *Oklahoma v. Texas*, 258 U.S. 574, 42 S Ct. 406, 66 L Ed 771, 776 (1921); *Micelli v. Andrus*, 61 Or 78, 120 P. 737 (1919); *State v. Adams*, 251 Minn 521, 560, 89 NW 2d 661, 687 (1957).
111. *Micelli v. Andrus*, supra at 88.
112. *Utah v. U.S.*, 403 U.S. 9, 91 S Ct. 1775, 29 L Ed 2d, 281 (1971); *The Daniel Ball*, 77 U.S. 557, 563 (1871).
113. *Dept. of Justice*, op. 150-25-303-00187; 77-7
114. *Ibid.*
115. ORS 274.210 grants the Division of State Lands the authority to contract for the drainage and reclamation of certain submerged lands of lakes, marshes or swamps in this State. See also ORS 274.260 on the title of riparian owners of lakes and ponds drained under 274.210 which generally is the same as ORS 274.440(2).
116. *U.S. v. Oregon*, (1935) 295 U.S. 1, 26 55 S Ct 610, 79 L ed 1267.
117. *Websters New 20th Century* (1956).
118. 56 Am. Jur. p. 893. See *State ex rel State Land Board v. Corvallis Sand & Gravel Co.*, 283 Or 147, specifically at 167 (1978).
119. A & T Legal Section opinion dated April 11, 1950, A & A no. 0202.
120. "Thompson" vol. 5, permanent ed (citing *Pes-semeir v. Hupe*, 121 Kans. 511, 247 Pac. 435).
121. 272 Fed 81.

122. *Hanson v. Thornton*, 179 P.494, 91 Ore. 585. *Gubser v. Towne*, 273 P.2d 430, 202 Or. 55.
123. *Kingsley v. Jacobs*, 174 Or. 514 at page 528.
124. *Kingsley v. Jacobs*, 174 Or. 514 at page 523.
125. *Smith Tug & Barge Co. v. Columbia Pacific Towing Corp.* *supra* (1968), 443 P.2d 205 to 207, 86 Adv. Sh 913.
126. *Freytag v. Vitas*, (1958) 213 Or. 462, D6, P(2d) 10. *State v. Imlah et al.*, (1931) 135 Or. 66, 294 P1046.
127. *Salem Improvement Company v. McCourt*; cited *supra*.
128. *Jeffries v. East Omaha Land Company*, 134 U.S. 178, 3 L. ed 872, 10 Supreme Court 518.
129. *Irvin v. Crammond*, 58 Ind. App. 540, 108 NE (2d) 539.
130. *Shively v. Bowlby*, 152 U.S. 1, 38 L. ed. 331, 145 Ct. 548.
131. *Gilliam v. Cielona*, 145 P. 1061, 74 Or. 462.
132. 28 Op. Atty. Gen. (1956-1958) 55.
133. *Wilson v. Shively*, 4 P.324, 11 Or. 215.
134. *Hume v. Rogue River Packing Co.*, 92 P. 1065, 51 Or. 237, 31 LRA, NS, 396, 131 Am St Rep 732, rehearing denied. *Hulme v. Burns*, 96 P. 865, 51 Or. 237, 31 LRA, NS, 396, 131 Am St Rep 732.
135. 23 Op. Atty Gen. (1946-1948) 242.
136. *Hanson v. Thornton*, 179 P. 494, 91 Or. 585.
137. B.L.M. Surveying Instructions.
138. *Oregon Coal and Nav. v. Anderson*, 206 Fed. 404. Also see, *Shawmut Mfg Co. v. Benton*, 123 Maine 121, 122 Atl. 49; *Merril Stevens Co. v. Durkee*, 62 Fla. 549, 57 So. 428; *Ullbright v. Baslington*, 20 Idaho 539, 119 Pac. 292.
139. *Columbia Land Co. v. Van Dusen Inv. Co.*, 50 Ore. 59, 91 Pac. 469.
140. *Montgomery v. Shaver*, 40 Ore. 244, 66 Pac. 923. Also, *Johnston v. Jones* 66 U.S. 117 (1861); and 50 L.D. 216 (1923) in the syllabus.
141. *Johnston v. Jones* 66 U.S. 117 (1861).
142. Atty Gen. Op OF 149-V, 12-29-1955. See "Clark on Surveying & Boundaries" 2nd ed., section 271.
143. *Ibid* (section 257).
144. *Washington v. Oregon*, 214 U.S. 205, 53 L. ed. 969, 29 S Ct. 631; *Washington v. Oregon*, 211 U.S. 127, 33 L. ed. 118, 29 S. Ct. 47.
145. *Borax Consolidated Ltd. v. Los Angeles*, 296 U.S. 10 (1935); *U.S. v. Washington*, 294 F 2d 830 (1961), cert. den., 367 U.S. 817 (1962 on land covered by an Indian Trust Patent).
146. *Hughes v. State of Washington*, 389 U.S. 290 (1967).
147. *Madison v. Basart*, 59 I.D. 415 (1947).
148. *John McCleenan*, 29 L.D. 514 (1900).
149. ORS 273.511.
150. ORS 273.505.
- 151A. Dept. of Justice No. 7729, 3-9-79 Coast Fork of Willamette River.
151. ORS 390.805(3).
152. ORS 390.805(4).
153. ORS 390.825(1) through (7).
154. ORS 307.010.
155. ORS 307.030.
156. P.T.L.A. Vol. XVII No. 24 (1-23-76). ORS 307.030.
157. *Ibid*. [OF 1932; 11-17-75.]
158. ORS 541.070.



CHAPTER 11

CARTOGRAPHIC
DRAFTING

Introduction

The function by which cartographers apply the lines and nongraphic data to maps is called *cartographic drafting*. It is the cartographer's primary means of communicating cadastral data to the map user.

This chapter will, for the most part, only define those drafting fundamentals essential to cadastral cartography.

Equipment and Supplies

The equipment and supplies defined in this section are basic to an efficient mapping office. They are:

1. Drafting medium. The papers, films and vellums.
2. Tapes.
3. Drafting machine.
4. Drafting machine straightedges.
5. Metal straightedge.
6. Drawing ink.
7. Drafting pens.
8. Drafting pencils and leads.
9. Erasing equipment.
10. Scales (Architect, Engineer, chain).
11. Drafting instruments.
12. Hand protractor.
13. Irregular curves.
14. Railroad or highway curves.
15. Ship and Engineer curves.
16. Circle templates.
17. Triangles.
18. Stereoscopes.
19. Planimeter.
20. Engineer's lettering set.

Note: Mention of any commercial product or company does not constitute an endorsement by the Oregon Department of Revenue.

Drafting Medium

The drafting papers, films and vellums should be stable, durable and capable of taking *both* pencil and drawing ink. The following are recommended specifications.

For control (large control sheets) and tracing we recommend a *polyester drafting film* (not linen or acetate).

- a. Thickness: .003 mil.
- b. Transparent.
- c. Stainproof.
- d. Waterproof.
- e. Guaranteed not to discolor.
- f. Anti-static.
- g. Matte on one side only.
- h. Guaranteed not to become brittle with age.
- i. Surface should be smooth enough to keep instrument wear to a minimum.
- j. Tearproof and punctureproof.
- k. Easy to erase.
- l. Very high degree of dimensional stability.

Notes: There are some advantages of polyester film with matte on both sides; i.e., being able to do pencil work on one side and ink on the other; being able to show permanent lines on one side and temporary lines on the reverse side. However, we feel that the disadvantages outweigh the advantages. The matte surface is susceptible to the dirt, grease and grime on furniture surfaces (file cabinets, tables, counters) and printing machine belts. Moreover, once imbedded in the matte the dirt and grime is difficult to remove. The face of the drawing, of course, must be a matte side; however, for the most part this surface comes in less contact with surfaces of drafting room furniture.

The film should be *anti-static* because this increases the erasability of the film by not picking up dust, carbon and dirt (whereas static would tend to retain this matter). Moreover, the reduction of static improves *print separation* in the diazo print process.

Before using the film, we recommend cleaning the surface with a pure, white rubber cement *thinner*. This will eliminate surface oils and greases that accumulate in processing, handling and packaging of most polyester films. This will *increase* ink retention and extend the life of the tracing.

For small control sheets and layout work (the pencil map) we recommend a high quality *drafting vellum*¹ instead of a regular drafting paper. The vellum specifications are as follows.²

- a. Thickness: .0025" to .003"
- b. 100 percent rag content; translucent.
- c. 16 lb. (approx.).

- d. Will not discolor with age.
- e. Should be capable of standing eight erasures of eight heavy pencil lines (2H pencil) using a 100 “Pink Pearl” or 112 “Ruby” eraser. The eight pencil lines should be lines that are redrawn in the exact location of the previously erased line. An acceptable vellum would show no *ghost* or *trace* after the final erasure.
- f. Pencil and drawing inks should take well to the surface yielding a good, continuous line without skipping, feathering or bleeding (i.e., a *fine-toothed vellum*).
- g. Pencil smudging should be minimal.
- h. Vellum must be tough and durable.
- i. Must be capable of making good reproductions on *light-through* printing processes (such as diazo).

Notes: We recommend a *solid-resin* type. This provides for good erasability and good, rapid light-through printing. On most solid-resin vellums the surface can be erased many times without leaving a ghost or trace of a mark.

Tapes for Drafting

The tapes used in cartographic drafting fall into three categories.

1. Drafting tape.
2. Mending tape.
3. Graphic tapes (or, pattern tapes).

Drafting Tape. The tapes marketed as drafting tape are medium-adhesive tapes designed for holding drawings and tracings to drafting tables. A good drafting tape will hold firmly, yet peel off easily without leaving gum residue on the vellum, film and table. We recommend a $\frac{3}{4}$ inch tape.

Do not use tacks, staples, masking tape or transparent tapes for holding drawings to the table. The tacks, staples (or pins) damage the drawing surface of the table. The masking tapes have too much adhesive and will not peel off easily; moreover, they will leave a gum residue on the paper and table surface.

Transparent tapes usually have too much adhesive that tends to remain on any surface—especially paper.

Mending tape. Prints, tracings, and vellum drawings can be mended with most high quality transparent mending tapes (e.g., Scotch Magic Transparent Tape).

Graphic Tapes. Graphic tapes (also called pattern tapes or pressure sensitive tapes) are special tapes used in cartography, graphic arts, general drafting, etc., that are available in special patterns and symbols.

Although the tapes are both transparent and opaque, and in black and white (or clear) or color, the tapes used in cadastral cartography must be transparent with black patterns.³

The graphic tapes are used on the tracing to eliminate repetitive tracing of standard line symbols; i.e., the subdivision boundary line, tax code area boundary line, railroad centerline symbol (if desired) and zoning district boundary lines. See Chapter 2 for standard patterns.

Be sure to use a graphic tape that assures you of high quality, good reproduction work.

Engineering Drafting Machine

Cadastral cartography demands the utmost care in measuring angles and laying out bearing lines. It requires the precision of the engineering drafting machine. The drafting machine combines the functions of a T-square and triangle with that of a protractor.

Chapter 4 (Direction) contains instructions on the use of the engineering drafting machine. The following are some additional suggestions and rules.

When mounting a drafting machine on the drafting table make certain that the drafting machine clamp casting (Figure 11-1) is snug against the table, and that the mounting clamp screws are tight.

The leveling knob should be adjusted so that the straightedges lie flat against the table surface. The tension should be so that the straightedges move easily across the drawing surface.

It is often difficult to maintain an exact 90° angle between the vertical and horizontal straightedges; therefore, some cartographers use a triangle for lines perpendicular to the bearing of the horizontal straightedge (e.g., using the triangle for a *north* line while the horizontal straightedge is set on *east* and *west*). Others, however, use the horizontal straightedge for all lines.

The flat head screws on straightedge male chucks (Figure 11-2) are used to adjust the vertical and horizontal straightedges (perpendicular to each other). These screws must always be kept tight.

When mounting a straightedge on the drafting machine be certain that the mounting chucks are firmly secured to the drafting machine female chucks. High quality drafting machines have a locking device (Figure 11-2) for securing the straightedge in the female chuck, and for ease in removing the straightedge (e.g., Bruning's *scallock*).

Plastic and wooden straightedges are subject to concave and convex warping. It is advisable to pe-

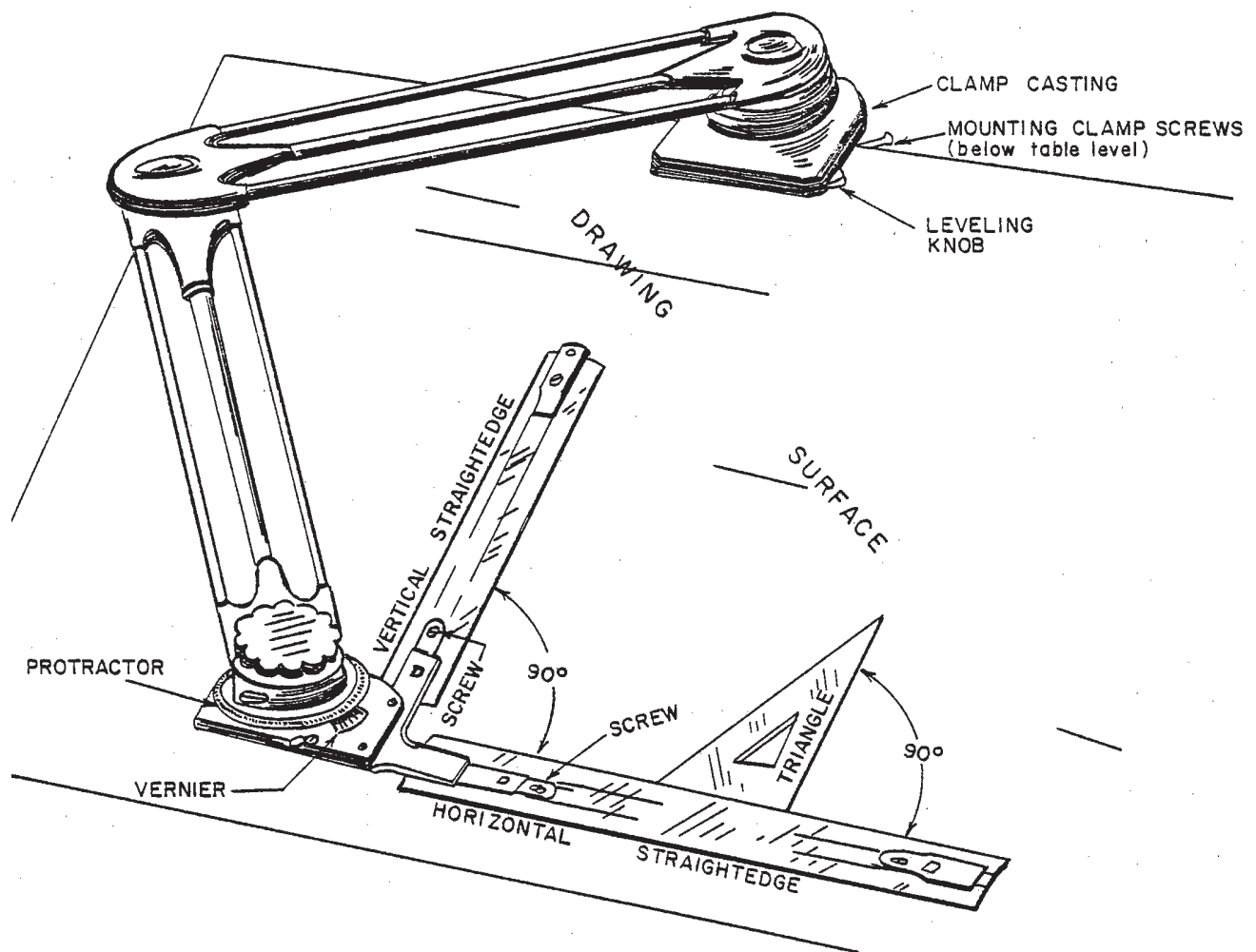


Figure 11-1

periodically check your straightedges to see that they are straight. This can be done by laying the drafting machine straightedge edge-to-edge against another straightedge (preferably a metal straightedge). Check it against more than one straightedge if possible. *If the straightedge is warped, it must be discarded regardless of the degree of warp.*

Never use a drafting machine straightedge as a cutting guide (even if it is metal). If it is necessary to have a cutting guide, obtain one for that purpose and mark it so that it *will never* be used to construct map lines.

Always keep your straightedges clean by wiping them with a rag soaked in alcohol. Alcohol will not leave an oily or soapy residue on the straightedge.

If one edge of a straightedge is chipped, it can be salvaged by turning it end-to-end to use the opposite side (but check that side for straightness).

When constructing a line, the pencil point should be against the edge of the straightedge as in Figure 11-3B. The top (or upper) edge must be used for all map lines (Figure 11-4B). Do *not* use the bottom of the

straightedge as shown in Figure 11-4A. Also, pressure should be to the drawing as in Figure 11-3B, rather than towards the straightedge as in Figure 11-4B.

As Figure 11-4 illustrates, pencil movement should be away from the point. In other words, do not push the pencil to construct your line. As you move the pencil along the straightedge, a slight twist (or rotation) of the pencil will prevent the lead from flattening out on one side.

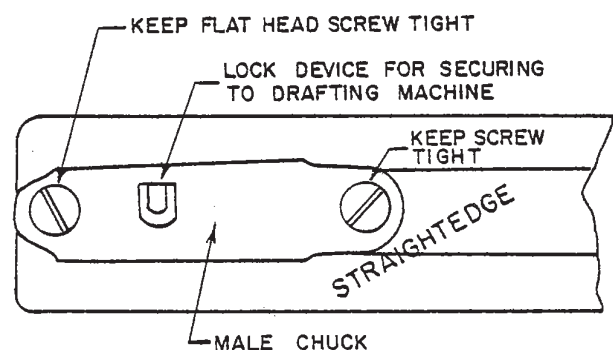


Figure 11-2

Metal Straightedges

Each mapping office should be equipped with at least one stainless steel straightedge 36" long to 42" long. The straightedge should be beveled on at least one edge.

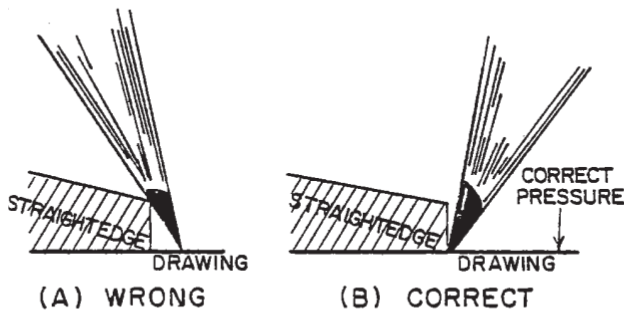


Figure 11-3

Stainless steel straightedges are for making straight lines that are longer than triangles or the drafting machine straightedges (such as coordinate grid lines on a large control map). The steel straightedges will also be useful for checking the other straightedges. *Do not use your steel straightedge as a cutting guide.*

Drawing Ink

The drawing ink should be of the type specially prepared for tracing on the polyester film matte surface. It should be a quick drying ink with good adherence qualities; waterproof; crackproof and chip-proof.

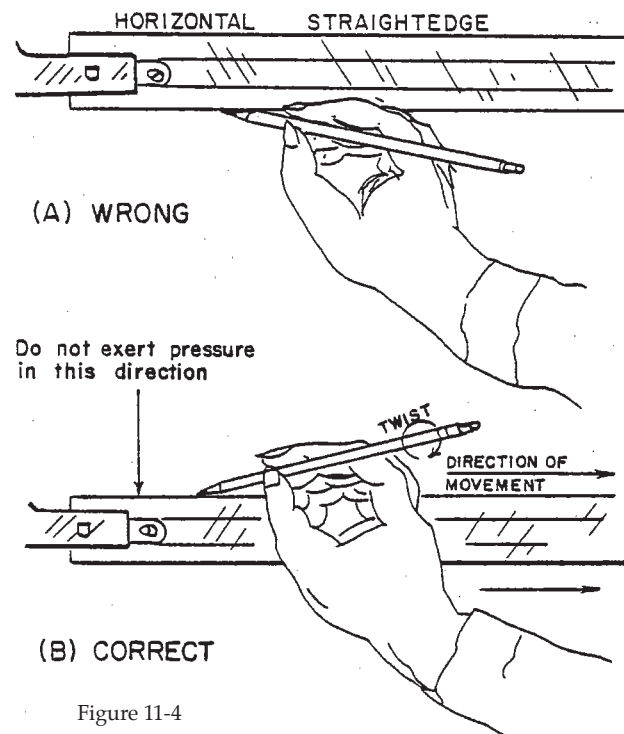


Figure 11-4

Although other inks (including old inks) may adhere at the time of tracing, the lines will begin to chip off with age. This will be less apt to happen with the inks developed for film (e.g., Pelikan Tusche T or Mars T).

Any drawing ink gets old and becomes hard to use; therefore, for a small tracing operation it is advisable to purchase the 1 ounce bottles, one or two at a time.

Drafting Pens

At one time all tracing work was done with *ruling pens* and freehand *crowquill* type pens. Now, most professional draftsmen use *reservoir* type or *cartridge* type technical pens (Figure 11-5).

Technical drafting pens use interchangeable points that range in size from 6 x 0 (super fine) to 14 (very heavy). These pens provide steady ink flow without constant wiping and filling (as was necessary with ruling pens) and they produce lines of consistent width (which was nearly impossible with ruling pens) and contrast.

The refillable cartridge style technical pens have the advantage of better ink flow (because the cartridge is air-tight), ease in changing points and ink, and ease in cleaning (because the holder does not have to be cleaned).

Figure 11-5 shows the general disassembly of most reservoir style technical pens. The pens should be cleaned every week. To clean, unscrew the filler knob unit and the pen point unit and wash. Pen cleaning can be made easier by soaking the parts in an ultrasonic cleaner. If the pen is not dirty ultrasonic cleaning can be accomplished without removing ink or disassembling the pen.

Pen numbers and line widths are as follows:

No.	Inches	mm
6x0 (000000)	.0045	.11
5x0 (00000)	.0053	.134
4x0 (0000)	.0076	.19
000 (M)	.0098*	.25
00 (W)	.0117*	.30
0	.0138	.35
1	.018	.46
2	.022*	.56
3	.032	.81
4	.045*	1.14
6	.0551	1.40
to 14	.236	6.00

*Recommended for Mylar tracings.

Although single line *ruling pens* are not used in tracing, the double line railroad pen is used for drawing parallel right-of-way lines (See Figure 11-6). Another ruling pen suitable for parallel lines is the *double curve* pen which is constructed very much like the railroad

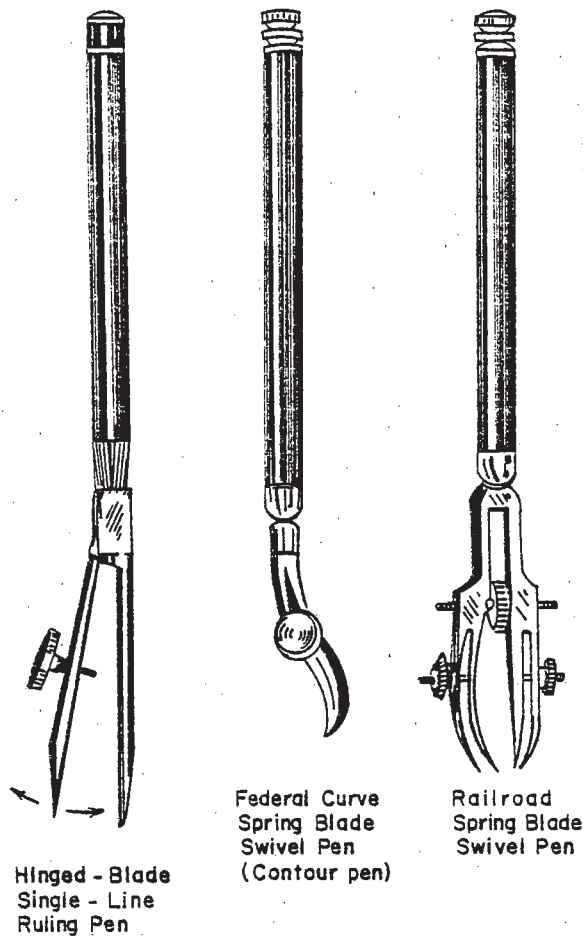


Figure 11-6

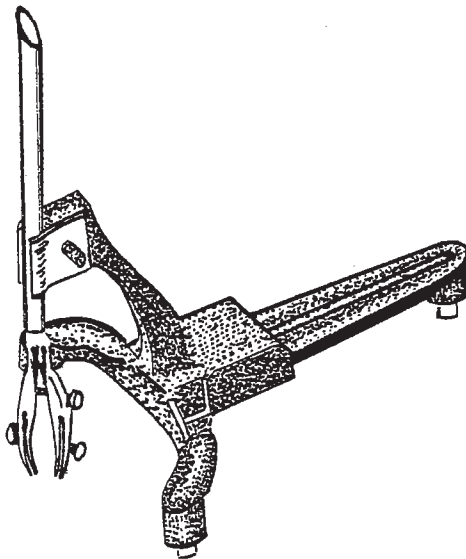


Figure 11-7

Scales

Scales are used by engineers, architects, cartographers and draftsmen because the space on maps and drawings does not allow lines and areas to be shown in their actual dimensions. The dimensions of the scales are in accurate proportion to the actual dimensions used. The various systematic length ratios, provided on the scales, enable cartographers to plot the proportional dimensions quickly, easily and accurately.

There are four basic types of scales: architect, engineer, metric, and chain (Figure 11-8). The scales are either flat or triangular. The flat scales have four shapes: (1) *four bevel* with four faces for scales; two on each side. (2) *two bevel* with two faces for scales; both on the same side. (3) *one bevel* with only one face for scales. (4) *opposite bevel* with two faces for scales; one on each side.

Drafting scales are made in either boxwood, white plastic on boxwood, white plastic, yellow hardwood or stainless steel. We recommend white plastic scales because they are easy to read and highly stable.

Note: Architect scales are never used on cadastral maps; however, we feel some instruction is warranted here because cartographers will use them on office floor plans, condominium floor plans, etc.

Architect Scales. An architect scale is used for almost all drafting work except civil engineering, cartography, photogrammetry and graphic solutions to problems. The triangular scale shown in Figure 11-8A is standard and contains eleven scales. The following are the most common scales and the ratios they represent.

48"	=	1'-0"	(quadruple size)
24"	=	1'-0"	(double size)
12"	=	1'-0"	(full size)
6"	=	1'-0"	(1/2 size)
3"	=	1'-0"	(1/4 size)
1-1/2"	=	1'-0"	(1/8 size)
1"	=	1'-0"	(1/12 size)
3/4"	=	1'-0"	(1/16 size)
1/2"	=	1'-0"	(1/24 size)
3/8"	=	1'-0"	(1/32 size)
1/4"	=	1'-0"	(1/48 size)
3/16"	=	1'-0"	(1/64 size)
1/8"	=	1'-0"	(1/96 size)
3/32"	=	1'-0"	(1/128 size)

On the architect scale in Figure 11-8, six scales read from the left end (the *right-reading* scales) and five scales read from the right (the *left-reading* scales). The various scales are arranged so that inches and fractions of inches represent 1 foot. Thus, drawings can be made to proportion, such as 1/4 size (3" = 1' - 0") or 1/48 size (1/4" = 1' - 0").

On all scales except the full scale the end unit is divided to represent inches and fractions of an inch (decimal parts are seldom used in architectural drawings). Scales divided in this manner are called *open-divided scales* (Figure 11-9).

When using an architect scale, draftsmen form the habit of reading scale dimensions as *real* dimensions.

In the scale $1/2'' = 1' - 0''$ (Figure 11-9) the end unit is divided into 24 parts so that the interval between divisions represents $1/2''$. In the $1/4$ scale the end unit is divided into 12 parts so that each interval represents $1''$. On the full scale ($12'' = 1' - 0''$) the graduations are *full divided* so that the entire scale represents inches and fractions of an inch; the distance between the smallest interval measuring $1/16$ inch.

The smallest units can be subdivided by interpolation so that the smallest measurement possible on full scale is $1/32''$ and the smallest distance representable on the $1/28$ scale is $1''$.

When reading open-divided scales feet are read from the index (zero) toward the inside of the scale and inches are read from the index toward the outside of the scale. This permits direct reading of the scale.

For example, in Figure 11-10 we must measure $13'-8''$ from given point X to desired point Y. The drawing scale is $1/8'' = 1' - 0''$. Set the $8''$ (measuring left of the zero mark) on the "inches" scale at point X. The desired point is the first division to the right of the 12 on the $1/8$ scale.

In Figure 11-10 the scale number at the desired point is 40. This is the forty foot mark of the $1/4''$ scale reading right to left; however, it is also the thirteen foot mark of the $1/8$ scale.

Engineer Scale. Triangular engineer scales, such as the scale of Figure 11-8B, are graduated in divisions of 10, 20, 30, 40, 50 and 60 parts to the inch. Each scale is graduated uniformly throughout its marked length (Figure 11-11) and is classified as *full-divided*.

The decimal divisions of the engineer scale allows them to represent $1/10$ of a foot, 1 foot, 10 feet, 100 feet, and so on. For example, the 60 scale can be used to represent $1' = 6'$, $1'' = 60'$, $1'' = 600'$, $1'' = 6,000'$, etc. In the standard cadastral map system the 10, 20 and 40 scales will represent the relationships illustrated and described in Figures 11-12 through 11-16.

On some engineer scales the unit graduations will read left to right as that of Figure 11-8B. However, on most engineer scales the graduations can be read from either end of the scale (Figure 11-16).

When using the type of scale shown in Figure 11-16, use the left, index (0) for measuring *right* from a given point; and use the right index (0) for measuring *left*

from a given point. *Be careful to not inadvertently read the right to left numbers when using the left to right scale (or vice versa).*

Example. To measure 415.3 feet on a $1'' = 200'$ map use the 20 scale. Always read the scale from the top (as all the figures show). The point (X) to be located is to the right of the given point. Therefore, our measurement will be left to right and we will use the uppermost numbers of the right reading scale. Set the left index (0) *exactly* at the given point. Next, mark off the hundreds of feet (to 4 on the right reading scale). Mark off the tens of feet over 400' (one graduation to the right of the 4). And *interpolate* the number of feet beyond 410' (this is 5 feet; therefore, it is halfway between the 410' and 420' graduations). This is at *approximately* 415 feet. The .3 cannot be measured and is, therefore, disregarded.

If, in our example, we would have inadvertently switched to the left reading numbers when we set off the hundreds of feet (4), the result would have been the establishment of point Y (Figure 11-16). The true measurement would have been 2,015' rather than 415', an error (blunder) of 1,600 feet more or less.

In Chapter 9 we learned that the number of *significant figures* are the number of digits in a number that have meaning. For example, in mathematics the number 415.3 has *four* significant figures. The number of significant figures that are accurate is one less than the total significant figures; therefore, in 415.3 there are three significant figures that are accurate. However, in plotting measurements we can only claim accuracy to the graduation marks of the scale. Any figure that must be interpolated is only approximate, and any figures beyond that are not significant figures in the measuring process. Therefore, in measuring 415.3 feet we can only consider 415 as significant to the measurement.

Does this mean that decimal values are disregarded in plotting? The answer is *no*. Although they cannot be measured they cannot be indiscriminately disregarded. In making the measurement 415.3 feet we can disregard the .3 as it stands, by itself; however, in a series of measurements on one line the decimal value must be considered. To explain this, consider the rule for measuring several points along a line.

When making more than one measurement on a line, or projection of a line, all measurements should be made from the initial point of measurement.

This rule is necessary to prevent *accumulative errors*.

If all points are measured from the initial point of measurement, it will be necessary to use accumulative totals to locate each point on a line (or projection of a line). If we expect accurate results, the decimal

value of a number must be considered when adding for accumulative totals. For example, Figure 11-17 contains the values for a series of block and right-of-way widths to be established across a control map. If the decimal was disregarded in making each measurement we would have a noticeable mathematical accumulative error by the time we would have established point 7, and a 10-foot error by the time we located point 21.

We established that the .3 foot could be disregarded in making a single measurement of 415.3 feet. However, if the number was 419.57 feet the decimal value is important because the number should be rounded to 420 feet *for measuring*. Any attempt at marking 419.57 feet (rather than 420' at the 420 foot graduation) would result in a probable measurement of 418 to 419 feet; something less than 419.57 feet. The computations of Figure 11-17 show that numbers can be rounded to expedite the adding of accumulative

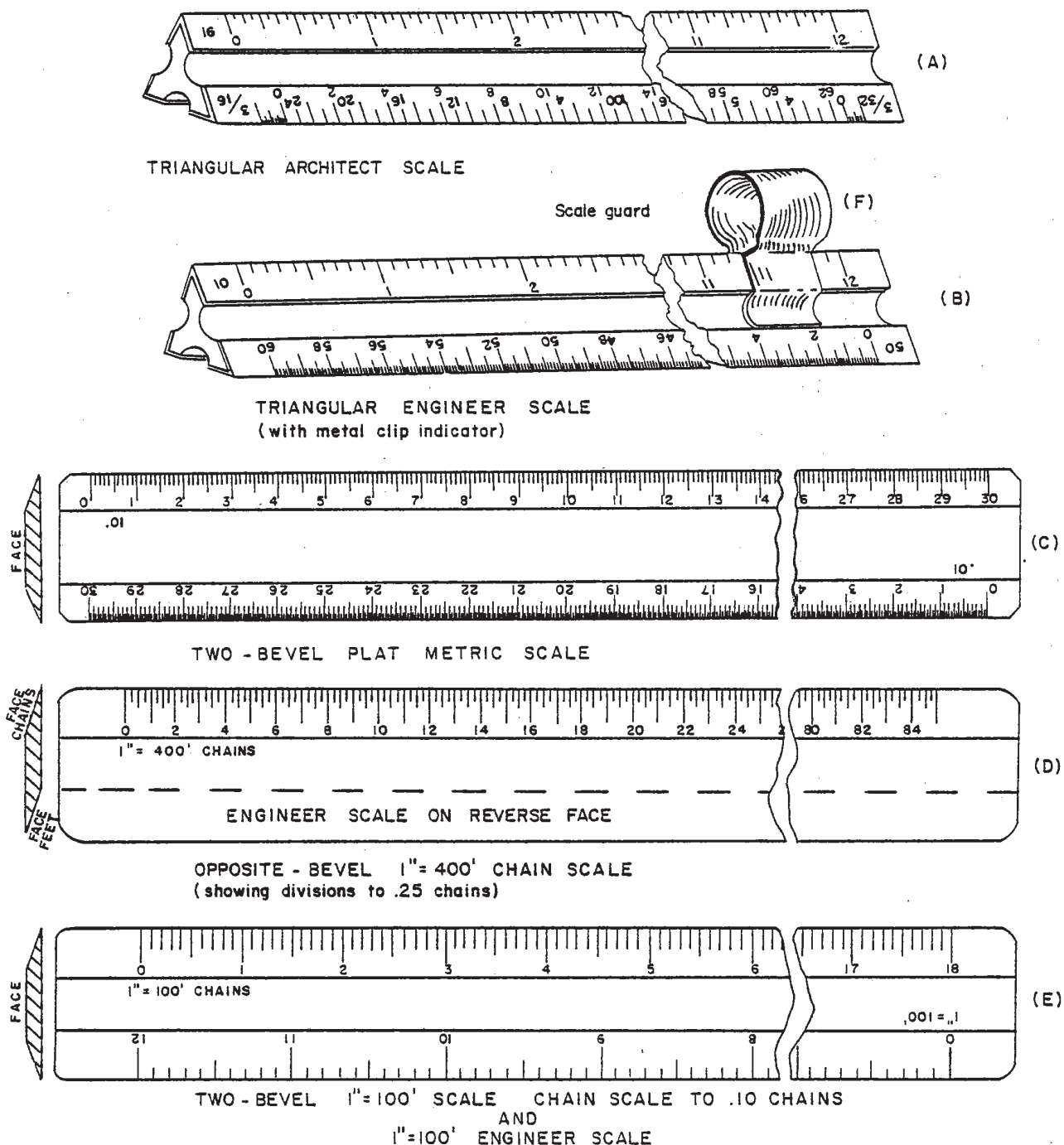
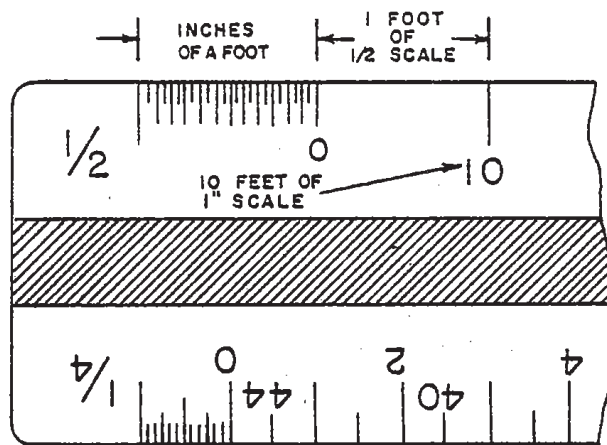


Figure 11-8
REDUCTION SCALES



OPEN - DIVIDED ARCHITECT SCALE

Figure 11-9

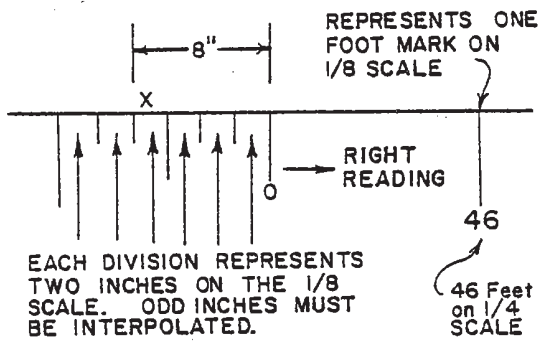
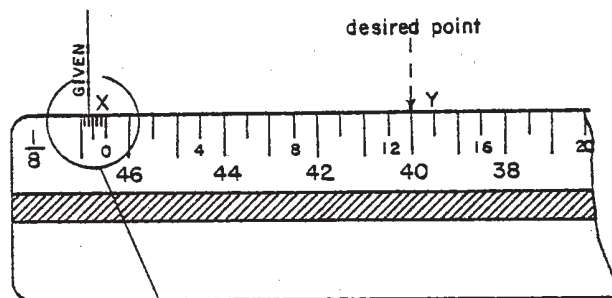
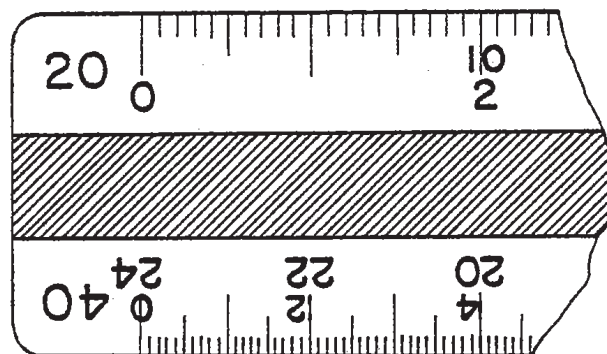
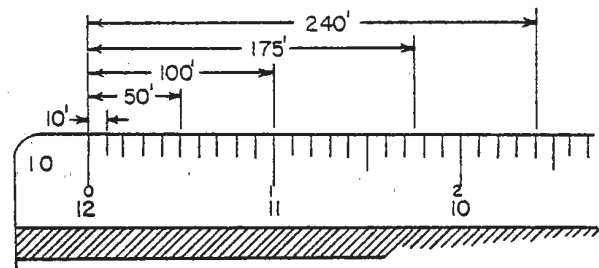


Figure 11-10



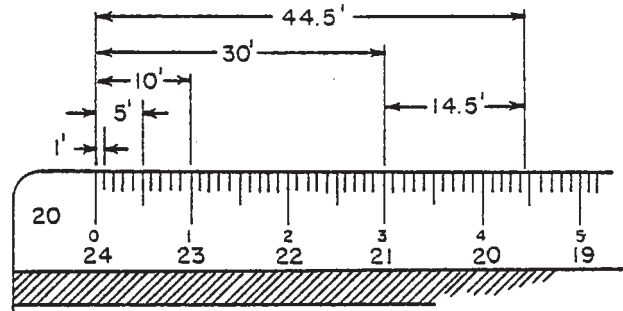
FULL - DIVIDED ENGINEER SCALE

Figure 11-11



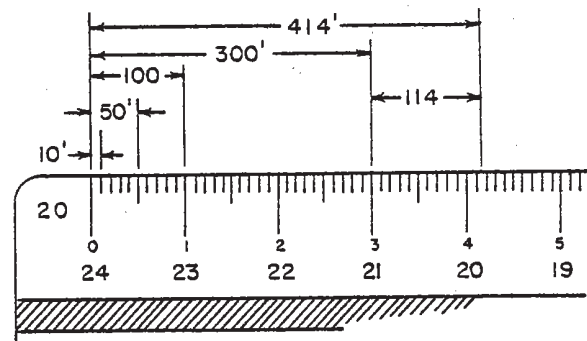
THE 10 SCALE USED TO REPRESENT CADASTRAL MAP SCALE 1"=100'. Each graduation equals ten feet.

Figure 11-12



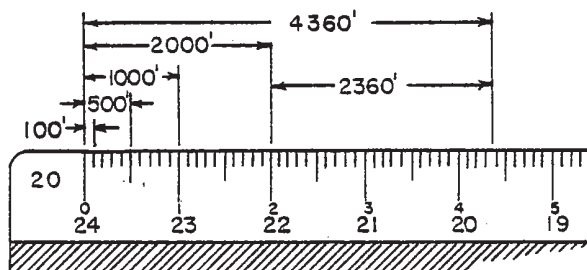
THE 20 SCALE USED TO REPRESENT 1"= 20' CONDOMINIUM DETAIL MAP SCALE. Each graduation equals one foot.

Figure 11-13



THE 20 SCALE USED TO REPRESENT 1"= 200' CADASTRAL MAP SCALE. Each graduation equals ten feet.

Figure 11-14



THE 20 SCALE USED TO REPRESENT 1"= 2000' CADASTRAL MAP SCALE. Each graduation equals 100 feet.

Figure 11-15

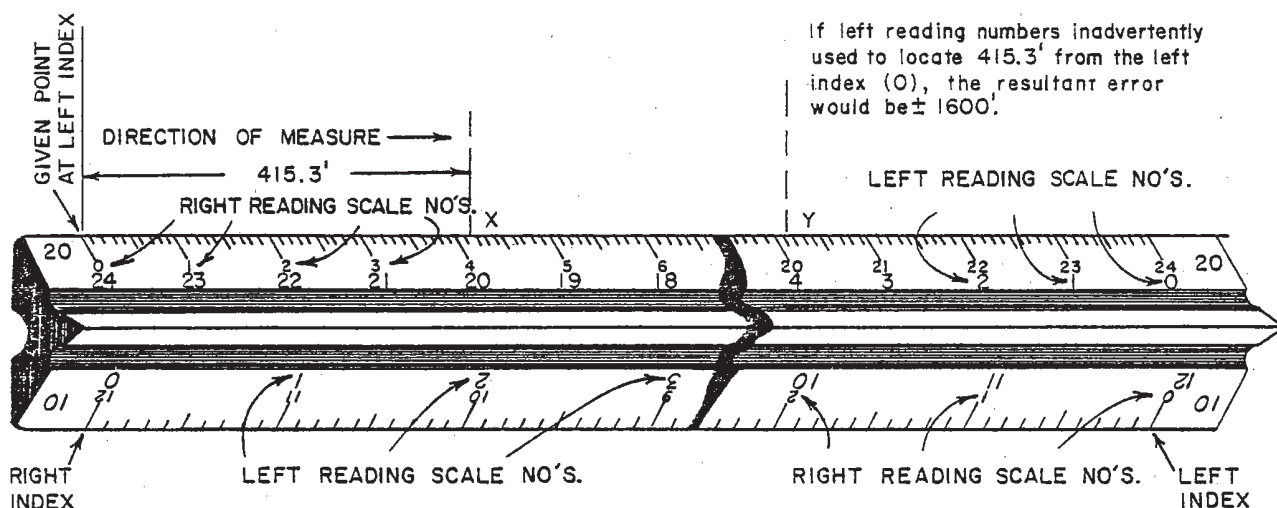


Figure 11-16

totals. In that example the total accumulative error for 21 values is only 0.99 feet.

The *accumulative errors* of the example of Figure 11-17 are *mathematical*. The other type of accumulative error is the result of making each measurement on a line from the prior point established, rather than from the initial point of measurement. If this had been the case in the foregoing example, 21 measurements would

have been made to establish point 21. Probability computations would show the resultant accumulative error greater than the 10-foot mathematical error. However, if we use the rule for making all measurements from the initial point, point 21 would be located by one measurement (4,690'). The use of the accumulative totals is illustrated in Figure 11-18. The values in the illustration are for the first seven measurements of Figure 11-17.

Figure 11-17

Desc. of Measure		Survey Value	Accumulative Totals	Decimal Disregarded	Accumulative Totals	Value Rounded	Accumulative Total
Initial Point	pt. 0	0.00		0		0	
Block width	pt. 1	300.21	300.21	300	300.00	300	300.00
R/W width	pt. 2	59.62	359.83	59	359.00	60	360.00
Block width	pt. 3	300.35	660.18	300	659.00	300	660.00
R/W width	pt. 4	59.92	720.10	59	718.99	60	720.00
Block width	pt. 5	299.57	1,019.67	299	1,017.00	300	1,020.00
R/W width	pt. 6	60.32	1,079.99	60	1,077.00	60	1,080.00
Block width	pt. 7	300.86	1,380.85	300	1,377.00	301	1,381.00
R/W width	pt. 8	59.31	1,440.16	59	1,436.00	59	1,440.00
Block width	pt. 9	300.62	1,740.78	300	1,736.00	301	1,741.00
R/W width	pt. 10	61.38	1,802.16	61	1,797.00	61	1,802.00
Block width	pt. 11	299.90	2,102.06	299	2,096.00	300	2,102.00
R/W width	pt. 12	59.50	2,161.56	59	2,155.00	60	2,162.00
Stream width	pt. 13	686.73	2,849.29	686	2,841.00	687	2,849.00
R/W width	pt. 14	60.00	2,909.29	60	2,901.00	60	2,909.00
Block width	pt. 15	302.10	3,211.39	302	3,203.00	302	3,211.00
R/W width	pt. 16	59.25	3,270.64	59	3,262.00	59	3,270.00
Block width	pt. 17	300.01	3,570.65	300	3,562.00	300	3,570.00
R/W width	pt. 18	60.32	3,630.97	60	3,622.00	60	3,630.00
Park block	pt. 19	700.15	4,331.12	700	4,322.00	700	4,330.00
Block width	pt. 20	299.55	4,630.67	299	4,621.00	300	4,630.00
R/W width	pt. 21	60.32	4,690.99	60	4,681.00	60	4,690.00
FINAL TOTAL			4,690.99		4,681.00		4,690.00
ACCUMULATIVE ERROR			0.00		9.99		0.99
ERROR			0.00		10.00 feet		1.00 foot

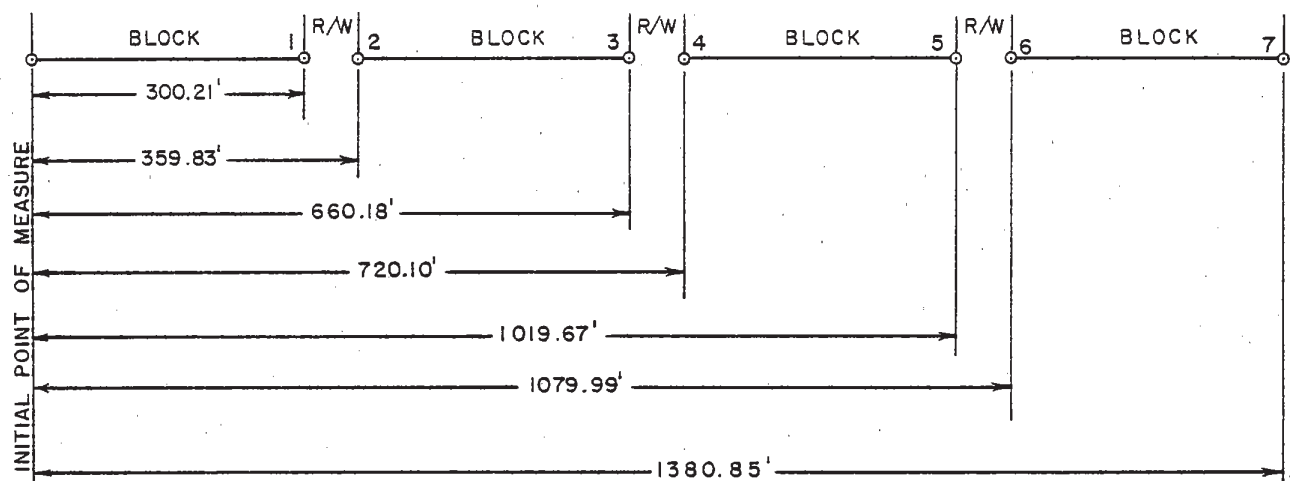


Illustration of rule for making more than one measurement on a line. Note: Each measurement is independent of the prior measurement.

Figure 11-18

Chain Scales. Many of the early surveys and deeds reflect the measurements made by the *Gunter chain*. The Gunter chain equals 4 rods, or 66 feet, or 100 7.92" links. 80 chains equal one mile and 10 square chains is one acre. It is important to understand that a Gunter chain is *not* the same as an *engineer chain*. An engineer chain is 100 feet long, divided into 100 12-inch links.

Rule: When measuring, chain always means "Gunter chain" unless a deed, plat or survey specifically calls for an "engineer chain."

To avoid converting all chains to feet, when plotting, the Department of Revenue had special chain scales manufactured. The chain divisions and graduations are as shown in Figure 11-8. The 1" = 100' and 1" = 200' chain scales are full-divided with graduations to the tenth of a chain. Measurements to the hundredth of a chain must be interpolated. The 1" = 200' chain can be used for the 1" = 2,000' scale map. At this scale each graduation is equal to one chain. Measurements to the tenth or hundredth of a chain must be interpolated.

The 1" = 400' chain scale is full-divided with graduations engraved for each 0.25 of a chain. Therefore, any measurement that is not to the chain, quarter of a chain, half a chain or three-quarters of a chain must be interpolated. In such cases we recommend converting the chain value to feet for measuring (multiply chains x 66 feet; e.g., 10 ch. x 66' = 660').

All Department of Revenue chain scales include engineer scale graduations of the same scale as that of the chain scale; i.e., 1" = 100' chain scale also has a 1" = 100' (or 10) engineer scale. These engineer scales can be used in place of the triangular or flat engineer scales. However, when making measurements in chains be sure not to inadvertently switch to the engineer scale for a chain measurement.

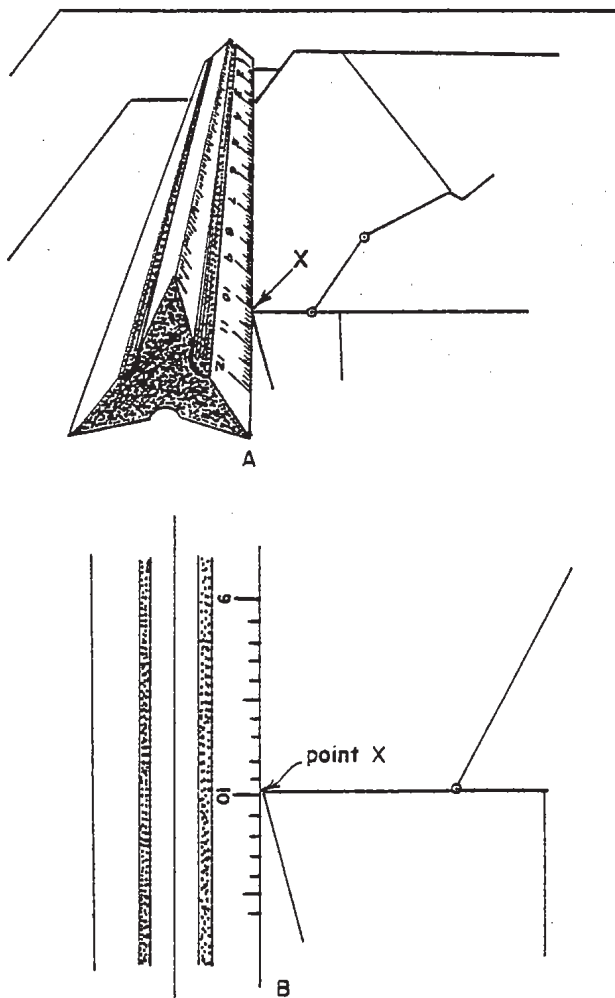
Parallax. Parallax is a factor contributing to errors made in measuring angles and distances. It is the apparent displacement, or the difference in apparent direction, of an object as seen from two different points that are not in a straight line with the object. For example, when viewing the engineer scale, in Figure 11-19, from the end, the 10 graduation on the scale appears to be in line with point X of the map. Yet, when placing the eye directly over the scale, it can be seen that the 10 graduation and the X point are not exactly contiguous.

Here are three additional rules regarding your scales.

1. *Never use the scale as a cutting guide—even if it is a stainless steel scale.*
2. *Never use the scale as a pencil or ink straightedge guide (as you would a triangle or drafting machine straightedge). Such use will wear off the graduation marks on the edge of the scale.*
3. *Never leave the scale in the sun—especially plastic scales.*
4. *Never wash wooden scales with water or with cleaning solvent containing water. Use either alcohol or rubber cement thinner for periodic cleaning.*

The last rule is contradictory to the recommendations of some authorities to *always keep the drafting tools clean*. In the case of scales, too much cleaning will eventually wear off unit graduations and numbers. When you do clean them, *never use abrasive cleaners or abrasive materials*.

As mentioned earlier in this section, scales are subject to *instrumental errors* and *natural errors*. Therefore, they must be periodically checked for accuracy. This can be done by placing the scale *graduation-to-graduation* (edge-to-edge) against other scales (always make more than one comparison). Always discard your



EXAMPLE OF PARALLAX

Figure 11-19

scale if it proves inaccurate. A new scale is cheaper than redrawing a map.

Drafting Instruments

Dividers. Dividers, such as those in Figure 11-20, are used to transfer measurements, divide straight or curved lines, and measure a given distance by spanning it and checking the distance of the span against a scale.

One type of divider is the *spring bow* divider used for small map areas where it is important to retain a specific divider setting. The setting is made by turning the center thumb screw (Figure 11-20A) mounted horizontally between the legs of the divider. A similar instrument is the *ringhead bow divider*. This type of divider is also capable of retaining settings, but will usually span a larger distance than the spring bow divider.

The divider of Figure 11-20C is a *hairspring divider* used in general drafting. It does not have an adjustment screw for maintaining settings; therefore, it should not be used for cadastral map purposes.

Proportional dividers. The drafting instruments of Figure 11-21 are called proportional dividers. This type of divider can be used to enlarge or reduce straight lines, including the diameter and radius of a circle, or to divide straight lines and circles into a given number of equal parts.

The proportional dividers consist of two legs pivoted in such a way that the distance between the legs at one end is in specific proportion to the distance between the legs at the other end. To set the legs into the desired relationship, use the adjustable pivot to lock the scale on either leg.

Never use a proportional divider to transfer a distance, from one scale to another, when the measurement can be made with an engineer or chain scale.

When using any divider, merely set the point on the drawing medium applying only *gentle pressure*. Do not jab the points into the surface of the table.

The Drafting Compass. The basic drafting compasses are the *spring bow compass*, the *ringhead bow compass* and the *hairspring compass*. Special compasses are the *drop bow compass*, the *extension compass* and the *beam*

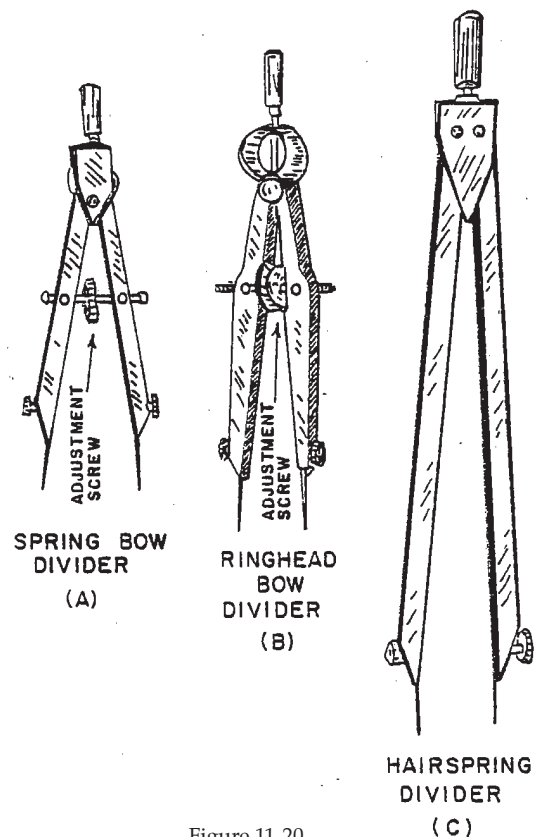


Figure 11-20

compass. All of the compasses are capable of both pencil and ink work.

The spring bow, ringhead and hairspring compasses are constructed like their counterparts, the dividers (Figure 11-20A), except the compasses have pen and pencil attachments in place of one of the divider point arms.

Like bow dividers, bow compasses are designed for maintaining settings. The hairspring compass should never be used in cadastral cartography when a bow compass is available.

Figure 11-22 illustrates the design of the large ringhead bow compass and attachments, the *drop spring bow compass* and the *beam compass* attachments. The large bow compasses are the most useful for control work because the compass and extension provide circle and arc capabilities that cover radii up to approximately 20 inches. Moreover, most of the high quality large bow compasses can be equipped with either the ruling pen attachment (Figure 11-22B) or a technical pen adapter (Figure 11-22C). The latter is preferable in cadastral work.

The drop spring bow (Figure 11-22E) is for very small circles. The drop bow has both pen and pencil attachments attached to a compass sleeve that rotates on the stationary center point rod. There is no question that the drop bow produces small circles that are accurately located over the radius point; however, most cartographers find that acceptable results can be obtained faster with a *circle template*.

The *complete* beam compass consists of a long bar with a needlepoint attachment at one end and a pencil or pen attachment at the other end. Both attachments can be adjusted either direction on the bar. Figure 11-2 F shows a pair of beam compass attachments that can be attached to most stainless steel straightedges. This will provide a radius that is nearly as long as your largest stainless steel straightedge (about 2 inches less than the straightedge length). Some of the better beam compass sets (e.g., the "Dietzgen Fed-

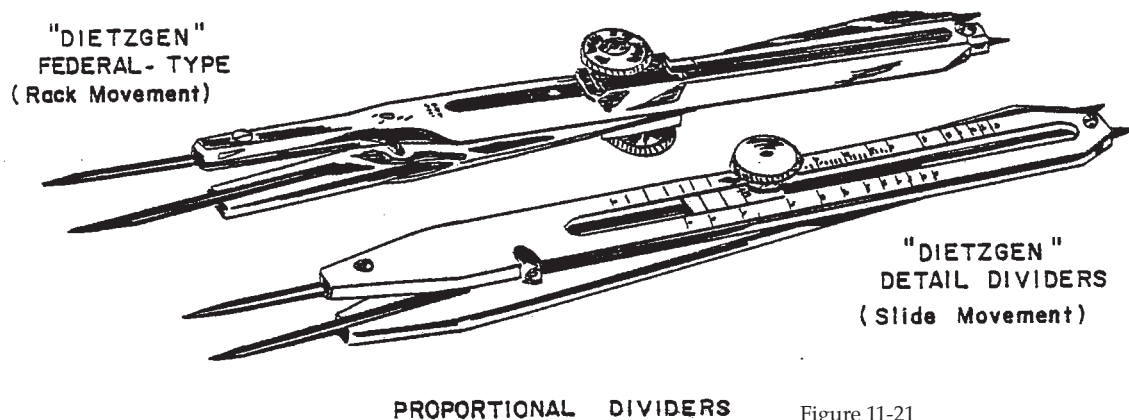
eral" set) have micrometer adjustments built into the needlepoint attachment.

Use of the Compass. When drawing circles and circle arcs, it is important that the lines produced with the compass be of the same weight as those produced with the pencil. For this reason the lead in the compass should be slightly softer than that of the pencil. The lead is sharpened to a bevel point as shown in Figure 11-23, the point being rounded slightly as shown in Figure 11-24. The heel of the bevel is begun one-quarter inch from the tip of the lead. The needle point is inserted with the shoulder point out and permanently adjusted to the pen attachment, as in Figure 11-24. The pencil leg (of the pencil attachment) should be slightly shorter and must be readjusted after each sharpening.

To draw circles or arcs, locate the radius point and measure the radius distance to establish the compass span between the needle point and the tip of the lead. With the needle point located accurately at the radius point, open the compass so that the lead point is at the point of the arc. The arc or circle should be swung in a clockwise direction, beginning and ending at the lowest point with the compass inclined at about 60° in the direction of motion. When drawing concentric circles, professional draftsmen draw the smallest circle first. Bow compasses (and dividers) are roughly adjusted by compressing the legs between the thumb and forefinger of the left hand and spinning the adjustment thumbscrew with the right hand; this decreases wear on the threads. Final adjustments are made with the thumb and forefinger of the right hand when the instrument is in position.

The Hand Protractor

In cadastral cartography angles and bearings *must* be measured with the drafting machine engineering-head protractor. Hand protractors should only be used to *check* angle measurements.



PROPORTIONAL DIVIDERS

Figure 11-21

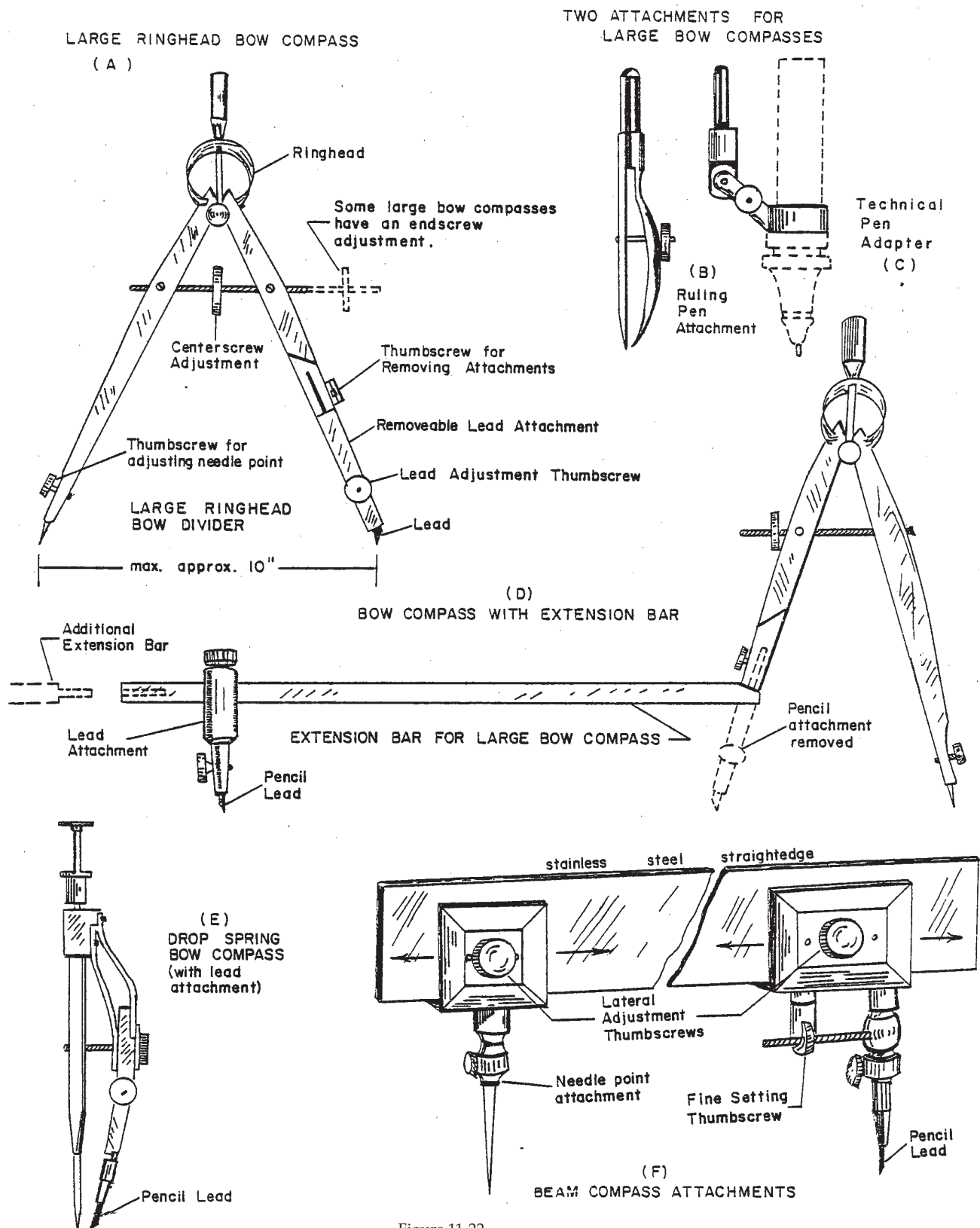


Figure 11-22

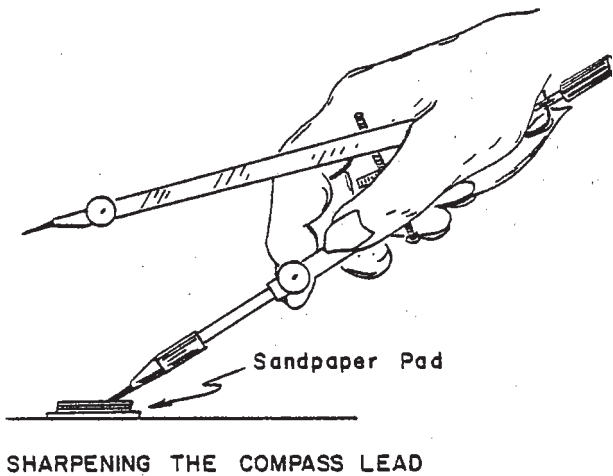


Figure 11-23

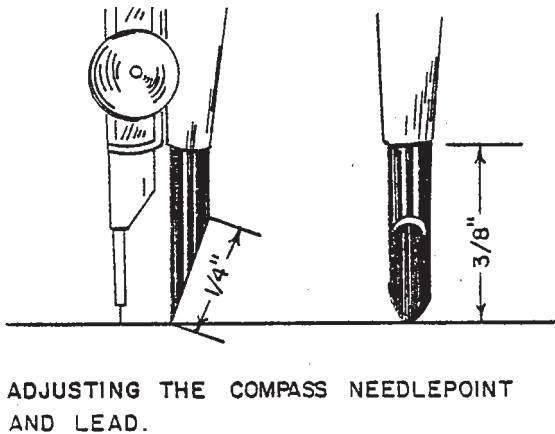


Figure 11-24

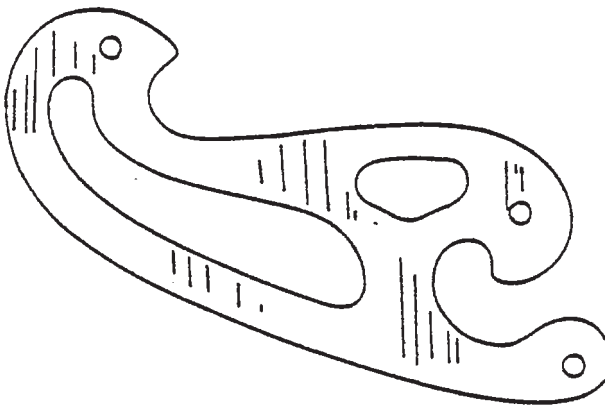


Figure 11-25

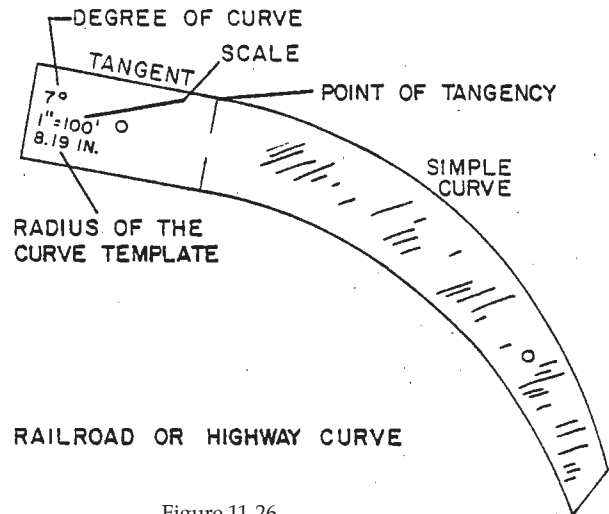


Figure 11-26

Most hand protractors are graduated by half degrees and are readable in both clockwise and counterclockwise directions.

French Curves

French curves, also known as *irregular curves*, are used as mechanical guides for drawing curves other than circles or circle arcs. The curves (Figure 11-25) are made of transparent plastic, and their edges represent successive parts of ellipses, parabolas, spirals and other geometric curves.

Railroad or Highway Curves

Railroad curves (also known as highway curves) are special curves with a straight section that is tangent to a simple curve section, the point of tangency being precision-engraved on the transparent plastic curve. Railroad curves are calibrated in inches; that is, at a scale of $1'' = 100'$. A complete set of railroad curves would contain one curve for each fifteen minutes (degree of curve) up to 12° , and for each thirty minutes (degree of curve) up to 20° . (Figure 11-26)

When plotting a highway or railroad curve, never use the railroad curve template to *establish* the end points of the curve traverse. Always establish curve points as described in Chapter 8.

Ship and Engineer Curves

Ship curves are not necessarily critical to a cadastral mapping operation, but they are useful because of their many tapered (similar to a spiral) curve shapes. Most ship curve sets contain from 50 to 60 acrylic plastic curves.

Engineer curves are somewhat like ship curves because they represent tapered curves; however, they

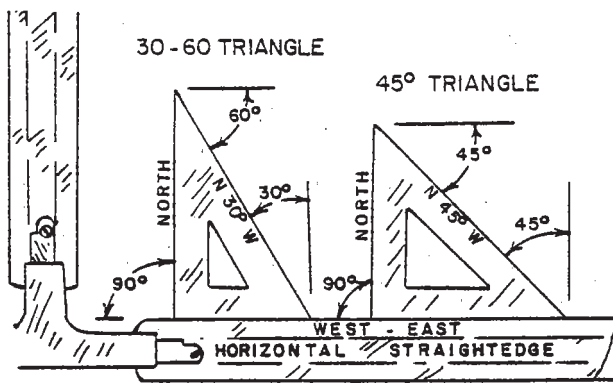


Figure 11-27

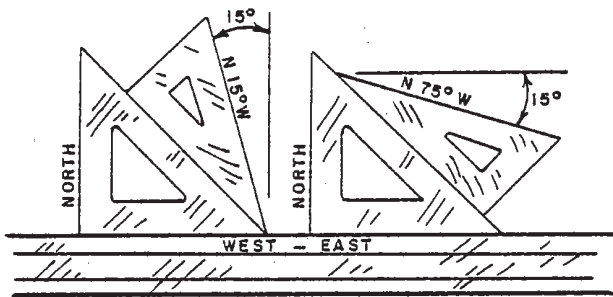


Figure 11-28

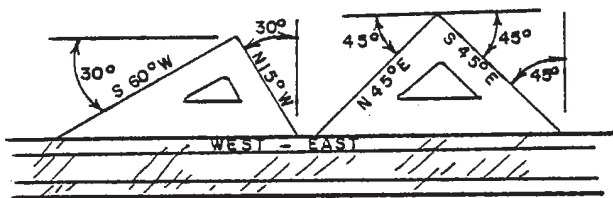


Figure 11-29

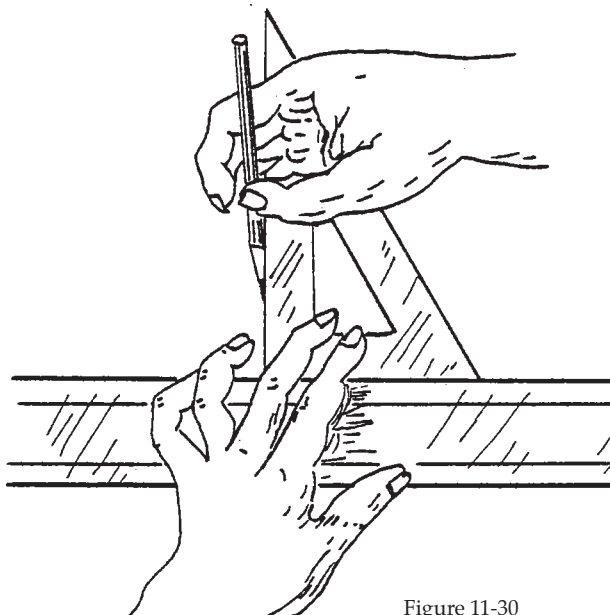


Figure 11-30

are not manufactured in as many shapes and sizes as the ship curves.

Triangles

There are two basic types of triangles used in every drafting operation. One is constructed so as to have angles of 30°, 60° and 90°. This is called a 30-60 (thirty-sixty) triangle (the left triangle of Figure 11-27). The other triangle has two 45° angles and one 90° angle. This is called a forty-five degree triangle (the right triangle in Figure 11-27).

Most triangles are made of crystal clear plastic that will not distort or scratch (if handled with reasonable care). Transparent triangles are also available in fluorescent orange. This type of triangle is often preferred because the orange edge casts a glow which tends to eliminate the usual shadows created by triangles.

Figure 11-27 shows how 30°, 60° and 90° can be obtained from a pair of triangles. Figures 11-28 and 29 illustrate two methods of obtaining 15° and another method of obtaining 30° and 45° from a pair of triangles.

When using a triangle to draw a vertical line, one leg of the triangle is placed against the edge of the drafting machine straightedge. If the vertical leg of the triangle faces the left end of the drafting table, you will be less likely to cast a shadow over your work. Draftsmen draw their lines from the bottom up as illustrated in Figure 11-30. The drafting pencil is inclined toward the top of the map sheet at an angle of approximately 60°. The point is as close as possible to the junction of the triangle with the drafting media (Figure 11-34B). The usual sequence in drawing a series of lines is from left to right. *At no time should the lower edge of the drafting machine straightedge be used as a base for triangles.*

Testing Triangles. The separate edges of triangles may be tested for accuracy by comparing triangle angles against those turned with the drafting machine. If *any* angle of the triangle is inaccurate, it should be discarded. To check a triangle for straightness, match each edge against a stainless steel straightedge.

Note: Do not use your triangle as a cutting guide. Also, smudging can be minimized if the triangle is kept clean.

Stereoscopes

The small stereoscopes (Figure 11-31) are photogrammetric instruments designed to obtain a three-dimensional picture of the object being viewed. There are two basic stereoscopes. The most common (Figure 11-31A) is the *lens-type hand stereo*. This type is limited by prismatic qualities of the lenses. Also, the stereoscopic area is small by comparison with the

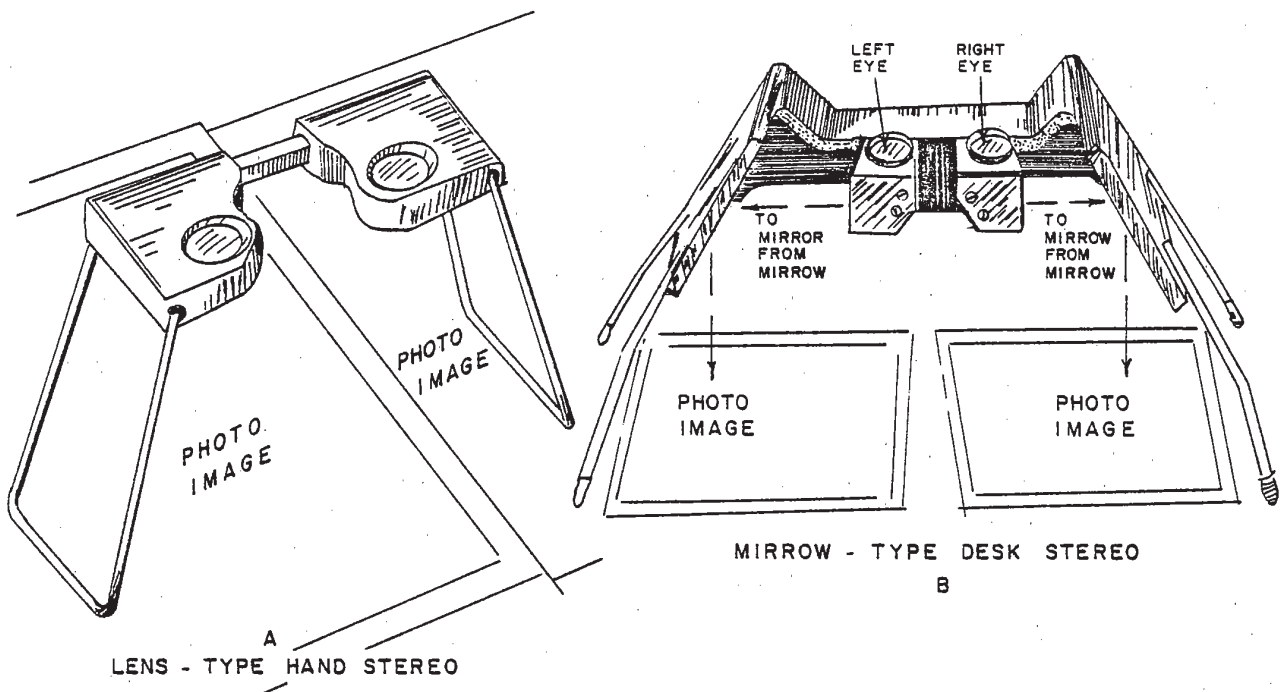


Figure 11-31

other type of stereo—the *mirror stereo*. The lens stereo has magnifying qualities, whereas the mirror stereo has a diminishing effect. One type of stereo supplements the other; however, most cartographers prefer the lens type.

To obtain a three-dimensional view of an object requires that the conditions for natural depth perception be artificially reconstructed and necessitates the following:

1. two slightly different views of the same object or scene from different angles;
2. correct orientation of the two views with respect to one another and to the eyes; and
3. normal binocular vision that allows the two images to be recombined in the brain so as to give the effect of a single picture.

Ground stereoscopic photography has been practiced for years. This process involves making two simultaneous exposures on different sections of film, using a special stereo camera having two lenses, separated by a distance about equal to that between the average person's eyes. In aerial stereoscopic photography the concept is the same but the practice is somewhat different. Only one camera is used and the exposures are made at regular intervals with the camera in a fixed position pointing in a direction perpendicular to the line of flight. The distance between the exposures is such as to permit the photos to overlap in area. Any overlapping vertical photographs made

with the same camera, from the same altitude, when correctly oriented, permit stereoscopic observation of their common area. This is done by means of the stereoscope.

To use the stereoscopes, the cartographer simply places the left lens over the area to be viewed in the left photo and the right lens over the same area to be viewed in the right photo. The object distance between the identical point in each photo would be about 2.50". Next, the stereoscope lens are focused. Normally the cartographer has to adjust the distance between lenses to establish the eye base distance (also about 2.50"). It is usually necessary to make slight adjustments of the aerial photo to obtain the stereoscopic, or third dimensional view. Remember, *stereoscopic photographs can only be viewed correctly if the photographs are laid out according to the direction of flight of the aircraft.*

The Polar Planimeter

A *polar planimeter* is an accurate and convenient instrument designed to measure the surface area of irregular shaped polygons; areas that would be difficult, time consuming, or impossible to determine by mathematical computations.

Polar planimeters have three basic parts (Figure 11-32)—the *carriage*, *tracer arm* and *anchor arm*. The carriage contains the area-measuring parts; the *unit vernier*, *measuring wheel*, *measuring wheel drum* and *drum vernier* (see Figure 11-33). The tracer arm con-

sists of the *tracer needle*, *tracing point guard*, *tracing grip* and *adjustment graduations*. The anchor arm consists of a ball-joint link that sets in a socket of the carriage, a needlepoint mounted on a circular weight (the anchor) and the arm. Some anchor arms are adjustable to allow the anchor to be at an operational distance from the polygon. The planimeter only touches the map at four points: the anchor arm needlepoint, the measuring wheel, the rear carriage support wheel and the tracing point guard.

In operation, the entire instrument pivots on the anchor arm needlepoint and the carriage pivot socket. The anchor needlepoint is set at a point outside the polygon to be measured, as in Figure 11-32. The tracer point is set at a point of beginning. The zero adjustment thumbscrew (Figure 11-33) or the measuring drum (of the old-style carriage of Figure 11-32) is rotated so that the zero of the unit vernier is at the indicator mark, and the zero of the measuring drum is at the zero of the drum vernier. *Note, most textbooks and planimeter instructions recommend not setting the unit vernier and measuring drum at zero. The drum and vernier readings are to be recorded, then the difference between those readings and the final readings is either the area or a number that must be multiplied by another number to supply the area. The original purpose was to keep from touching the measuring wheel, which must be kept free of body oils and moisture. We find, however, that fewer errors are made if the unit vernier and measuring drum are always set at zero.*

Next, the tracer needle is carefully guided around the polygon boundary in a clockwise direction (as illustrated by the polygon ABCD of Figure 11-32) and returned *exactly* to the starting point. The measuring wheel turns when the tracer needle parallels the measuring wheel, but slides when it parallels the axis of the measuring wheel. The result is that the planimeter measures an imaginary rectangle with an area equivalent to that of the polygon; the net distance rolled by the wheel being the length of one side of the imaginary rectangle.

In cadastral cartography, the carriage is adjusted on the tracer arm so that the unit vernier and measuring drum readings are either the area in acres, or a value which multiplied or divided by a certain number equals the area in acres. These relationships are as follows:

1" = 100' scale: Reading $\div$ 4 = Acres

1" = 200' scale: Reading acres direct.

1" = 400' scale: Reading $\times$ 4 = Acres

1" = 1,000' scale: Reading $\times$ 25 = Acres

1" = 2,000' scale: Reading $\times$ 100 = Acres

The planimeter readings are obtained as follows:

1. The first digit is obtained from the unit vernier. The reading of the unit vernier in Figure 11-33 is 5 because the indicator mark is between 5 and 6.
2. The second digit is obtained from the measuring drum. In this case, zero of the drum vernier is between 5 and 6 of the drum. The second digit is, therefore, 5.
3. The *tenths* digit is taken from the unit graduations of the drum. In Figure 11-33 the drum vernier zero is between the 5 graduation and the first unit graduation; therefore, the tenths digit is .0.
4. The hundredths digit is the reading on the drum vernier at a graduation that is in a direct line with a unit graduation of the drum; in this case, halfway between vernier zero and ten. Therefore, the decimal value is .05.

Hence, the reading of the planimeter in Figure 11-33 is 55.05. At the different scales it is equivalent to:

1" = 100': $55.05 \div 4 = 13.76$ acres

1" = 200': 55.05 direct = 55.05 acres

1" = 400': $55.05 \times 4 = 220.2$ acres

1" = 1,000': $55.05 \times 25 = 1,376.25$ acres

1" = 2,000': $55.05 \times 100 = 5,505$ acres

A flat metal bar is usually supplied with each planimeter. This is the planimeter *test gauge*. It has a needle pivot at one end, inch graduations up to 3 inches and an index mark at the beveled edge of the other end. At the graduation mark there is a small hole in the center of the gauge. This is for the tracer point of the planimeter.

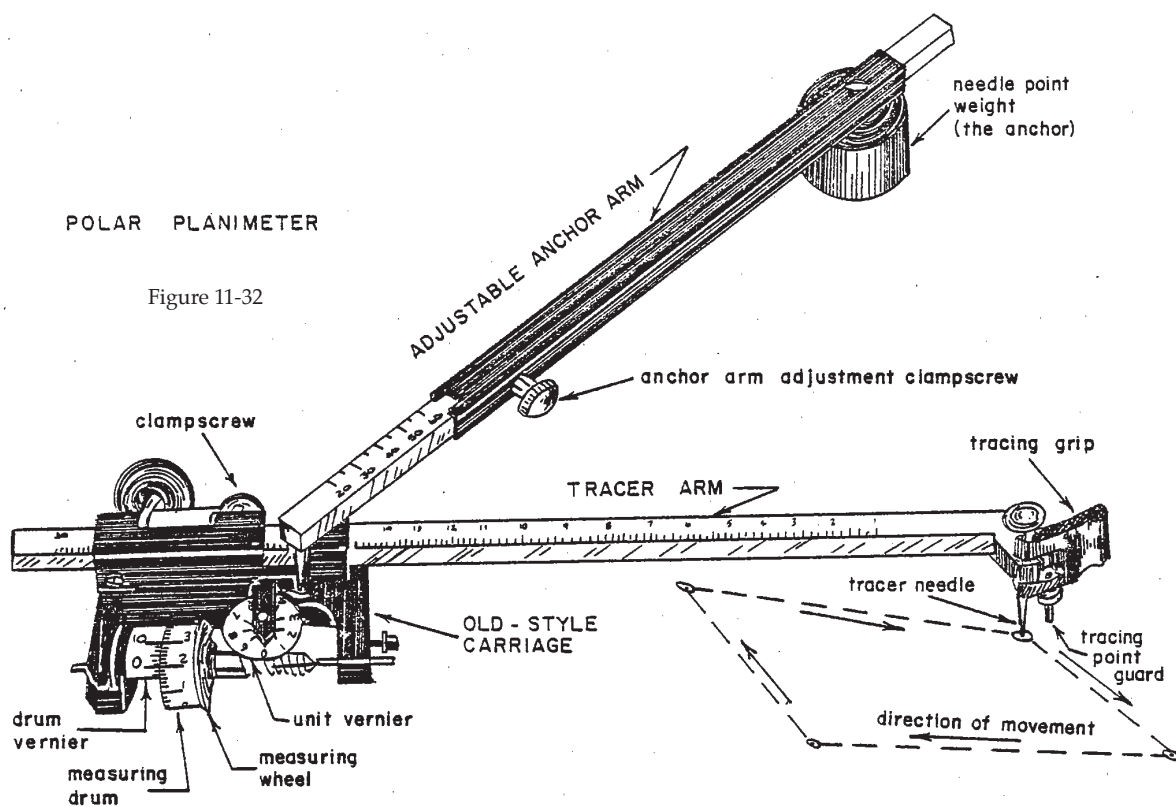
To check the setting of the tracer arm, place the tracer arm needlepoint in one of the holes of the gauge. Next, swing the tracer arm through one complete turn. This provides a circle of a known area. The distance that the measuring wheel travels is read on the verniers and drum. The reading provides a comparison against the known area. The tracer arm can be adjusted until the reading is identical to the known (or required) value.

Here are some rules and suggestions regarding use of the planimeter.

1. Do not apply pressure to the carriage.
2. Do not get moisture (or sweat) on the measuring wheel. This will cause it to rust.
3. Do not get oil or grease on the measuring wheel. This will cause it to pick up dirt, dust and grime and prevent it from revolving consistently.

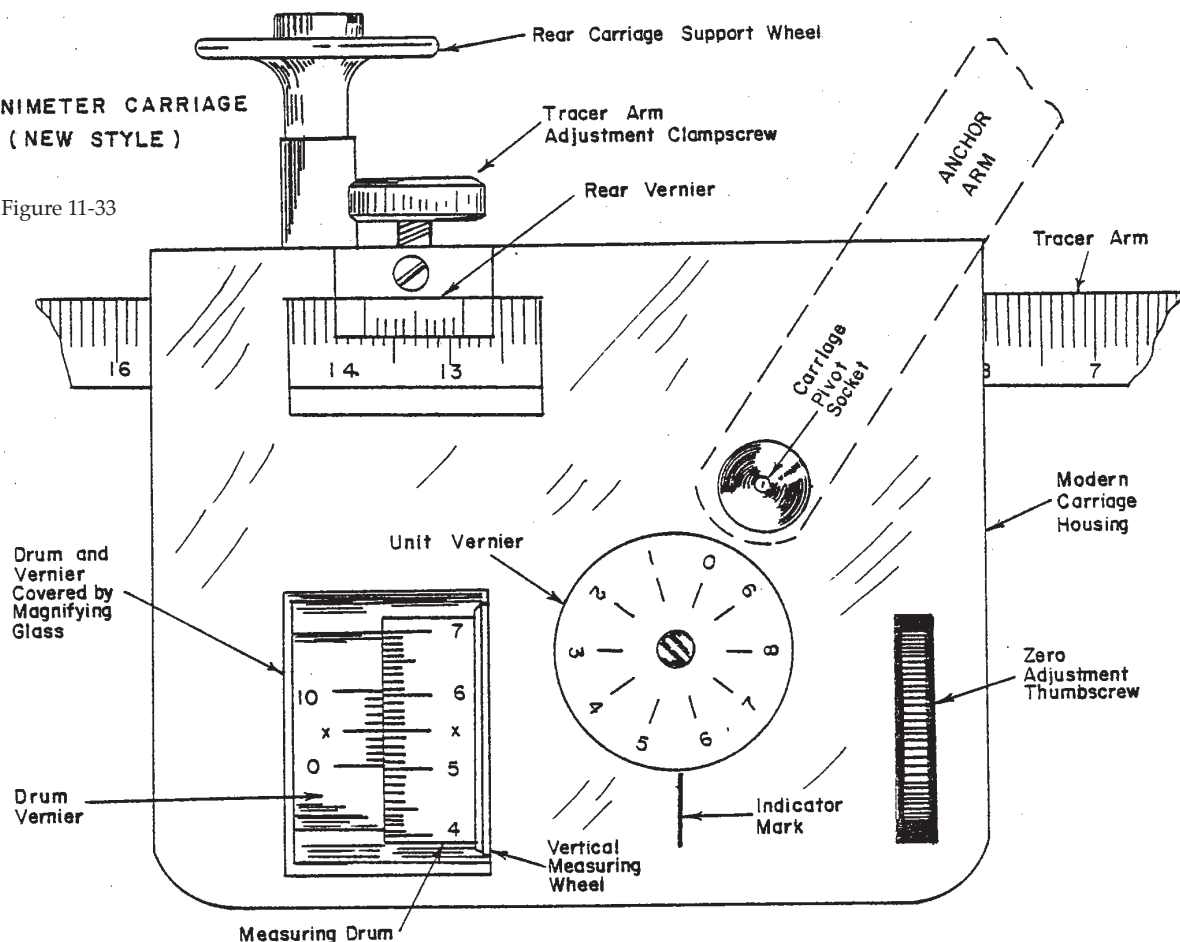
POLAR PLANIMETER

Figure 11-32



PLANIMETER CARRIAGE (NEW STYLE)

Figure 11-33



4. Keep the anchor arm ball and carriage socket clean and oiled (lightly).
5. Do not press the anchor arm needlepoint, the tracer point, or test gauge point into the drafting table surface.
6. Remember, when completing your traverse of a polygon, you must return to the *exact* point of beginning. If you develop the habit of always starting at the northeast corner of a polygon, it will be easy to remember where you started each time.
7. If the polygon to be traversed is too large for the planimeter, divide it into smaller plane areas.
8. Do not place the anchor needle *inside* large polygons when planimentering those polygons.
9. Remember, the area reading will change every time the tracer arm or anchor arm setting is changed.
10. Keep the planimeter in its box when not in use.
11. Do not lose the manufacturer's instructions. This contains the constants, factors and information on adjusting the instrument.
12. Do not planimeter on slick surfaces such as the glossy side of mylar.
13. Check the accuracy of your planimeter every day before use. This can be accomplished by planimentering a square or rectangle of known area.
14. Position the planimeter so that the measuring wheel does not travel over the edge of the map sheet.

Mechanical Lettering

Mechanical lettering, such as that executed by the "Leroy" lettering set, is lettering produced with a special ink pen in a scribe that is guided by a lettering template (see Figure 11-34). The lettering set is used for executing major lettering on cadastral maps, specifically those listed in the *Standard Lettering Guide* in Chapter 2.

Note: The availability of a mechanical lettering set should not deter cartographers from periodical practice required to execute neat freehand lettering.

The standard engineer's mechanical lettering set consists of a set of templates, a scribe, and a set of pens.

The templates are made of laminated plastic with letter and number characters engraved in the face so that their component lines are guide grooves for the scribe tracing pen. The height of the characters, in thousandths of an inch, is given by a number on the upper right-hand side of the template. The range of

character heights offered by a standard set of templates is from 80 (0.08 inch or 5/64 inch) to 500 (0.5 inch or 1/2 inch). The scale at the bottom of each template has the zero in the center and is arranged for proper spacing in relation to character heights. The distance between each scale graduation represents the area required by a normal letter. Templates capable of producing larger characters, up to two inches in height, are available in many styles of lettering.

Modern reservoir pens (as shown in Figure 11-34) range from 000000 (6 x 0, the very finest) to 14 (the very largest). Their approximate widths are as shown in Figure 11-35. The pen holder contains a removable plastic reservoir that is easy to fill and clean. The pen point has a *cleaning pin* that acts as a valve, protruding beyond the edge of the bottom tube when the pen is not touching the surface of the map. In this position no ink flows. When the pen is rested on the map surface the cleaning pin is pushed up, allowing a flow of ink. Action of the pin in the pen casing minimizes ink clogging.

The scribe holds the pen in alignment and controls its motion as the tracer pin is guided through the character grooves of the template. Two types of scribes are available, adjustable and fixed. An adjustable scribe produces vertical and inclined letters from a single template. Figure 11-34 shows a scribe in the *open* position for *slant* lettering. Except for a locknut, which permits the setting of an adjustable scribe to be changed, both scribes consist of a *tracing pin*, *socket screw*, *finger grip*, *adjusting screw*, *locknut*, *tailpin* and an *aluminum mount*.

Lettering Set Operation

The recommended combinations of pens and templates are presented in Chapter 2.

The rules for freehand letter sizing and spacing also apply to mechanical lettering. For blocks of lettering having more than one line of lettering, horizontal baselines may be drawn at intervals for the proper spacing between each line for the size of letters used. Lines of lettering are arranged symmetrically about a vertical centerline. In centering a line of lettering, count the number of letters in the line, add one-half for spaces between words, and subtract one-half for each letter I (large i), l (small L), or for each number 1. Select the template bearing letters of the desired size and place the zero of its scale on the vertical centerline. Mark the number of divisions equal to half the number of words in the line first to the left, then to the right of zero. This indicates the approximate starting and ending points. *Once you become used to the mechanical lettering set, letter or number centering will be by eye.*

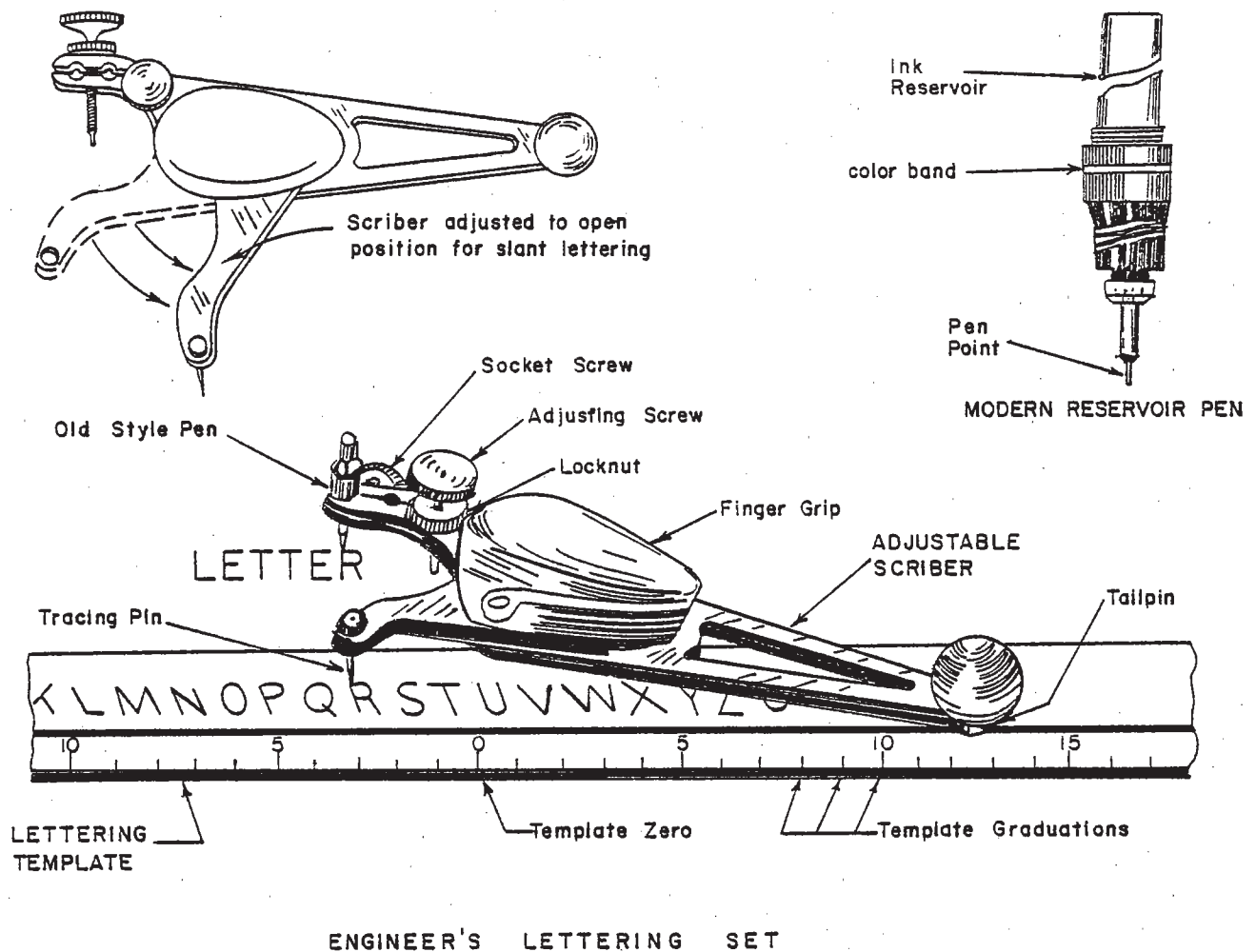


Figure 11-34

Procedure. Loosen the socket screw. Choose the pen recommended for the letter size. Insert the pen in the pen socket so that the shoulder sits against the scriber arm, and tighten the socket screw. Loosen the adjusting screw locknut. With the lettering template against the drafting machine straightedge, set the scriber tailpin in the straight groove of the template and the scriber tracer pin in the groove for the letter or number character. Using a piece of scrap mylar for trial lines, regulate the adjusting screw so that the cleaning pin is pushed far enough back to allow the ink to flow freely. *If the pin is pushed too far back so that there is no clearance provided and the pen sleeve is allowed to rest against the map surface, the ink will not flow smoothly.* The amount of clearance varies with the consistency of the ink and the nature of the drawing surface. When satisfactory trial lines are produced, tighten the adjusting screw locknut. Proceed with the lettering by moving the tracer pin in the character groove, at the same time keeping the tailpin in the straight groove. Spacing between letters is by eye and involves the same considerations of equal letter areas as in freehand lettering.

Technique. Hold the drafting machine straightedge in position with the ball of the left hand against it. The fingers of the left hand hold the lettering template against the working edge of the straightedge and change the position of the template when necessary.



Figure 11-35

The scribe is held between the thumb and first three fingers of the right hand. The little finger of the right hand presses the right side of the template against the T-square edge, preventing slipping from the motion of the tracing pin in the character grooves.

LETTERING

The lettering on cadastral maps should be *single-stroke*, uppercase, commercial gothic. On finished tracings all Leroy lettering shall be vertical uppercase, except for the names of bodies of water; these should be slant (inclined) uppercase. The names of subdivisions are to be the vertical uppercase shadow style.

Dimensions, bearings, survey corner data and notes are to be single-stroke, uppercase commercial gothic.⁶ Vertical freehand lettering or inclined freehand lettering may be used, but only one type should appear for a single map. The expression *single-stroke* means that the width of lines composing the letters is the same as the width of a stroke of the pen or pencil being used for lettering; it does not mean that each letter is executed with a single, continuous movement of the pen or pencil. *Uppercase* refers to capital letters, *lowercase* to small letters.

Letter and Number Proportions

The ratio of letter width to letter height varies with individual letters. This section presents standard proportions that take into consideration the characteristics of individual letters. Letters using these proportions are called *normal letters*. When letter width is decreased in relation to letter height to conserve space, the letters are said to be *compressed letters*. When letter width is increased in relation to letter height, the letters are known as *extended letters*.

Stability

If the areas of upper and lower portions of certain letters and numbers are made equal, an optical illusion is created which causes them to appear top heavy (i.e., the number 8). To correct this and give the impression of stability, the letters B, E, F, H, K, S, X, and Z and the numbers 2, 3, 5, and 8 must be drawn smaller at the top than at the bottom. The central horizontal strokes of the letters B, E, F and H are drawn slightly above the center. The upper portions of the letters K, S, X and Z and the numbers 2, 3, 5 and 8 are made slightly narrower than the lower portions.

Uniformity

Lettering on a map must present a uniform appearance. Height, inclination, alignment, line weight and spacing are the principle considerations. Uniform height, alignment and inclination are achieved through the use of guidelines; however, once a cartographer becomes proficient at freehand lettering, he can produce *fairly* uniform lettering without the guidelines. Uniformity in line weight depends on the skillful use of the pencil or lettering pen. Uniform spacing of the letters in words and of words in sentences (or numbers in dimensions) is performed by eye. *Good judgment results from practice.*

Freehand Letter Formation

All letters and numbers are drawn with the basic strokes illustrated in Figure 11-37. To execute satisfactory letters, a cartographer must learn and practice the direction and sequence of the strokes used to form each letter.

Position. Rest forearm on the drafting table below the edge of your map sheet. Hold the pencil or pen between the thumb, forefinger and second finger so that each rests against a side. The third and fourth fingers and the ball of the palm rest on the map sheet.

Basic Strokes. Vertical strokes are drawn from the top down with an even finger movement. Inclined strokes are drawn in the same way and are slanted in the desired direction. Horizontal strokes are drawn from left to right (or reverse for a left-handed cartographer) with a complete hand movement, pivoting at the wrist. Curved strokes proceed from above downward, moving in the desired direction, and are produced with a combined finger and wrist motion. Lettering strokes are *drawn*, not *sketched*; the uniform, single-stroke appearance required of lettering can be achieved only by practicing the fundamental strokes in the manner described.

Lettering Pen Technique. The lettering pen is held in the same manner as the pencil, tightly enough for control but allowing a loose, free movement. Strokes are *drawn*, not *sketched*, in the same manner as pencil strokes. Avoid undue pressure on the pen; pressure forces the cleaning pin of the point too far back so that the shoulder, or sleeve of the point, rests on the mylar. This will stop the ink flow and wear out the pen. Hold your pen in the same manner consistently because tilting it in different directions causes different stroke weights. Regular practice is the only way to achieve uniform lettering of acceptable quality.

Vertical Letters. Figure 11-35 illustrates the required shape of vertical letters and numerals. Figures 11-38, 11-39 and 11-40 illustrate the construction of letters

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0 $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{16}$

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0 $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{16}$

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0 $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{16}$

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z

VERTICAL COMMERCIAL GOTHIC LETTERING

Figure 11-36

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0 $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{16}$

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0 $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{16}$

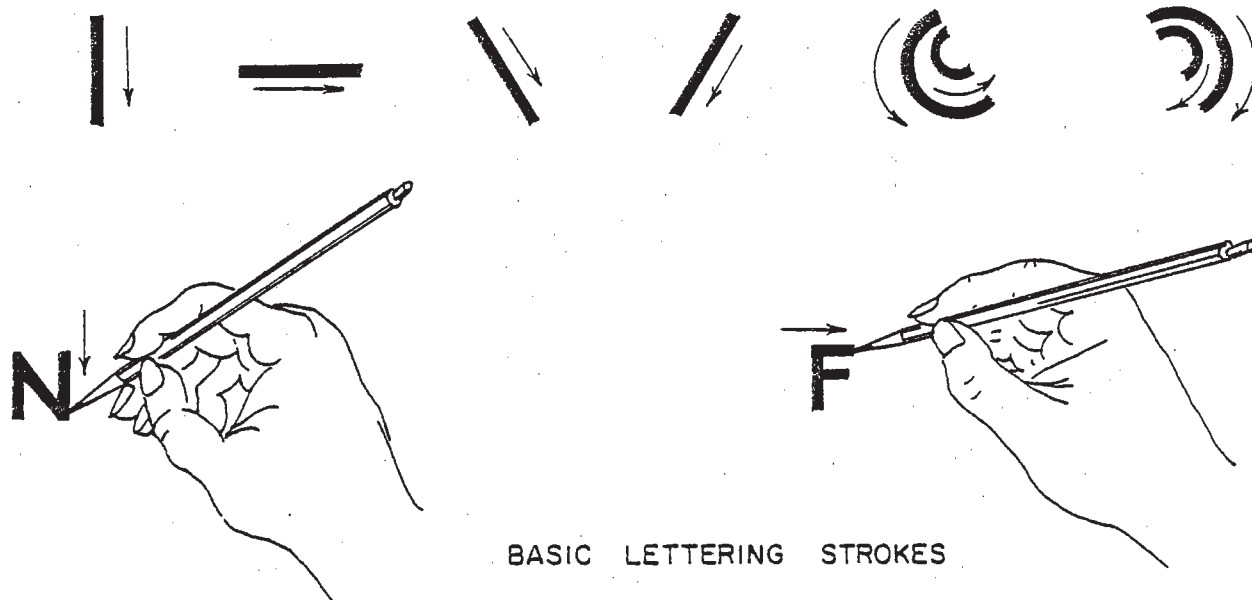
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 0 $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{16}$

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z

INCLINED GOTHIC LETTERING

Figure 11-37



BASIC LETTERING STROKES

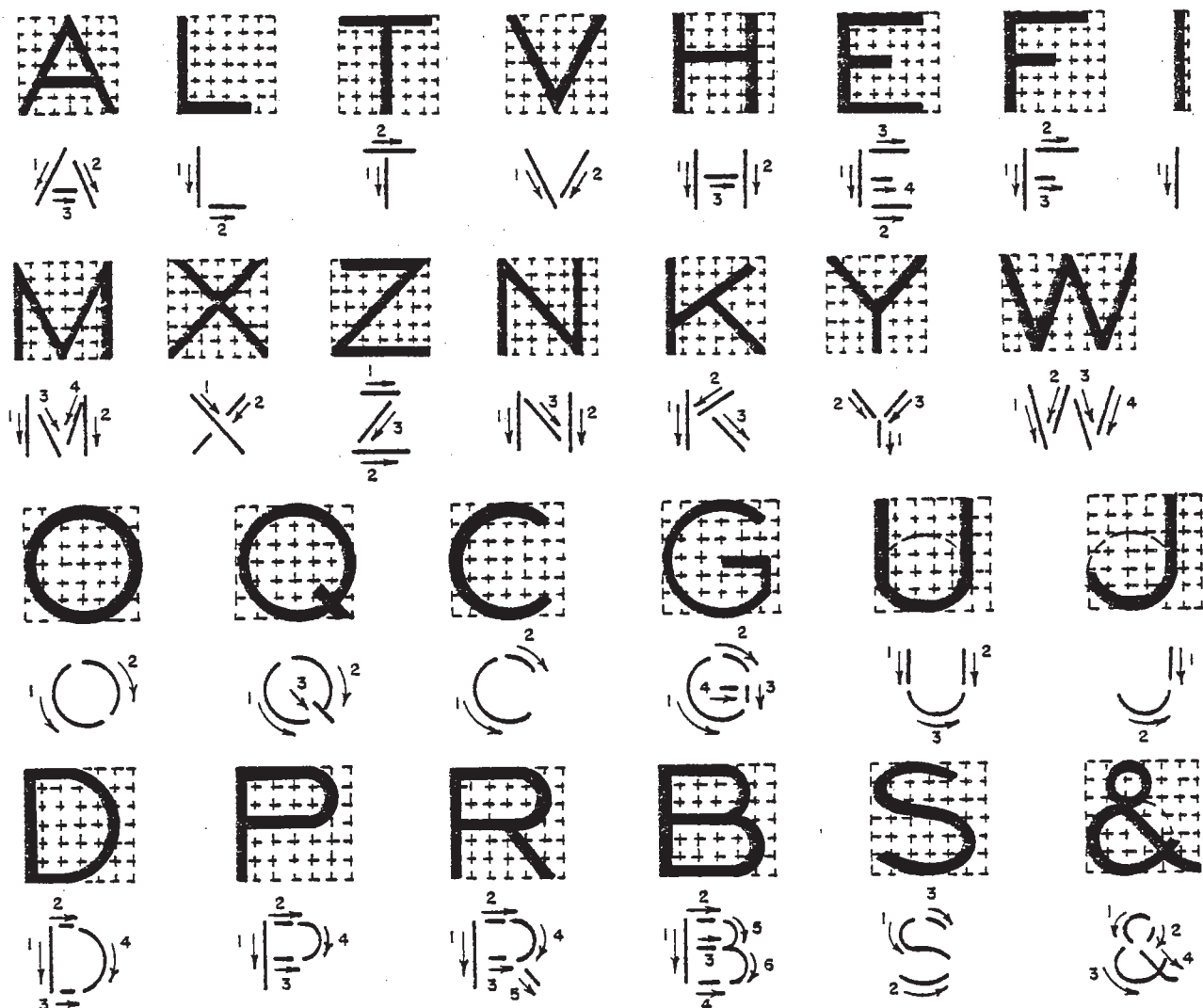


Figure 11-38

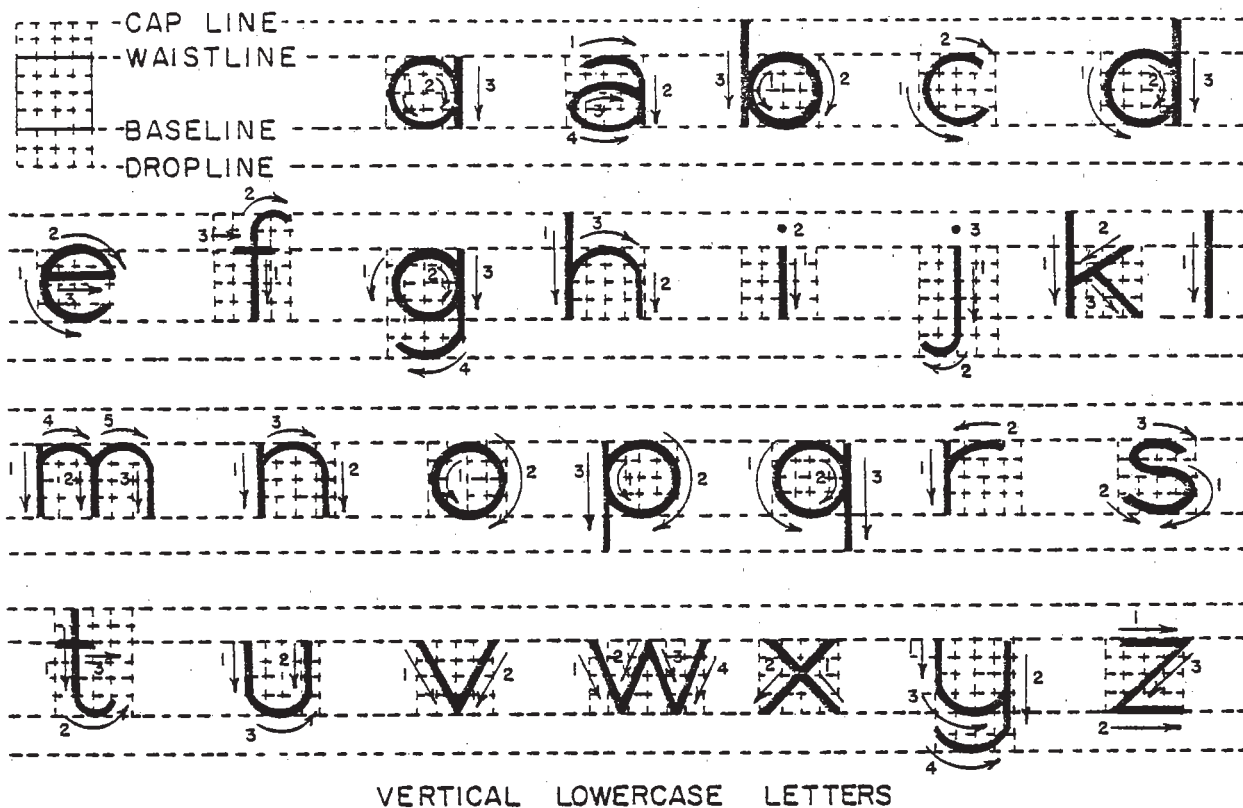


Figure 11-39

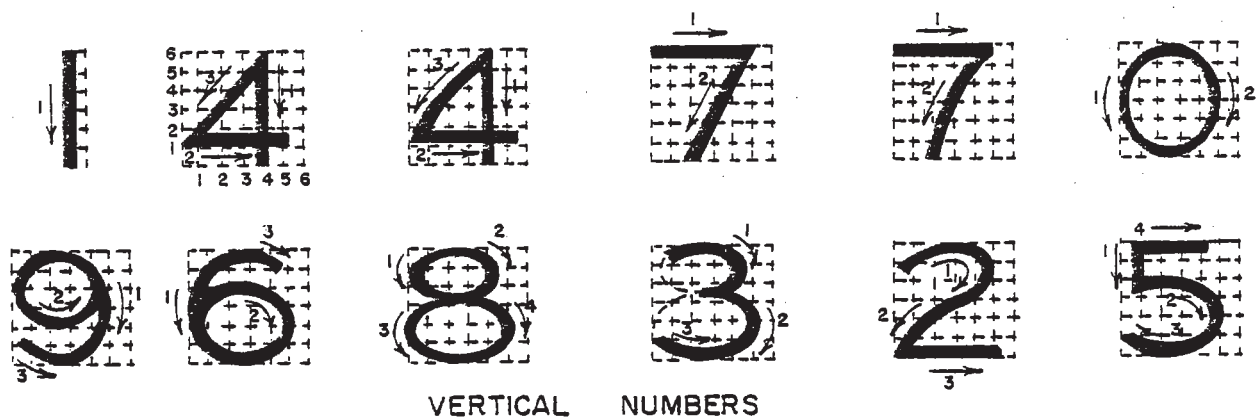


Figure 11-40

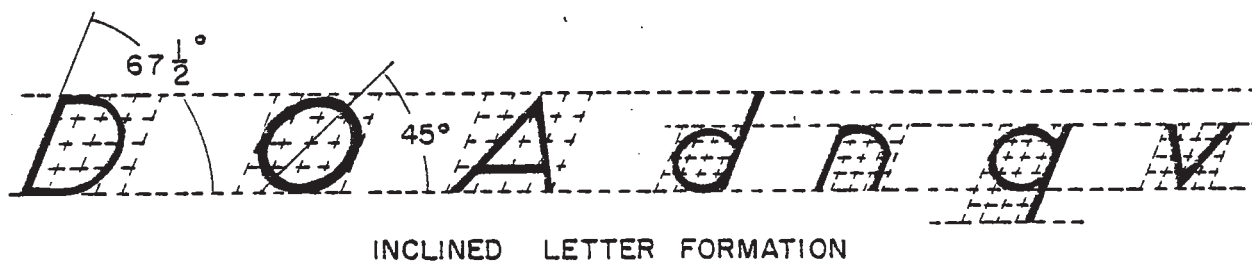


Figure 11-41

and numbers against a square background with each side divided into six equal units. The background will serve as a reference framework for comparing the height of the various characters in proportion to their width, as well as the location of the individual lines that compose each letter and number. A smaller drawing below each character shows the direction and sequence of the strokes used in the formation of the character.

The need for drawing number characters *carefully* cannot be overstressed, particularly in the layout of your cadastral map. A poorly executed number can cause serious errors and delay.

Inclined Letters. Figure 11-36 illustrates the required shape of inclined letters and numerals. Figure 11-41 shows the formation of some inclined letters. The angle of inclination (slant) should be no less than 67.5° with the horizontal. The sequence of strokes for inclined letters are the same as for vertical letters. Rules of stability, proportion and balance are similar. The circles and circle arcs used in vertical letters become elliptic in inclined letters, their major axes making angles of 45° with the horizontal.

Uppercase Letters in Words. Proper spacing of uppercase letters in words requires that the areas occupied by the letters *appear* equal rather than that the actual clearance between the letters be equal. In the word MELT, for example, the actual spacing between the L and T can be so close that a vertical dropped from the left end of the horizontal stroke of the T will touch the right end of the horizontal stroke of the L. The areas enclosed in the letters by their vertical strokes gives the appearance of adequate clearance. The actual clearance between M and E must be such that the areas enclosed by their adjacent vertical strokes are roughly equivalent to those between the vertical strokes of L and the imaginary vertical connecting the horizontal strokes of L and T. The actual clearance between E and L can be slightly less than between M and E. The spacing between words should be equivalent to the basic width of M or O (if space allows).

Some Geometrical Solutions Used in Cartographic Drafting

The geometric constructions in this section occur frequently in engineering and cartographic drafting. They show how geometrical problems involving straight lines and circles can be solved with only a pencil, straightedge and compass. Although a modern cartographer can improve his speed and accuracy

by using the many instruments at his disposal, the solution of these problems affords an opportunity for practice in *accurate* instrumental drafting.

Postulates

All constructions are based on three postulates stated by Euclid.

1. A straight line can be drawn from one point to any other point.
2. A straight line can be extended to any length.
3. A circle can be described with a given point as center and any given line as radius.

Basic Problems

Any compass and straightedge construction is composed of a succession of three fundamental problems:

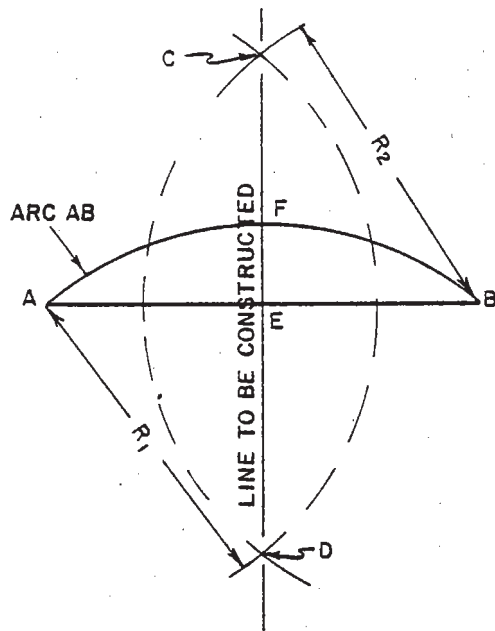
1. To construct a straight line through two points;
2. To find the point at which two lines intersect; and
3. To draw a circle (or circle arc) of given center (the radius point) and radius (the distance from the radius point to the arc of the circle).

Bisecting a Line

- a. With A as the center (of Figure 11-42) and radius R_1 of any convenient length, draw arcs on both sides of line AB.
- b. With point B as a center and radius R_2 equal to R_1 , draw arcs on both sides of line AB; intersecting the previously drawn arcs at points C and D.
- c. Connect points C and D, bisecting line AB at point E. This is half way between point A and point B.

Bisecting an Arc

- a. With point A (of Figure 11-42) as a center and radius R_1 of any convenient length, draw arcs on either side of the given arc AB.
- b. With point B as a center and radius R_2 equal to R_1 , draw arcs on either side of the given arc AB intersecting the previously drawn arcs at points C and D.
- c. Connect points C and D, bisecting arc AB at point F. It will be noted that this solution is identical to the preceding solution. It is *not necessary* to construct line AB.



BISECTING A LINE OR ARC

Figure 11-42

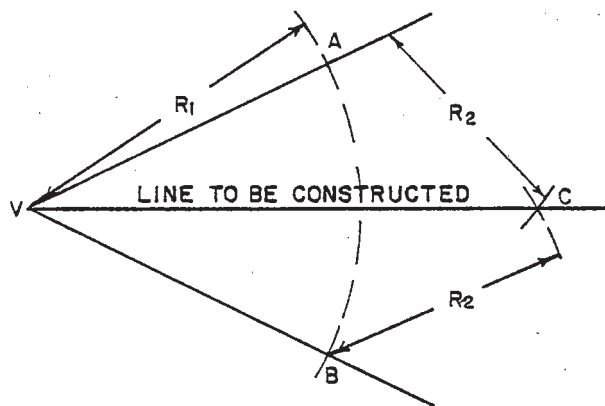


Figure 11-43

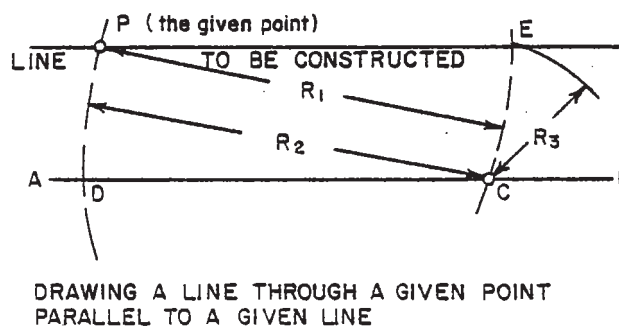


Figure 11-44

Bisecting an Angle

- With point V (of Figure 11-43) the *apex* of the given angle AVB, as a center and with radius R_1 of any convenient length, draw an arc intersecting both sides of the angle.
- With the points of intersection thus formed as centers and with radius R_2 of any convenient length, draw arcs intersecting at point C.
- Connect points V and C, bisecting the angle.

Drawing a Line Through a Given Point Parallel to a Given Line

- With given point P (Figure 11-44) as a center and a radius R_1 of any convenient length, draw an arc intersecting the given line AB at point C.
- With point C as a center and with radius $R_2 = R_1$, draw an arc intersecting line AB at point D.
- With point C as a center and radius R_3 equal to PD, draw an arc intersecting the arc drawn in AB at point E.

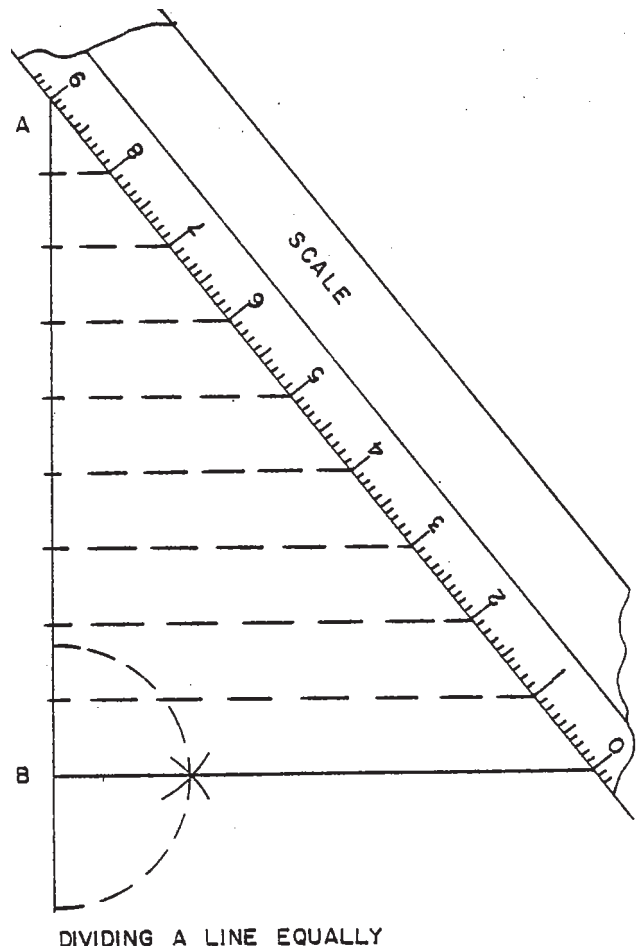


Figure 11-45

- d. Connect given point P with point E, forming the required parallel to given line AB.

(This is strictly a mental exercise because the drafting machine is capable of parallel line construction.)

To Divide a Line Into a Given Number of Equal Parts

- a. Extend line AB (Figure 11-45) and, with B as center, draw arcs of equal radius intersecting line AB and the extension.
- b. With these intersections as centers, draw arcs of equal radius intersecting each other on either side of line AB.
- c. Connect these intersections, thus erecting a perpendicular to line AB at point B.
- d. Place your engineer scale so that the given number of equal divisions, say nine, are included between point A and a point on the perpendicular, and mark off the divisions.
- e. Draw lines parallel to the perpendicular from the points thus located, intersecting line AB and, therefore, dividing the line into the required nine equal parts.

Erecting a Perpendicular to a Line from a Given Point

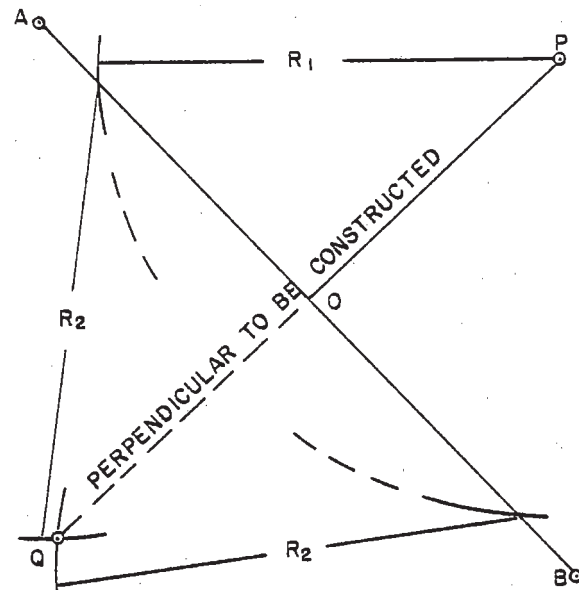
- a. With given point P (Figure 11-46) as a center and radius R_1 of any convenient length, draw arcs intersecting given line AB.
- b. With these intersections as centers and radius R_2 of any convenient length, draw arcs intersecting at point Q.
- c. Line PQ is the required perpendicular with point O, the intersection of the perpendicular with a given line.

Erecting a Perpendicular to a Line at a Given Point

- a. To erect a line perpendicular to a line PB at point P (Figure 11-47), select any convenient point O as a center and, with radius OP, draw an arc slightly greater than a semicircle from line PB.
- b. Extend a line from the intersection of the arc and line PB through point O, intersecting the arc at point C.
- c. Connect points P and C, forming the required perpendicular.

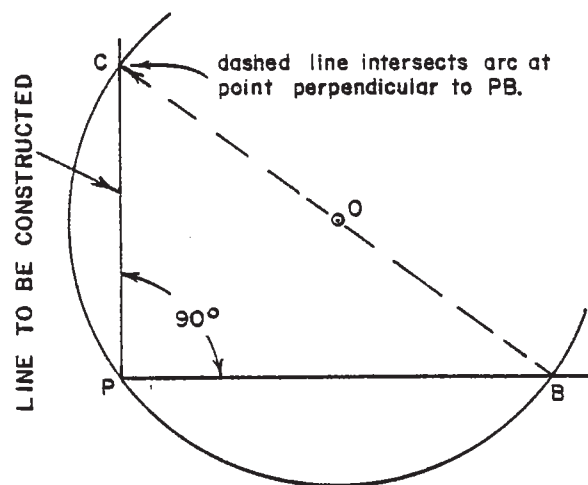
To Draw a Circle of Given Radius Tangent To a Given Line and Passing Through a Given Point

- a. Given the required radius $R_1=200$ feet (Figure 11-48), draw line CD parallel to given line AB at a distance equal to this radius.
- b. Using the given point P as a center and using the same radius, draw an arc intersecting line CD at point O.



ERECTING A PERPENDICULAR FROM A POINT TO A LINE

Figure 11-46



ERECTING A PERPENDICULAR AT THE END OF A LINE

Figure 11-47

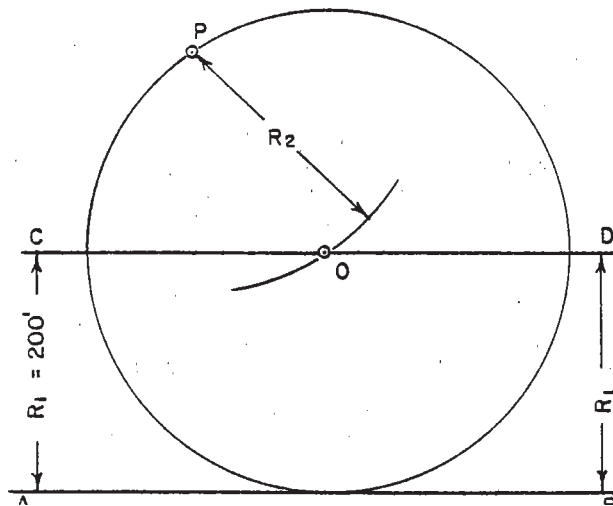


Figure 11-48

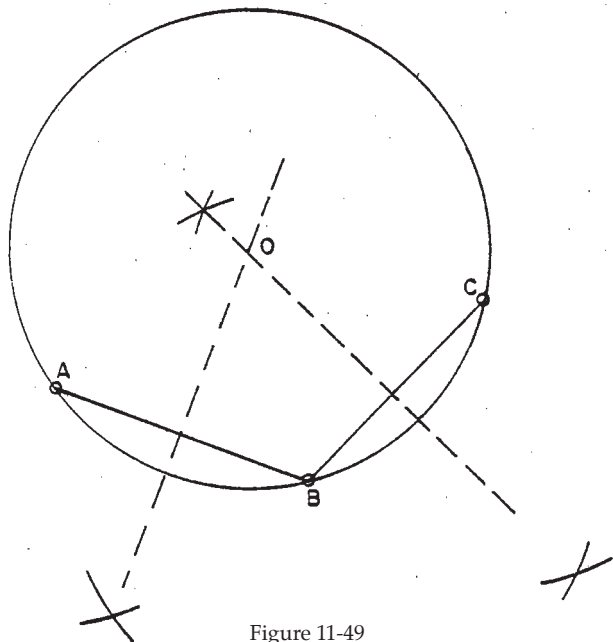
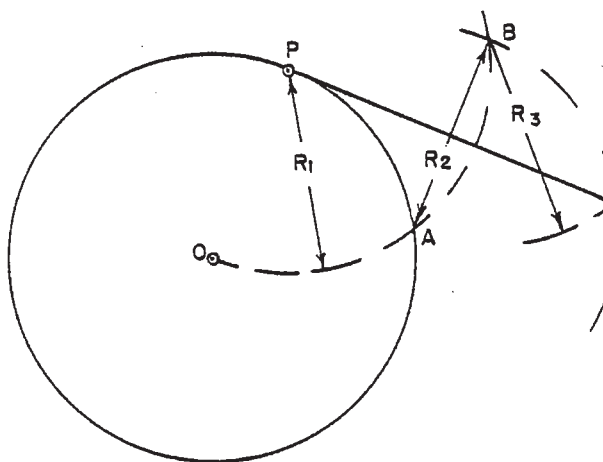


Figure 11-49



DRAWING A TANGENT TO A CIRCLE AT A GIVEN POINT.

Figure 11-50

- c. Using point O as a center (radius point) and with the same radius, draw a circle through point P tangent to line AB.

To Draw a Circle Through Three Given Points

- a. Draw chords AB and BC (Figure 11-48) connecting the three given points.
- b. Draw lines bisecting chords AB and BC, intersecting at point O.

Drawing a Tangent To a Circle at a Given Point On the Circle

- a. With given point P (Figure 11-50) on the circumference of the given circle as a center, and with radius R_1 equal to the radius of the given circle, draw arc OAB intersecting the circumference of the circle at point A.
- b. With point A as a radius point and $R_2 = R_1$, strike an arc as indicated in Figure 11-50. Point B is the point of intersection.
- c. With point B as the radius point and $R_3 = R_1 = R_2$, strike an arc with C as the point of intersection.
- d. Connect points P and C to form the required tangent.

Drawing Two Tangents to a Circle from a Given Point

- a. Draw line OP connecting the center of the circle O with the given point P (Figure 11-51).
- b. Bisect line OP at point C.

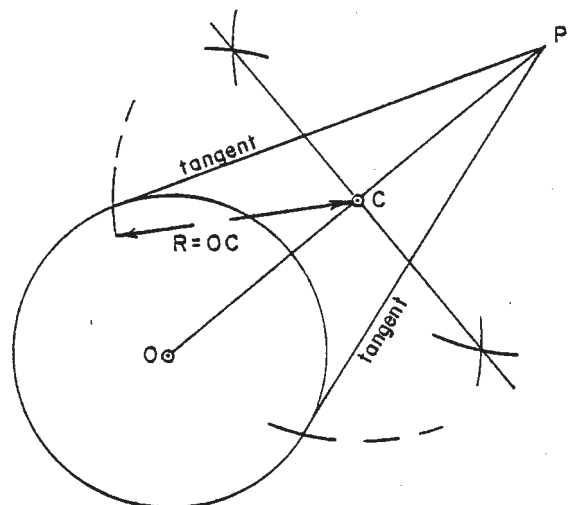


Figure 11-51

- c. With point C as a center and OC as a radius, draw arcs intersecting the arc of the circle.
- d. From the points of intersection thus formed, draw the required tangents to point P.

To Round Off a Right Angle With an Arc of a Given Radius

- a. With point B (Figure 11-52) as a center and given radius R, draw arcs intersecting the sides of the right angle at points L and M.
- b. With points L and M as centers and with the same radius, draw arcs intersecting at point O.
- c. With point O as a center and with the same radius, draw the required arc LM.

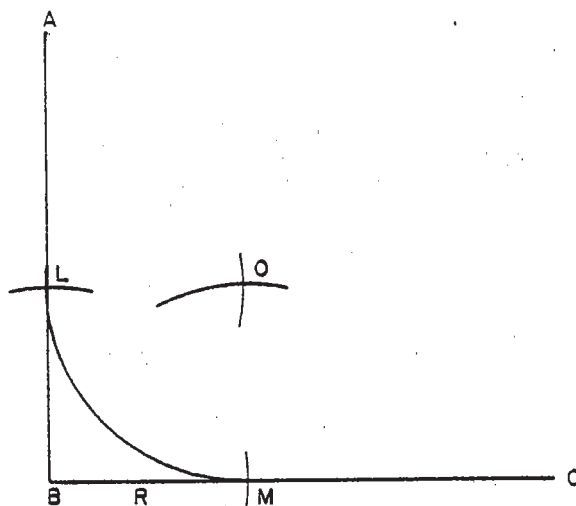


Figure 11-52

To Draw an Arc of a Given Radius Tangent to a Line and a Circle

- a. Let line AB (of Figure 11-53) be the given line, R_1 the given radius, and R_2 the radius of the given circle. Draw a line parallel to line AB at a distance equal to R_1 .
- b. With point O as a center and radius $R_3 = R_1 + R_2$, draw an arc intersecting the constructed parallel at point C.
- c. With point C as a center and a radius $R_4 = R_1$, draw the required arc tangent to the given line and circle.

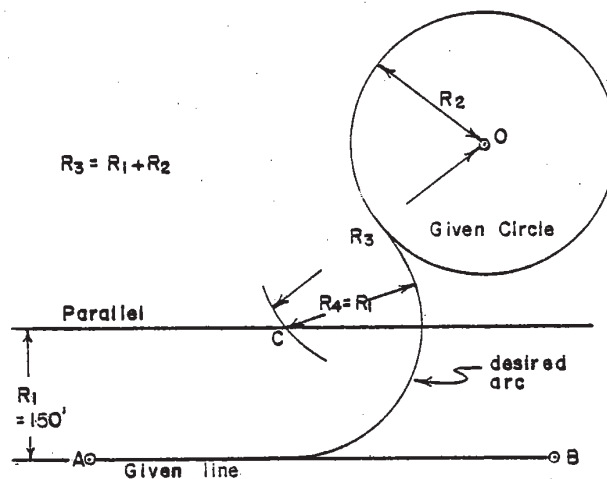


Figure 11-53

To Draw an Arc of Given Radius Tangent to Two Circles

- a. Let R (Figure 11-54) be the given radius and R_1 and R_2 the radii of the given circles. With point O as a radius point and a radius equal to $R + R_2$, draw an arc that projects at the approximate point of desired point P.
- b. With point S as a radius point and a radius equal to $R + R_1$, draw an arc that intersects the first arc. This is radius point P.
- c. With point P as the radius point of the desired arc, and the given radius R, construct the desired arc tangent to the two circles.

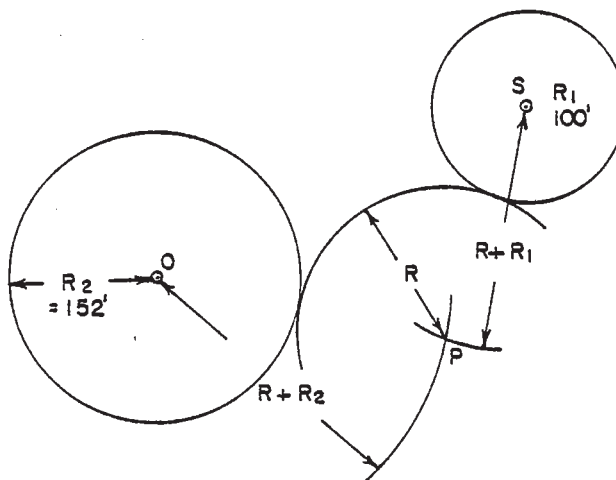


Figure 11-54

NOTE: SEE CHAPTER 8 FOR SPECIFIC INFORMATION ON THE CONSTRUCTION OF HIGHWAY AND RAILROAD CURVES.

DRAFTING THE FINISHED TRACING

Refer to Chapter 2 for the cadastral map standards to be used on cadastral map tracings.

The objective of the cartographer, when making a tracing, must be to *produce a final, error-free, finished cadastral map with sharp, clean lines and neat, legible and uniform lettering*. The tracing should be **MORE** accurate than the layout. To clarify the last statement, it is at the tracing step that many of the mistakes made in constructing the layout map can be spotted and corrected.

Tracing Medium

Cadastral map tracings are to be made on 18" x 20", .003 mil polyester drafting film. The specifications are spelled out in the first section of this chapter. All ink work must be executed on the matte side of the polyester film. Use the drawing inks prepared for polyester film **FOR ALL INK WORK**. Failure to do this will result in the ink flaking off, or rubbing off the film several months after the tracing is completed.

To prepare the film for tracing, clean the matte surface with a rubber cement *thinner* and cheesecloth. This will remove manufacturer's chemicals, grease and dirt from packaging and handling, and will provide a tacky surface for good ink adhesion. The tracing should be **LIGHTLY** wiped with the thinner during tracing and before making maintenance alterations. **DO NOT USE ALCOHOL TO CLEAN YOUR TRACING. IT WILL REMOVE THE INK WITH VERY LITTLE EFFORT.**

Positioning the Map Boundary on the Tracing

After a final cadastral map tracing is completed, a print is made for the map book. If the map boundary is located correctly on the tracing, it will appear balanced in the map book. If, on the other hand, the boundary is *centered* on the tracing, it will appear *unbalanced* in the map book. This is because the map bookbinding occupies about two inches of the left side of the map. To provide a uniform appearance, the map boundaries must be located by the specifications defined in Chapter 2.

The map should be oriented so that the bottom edge of the tracing will be east and west in relation to the east and west bearings of the layout, north being at the top of the map. After the tracing film is correctly oriented to the pencil layout it should be taped to the

layout. Do not tape the film or layout to the table as you must be able to rotate the map during the tracing process.

Proper Tracing Sequence

The following is the required tracing sequence for Department of Revenue cartographers.

1. Obtain the *Map Record Card*.⁸ Check to see that the map has not already been traced.
2. Analyze the map before taping to film. Determine what tracing problems will be encountered in the process and what tracing equipment is necessary to do the job. Ask about the problem areas relating to the map area.

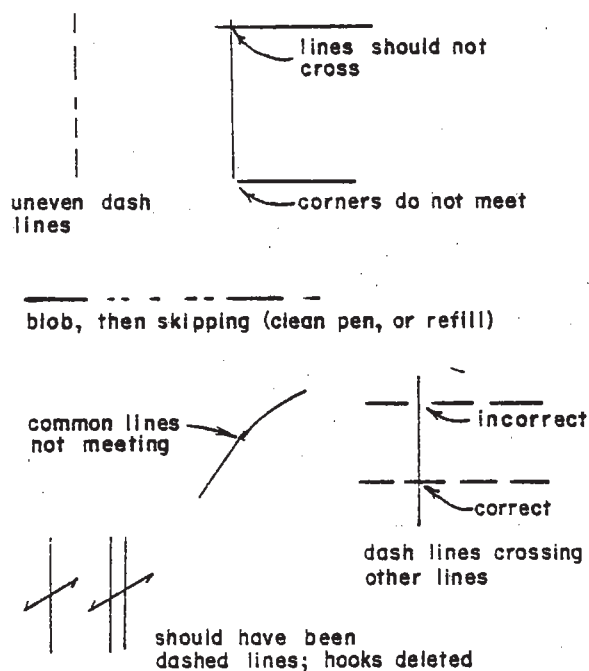


Figure 11-55

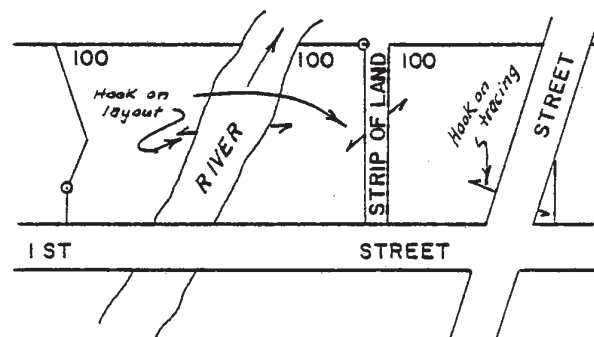


Figure 11-56

3. Before taping the film to the layout, the map should be checked with abutting maps to see that ALL LINES MATCH PERFECTLY. Also, all information on the boundaries of abutting maps must be in harmony with the layout.
4. Tape the film to the layout, carefully observing the rides for positioning the map layout, on the film (Chapter 2).
5. Clean the mylar with rubber cement thinner. Brush the mylar to remove any lint or dust from the rag used to clean the mylar.
6. *Order of Inking.*
 - a. Lines are inked in a definite order to save time that would otherwise be wasted in waiting for inked Lines to dry. The natural progression for drawing horizontal lines is from top to bottom. Vertical lines normally are drawn in sequence from the left- to the right-hand side of the sheet.
 - b. Ink the irregular roads that must be done with the railroad pens. When using the pen make equal line widths and proper spacing between right of way lines.
 - c. Next, ink all of the right of way lines; starting with small arcs, large arcs, horizontal lines, vertical lines and finally, inclined lines. If a compass or specific curve was used to construct the curve on the layout, the same method must be used to construct the curve on the tracing.
 - d. Put in the *standard* railroad symbol (see Chapter 2).
 - e. Put in all corners, traverse point and engineering station circle symbols (see Chapter 2). The 00 pen point lines should only run to the edge of the circle—not *through the circle*. The circles can easily be made with a circle template that has a 1/20" circle.
 - f. Add the heavy No. 4 map boundary lines. Do not draw these lines through the circular corner symbols.
 - g. Trace in all property lines, survey lines, section grid, easements, etc. Note: *a hook (↙) across a line on the layout means that the line is not an ownership line; therefore, it must be traced as a dash line. A broken hook on each side of any strip of land (road, stream or otherwise) means that the ownership of the land on one side of the strip is the same as on the other side of the strip. In this case the line is not to be dashed. See Figure 11-55.*

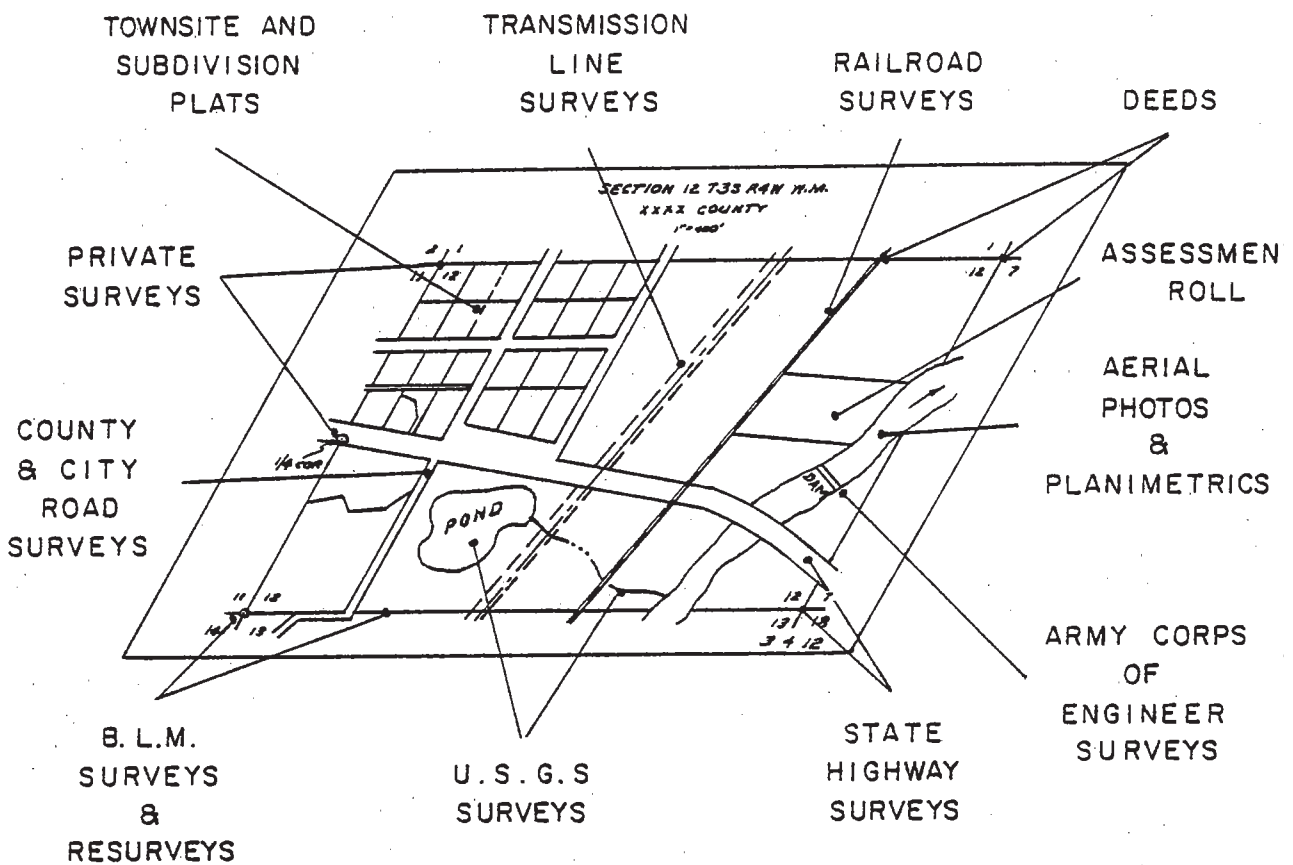
In Figure 11-55 the parcel numbers are to be placed in the upper left-hand corner of each isolated part of the parcel, in addition to the main body of land. Where the number can be placed in the isolated part, the hooks are *not* added to the tracing. However, some isolated parts of parcels are too small to contain the parcel number. In these cases it is necessary to add the hook as illustrated in the lower right-hand corner of Figure 11-55.

- h. Ink in all freehand 00 and No. 4 lines; i.e., lakes, rivers, creeks, etc. See Chapter 2 for single line creek symbols. Add the arrow that indicates the direction of flow of the water.
- i. Apply the code and subdivision lines on the back side of the tracing film. This should be done using adhesive mylar pattern chart tape (transparent; i.e., Chartpak). Be sure to burnish the tape onto the film.
- j. Add the shadow lettering.
- k. Add all freehand lettering.
 1. Add all Leroy lettering. Remember, code area numbers are to be placed in center of the respective code area. Parcel numbers are lettered in the upper left-hand corner of each parcel.
7. Check your tracing.
8. Clean up any rough spots. Figure. 11-56 shows some of the common deficiencies in ink work.
9. Initial and date the tracing at the left end of the film. Initial and turn in map record card.

The final check of the tracing (for errors and omissions) is best done by a cartographer other than the person who executed the tracing. A cartographer who checks his own work is liable to overlook his omissions and mistakes. It is as necessary for the checker to proceed systematically in reviewing a tracing as it is for the cartographer to work systematically in producing it. Corrections should be noted on the tracing with a *nonreproduction pencil*.

Endnotes

1. Drafting vellum is a translucent high quality paper.
2. Based on U.S. Government specifications.
3. With exception that the blue transparent tap works best for codes lines. See Chapter 2.



CHAPTER 12

MAP COMPILATION AND CONSTRUCTION

INTRODUCTION

The central operations of cadastral cartography are:

- A. Planning
 - 1. Cartographic design
 - 2. Generalization¹
 - 3. Development of specifications and graphic standards.
- B. Map Compilation
 - 1. Compilation of reference data
 - 2. Analytical Bridging
- C. Map Construction
 - 1. Plotting control points and lines
 - 2. Cartographic drafting
- D. Map Finalization
 - 1. Map Detailing
 - 2. Final drawing (or tracing)
 - 3. Map editing
 - 4. Map reproduction
- E. Map Maintenance
 - 1. Upgrade map geometry to coincide with current land surveys.
 - 2. Update map lines, points and data to conform to new deeds, ordinances, subdivisions, etc.
 - 3. Upgrade photogrammetric detail to conform to new aerial photogrammetry.
 - 4. Remap when necessary.

This chapter will describe the map compilation and map construction operations. The explanation and description of the operations and suboperations are brief. In fact they will appear over-simplified. This is because *most* of the operations are performed using concepts and principles of the preceding chapters. It would be redundant to repeat that information here. For example analytical bridging is accomplished by using the trigonometric procedures for computing missing measurements, traverse closure, etc., that are defined in Chapter 9.

It is IMPORTANT, at this point, that we place special emphasis on two fundamental principles of cartography.

Principle 1. *The purpose for which a map system is designed governs the procedures, methods, and standards employed in that system.*

It is, therefore, incorrect to assume that one set of concepts, methods, and procedures will apply to every kind of mapping program. For example, a.

photogrammetric map base is adequate for many kinds of mapping. This does *not* mean that it is adequate for *every* kind of map base. Likewise, the fact that the cadastral map system employs the cadastral land survey to control map geometry does not mean that this approach is applicable to every kind of map system.

Principle 2. *Maps are like fingerprints—no two are exactly the same. Consequently, the problems of each map will differ; thus requiring different approaches to problem solving.*

Therefore, it is impossible to provide one outline and one set of solutions that will apply to every mapping situation. All that we can provide is a *general* outline that applies to *most* situations. The solutions to the problems are accomplished by the precise scientific methods defined in the preceding chapters., and a *high degree of professional skill*.

DEFINITIONS

Analytical Bridging. The assembly, evaluation, mathematical analysis. selection and rejection of all horizontal surveys. The purpose is to build a continuous network of survey quadrilaterals to *bridge* as many cadastral map elements as possible.

Base Control Map. A graphic-geometric network of *primary survey* quadrilaterals that serve as a base: for *secondary surveys*, for the lines and points to be plotted from instruments of conveyance and for the natural and cultural features to be supplied by aerial photography. Generally synonymous with *basic map control*, *control map base* or *control*.

Map Life. The *effective* life of any map. In cadastral cartography it is that period of time when a map accurately represents the latest surveys, aerial photos and deeds. It is measured from the time that the original map is completed to that point in time when it will no longer accomodate new property segregations, new surveys, new photogrammetric detail or new parcel numbers. It also terminates when map specifications and graphic standards are no longer adhered to. It is based on the principle that *the permanent map does not exist*.

Map Triangulation. A system of joined or overlapping triangles in which the size of angles and length of sides are either established from existing curves, or are computed using existing survey data.

Maverick Survey. A survey that is not in harmony with abutting surveys. The term does not mean

that the survey is in error. In fact, new surveys are often labeled as maverick surveys because they are executed at a greater degree of precision than were the abutting surveys; hence, the measurements of the older surveys do not conform to the later.

Primary Survey. A survey that provides controlling data for bridging the section and township corners and the points, monuments and lines of other primary surveys, e.g., a subdivision survey, or a survey of a B.P.A. transmission line. See *secondary survey*.

Secondary Survey. A survey that does not provide measurements that could be used in map control. A survey that is subordinate to — or based on — a larger survey. A good example would be a survey of a lot in a subdivision, the subdivision survey would be the *primary survey*; the survey of the lot would be a *secondary survey*.

The eight *Generations of Control*. The author's classification of the various levels (or stages) of control now employed, or that were at one time employed in the cadastral map system. Generations one through six are in order of the quality of control; beginning with the lowest quality. This order of classification generally parallels the chronological order of employment in the cadastral map system; the sixth generation being the level of control now employed by the Department of Revenue. Levels seven and eight are considered superior approaches to map control to those now employed.

Trilateration. A method of surveying in which the lengths of the sides of triangles are measured.

DEVELOPMENT OF MAP CONTROL

What type of map control will provide us with the best framework upon which a cadastral map can be developed? Since the inception of the cadastral map program a considerable amount of thought, time and money has been invested in developing map control. The Department of Revenue and the counties have tried various systems of control. These are listed below. Most of the early approaches to control failed to solve such problems as gaps, overlaps, loss of meridian, accumulative error, mismatching at map borders, etc. Once a scientific approach was employed at the sixth generation of control, most of the traditional cadastral map problems were eliminated.

The original sixth generation of control has been improved many times to keep abreast of technological changes; improvements made to take advantage of the positive elements of other control systems; and improvements made to correct some inherent weaknesses of the original plan. Therefore, it is reasonable to expect further developments; at least as long as there are problems to be solved.

First Generation Control. This level was employed in the early years of cadastral mapping. Under this system any desired point, line, or series of lines were employed as the foundation of the map; regardless of the weighted evidence that *other* points and lines would provide better control. Each map was drawn with no consideration to abutting data. Often, the U.S. Public Land Survey was employed at the control base; all other cadastral data was adjusted to fit the section lines. Some maps were constructed by plotting one deed, and then building onto that deed polygon by plotting abutting deeds, and so on. *Surveys were rarely used.*

Second Generation Control. This was a slight improvement. The U.S. Public Land Survey became the base, then section corners and section subdivision corners were adjusted to conform to some of the cadastral surveys.

Third Generation Control. This level of control was based entirely on U.S.G.S. horizontal control without regard for the cadastral surveys executed by the governmental and private survey agencies.

Fourth Generation Control. This could be considered as a *scientific approach*. It is like sixth generation control, except that it is based on a random selection of horizontal survey data.

Fifth Generation Control. Control at this level is generated from aerial photos or orthophotos (or both) employing good horizontal and vertical ground control. This level is excellent for many map purposes because, in a geographic sense, the spacial relationships of cultural and natural physical features are very accurate. However, when related to cadastral needs it falls short of supplying the monuments corners, measurements, and lines upon which the deeds are based.

Sixth Generation Control. This level requires the use of *all* available horizontal survey data to establish map geometry. It employs the analytical bridging techniques, fifth generation control (when available), and the State Plane Coordinate System. Moreover, it has been refined to include computer-assisted mapping applications. Under

this system, control is generated over wide areas, and is plotted on 8' x 3' sheets of polyester film. The system is as applicable to one section map as it is to control of many sections.

Seventh Generation Control. Generations five and six are employed here. This level of control would include full vertical control as well as full horizontal control of *all* major cadastral elements. It is superior to the preceding levels because at this level any uncontrolled points would be located by field survey.

Eighth Generation Control. This level would incorporate fifth and sixth generation control procedures. In addition, the State Plane Coordinate grid, U.T.M and geodetic coordinates would be applied. It would employ full use of the *National Horizontal Control Network* with a positional accuracy specification not exceeding 1 part in 100,000 (or 1:100,000). *Note: At present much of the NHCN is used in the sixth generation of control.*

This categorization is not to imply that any of the above methods of control are the *ultimate*. It is almost certain that control procedures will improve as photogrammetric and land survey techniques improve. Moreover, computer-assisted-mapping (CAM) is destined to change much of our outlook on the control problem.

MAP COMPILATION

The first step in map compilation is the acquisition of *all* horizontal survey information. The word "all" is meant to be *all encompassing*. In other words, every U.S., state, county, city, and private survey (obtainable) must be considered in establishing cadastral map control. All other reference material should be obtained at this time (i.e., aerial photography, harbor charts, triangulation diagrams, quadrangle maps, etc.). The residual benefit of such a broad range of cadastral reference material is that you are building a reliable reference library for geographic names, contours, elevations, hydrographic features, vegetation features, cultural detail, physical features, demography, etc.

Reference Sources

Many federal, state, county, and city agencies are engaged in surveying and mapping. A large percentage of the material produced by these agencies has *usable* reference material for cadastral maps, e.g., maps, charts, survey notes and data, aerial

photogrammetry, geodetic control data, and map data in digital form. The chart of figure 12-1 shows the reference sources for major cadastral elements and cadastral detail. The following list of agencies and addresses includes a brief description of their surveying and cartographic activities.

U.S. Forest Service	USFS
P.O. Box 3623	
Portland, OR 97208	
Ph. Maps 221-3765; Orthophoto 221-2927	

Maps of national forests, wilderness areas, planimetric 15' quads, primary series 7.5' quads, aerials photo of national forests.

U.S. Corp of Engineers	USCE
P.O. Box 2946	
Portland, OR 97208	
Ph. 221-6473	

Maps of dams, reservoirs, navigable waterways, flood plain study areas. Various aerial photos 1936 to present.

Bonneville Power Administration	BPA
P.O. Box 3621	
ETLK	
Portland, OR 97208	
Ph. 234-3361 ext. 4643	

Transmission line maps (containing excellent survey control data & coordinate data). Low altitude photography along trans. lines.

Bureau of Land Management	BLM
(729 N.E. Oregon)	
P.O. Box 2965	
Portland, OR 97208	
Ph. 231-6273	

U.S. survey notes & plats (GLO & BLM). State of Oregon maps showing contours, county bdrys., highways, surface mineral and management status. Photo. of BLM lands; photomaps of Medford Dist; Orthophotos of Eugene Dist.

Soil Conservation Service	SCS
Federal Building	
1220 S.W. 3rd Ave., (16 floor)	
Portland, OR 97204	
Ph. 221-2794	

Soil-type maps and reports. Aerial photo. of agricultural lands.

Oregon State Forestry Dept.	OSFD
2608 State Street	
Salem, OR 97310	
Ph. 378-2504	

Maps of forest protection units, transportation, land manage. units, township aerial photo maps. High and low altitude photography.

Geology & Mineral Industries OGMI
1069 State Office Bldg.
Portland, OR 97201
Ph. 229-5580

USGS maps; topo, geologic, mineral resource maps. Geologic hazards maps. Geothermal, geophysical, rock resource, oil and gas deposit maps.

Land Conservation & Development LCDC
1175 Court Street NE
Salem, OR 97310
Ph. 378-4926

Maps of Oregon Coast (estuaries, forests, beaches, and dunes) and Pacific NW land resources inventory (land use, land ownership, energy, watersheds, soils).

Division of State Lands
1445 State Street
Salem, OR 97310
Ph. 378-3805

Maps and data on submerged and submersible lands; navigable status of Oregonlr waterways, etc.

Oregon Department of Transportation ODOT
Map Distribution, Rm. 17
Transportation Building
Salem, OR 97310
Ph. 378-6255 or 378-6256

Right-of-way maps. Highway & road index maps. City maps. Aerial photos.

Water Resources Dept. WRD
555 13th Street NE
Salem, OR 97310
Ph. 378-3671 or 378-8453

Maps of Drainage basins, water rights, adjudication, watersheds, flood plains, thematic. USGS for sale.

Cartography Center PSU
Portland State University
Cramer Hall
Portland, OR 97207
Ph. 229-3916

Cartographic facilities; map-related service, instruction, and assistance.

Department of Geography PSU
Portland State University
Cramer Hall
Portland, OR 97207
Ph. 229-3916

Collection of State, Federal, private and local agency maps. Aerial photos.

Environmental Remote Sensing ERSAL
and Applications Lab.
Oregon State University
Corvallis, OR 97331
Ph. 754-3056

Aerial photo.; remote sensed data. Landstate MSS & RBY imagery. Skylab imagery. NASA high altitude (U2) aerials photo; lack & white & color infrared.

Map Room - Kerr Library OSU
Oregon State University
Corvallis, OR 97331
Ph. 754-2971

Maps from federal, state, private, and local agencies. SCS & ASCS photography.

Cartographic Service OSU
Dept. of Geography
Oregon State University
Corvallis, OR 97331
Ph. 754-3141

Cartographic facilities, services & assist.

Map Room UO
University of Oregon
165 Condon Hall (basement)
Eugene, OR 97401
Ph. 686-3051

Large collection of maps & aerialphotos. Aerial photo archives (200,000 on file)

Oregon Department of Revenue DOR
Assessment & Appraisal Div.
Urban-Rural Mapping Unit
Revenue Building
955 Center Street NE
Salem, OR 97310
Ph. 378-3381; Mgr. at ext. 8-8218

Cadastral maps. Taxing district boundary information. Cadastral map standards Timber-type maps (not maintained). Some aerial photography Digital map file on part of Coos and Douglas County. Various historical maps. U.S.G.S. quad file, 15', 7.5' advanced and final (for ref. only). Microfilm—deeds, some co. surveys, BLM surveys (all), and old assessment rolls. Some 1/2" = 1 mile county maps. Legal file on various real property problems, i.e. ownership, submerged & submersible lands, assessment, roads, easements, etc.

National Cartographic Information Center
NCICW

Western Mapping Center U.S. Geological Survey 345 Middlefield Road Menlo Park, CA 94025 Ph. 415-323-8111 ext. 2427		Ph. 202-343-7435	
<i>Maintains information base on the location and availability of cartographic data. Sells copies of land use and land cover maps, maps of political units, hydrologic units, census county subdivisions, federal land ownership.</i>		Division of Cadastral Survey Bureau of Land Management (420) Washington, D.C. 20240 Ph. 202-343-8205	BLM/DCS
National Cartographic Information Center NCIC U.S. Geological Survey MS 507 National Center Reston, VA 22092 Ph. 703-860-6045		Bureau of Mines Mine Map Repository Denver Federal Center Denver, CO 80225 Ph. 303-234-4181	BM
<i>National information service to make cartographic data easily accessible, i.e. maps, charts, aerial imagery, space imagery, geodetic control, digital data, cartographic publications, etc.</i>		Bureau of Reclamation General Services Division Chief, Publications & Photo Branch 7442 Interior Building 18th & C Streets, NW Washington, D.C. 20240 Ph. 202-343-4683	BR
National Geodetic Survey Info. Center NOS National Ocean Survey National Oceanic & Atmospheric Admin. Rockville, MD 20852 Ph. 301-443-8631		Bureau of Census Users Services Staff Data Users Services Division Washington, D.C. 20233 Ph. 301-763-2400 or Geography Division, BC (same address)	BC
<i>National network of horizontal and vertical control available (write.- Attn. National Geodetic Info. C18). Technical publications (Attn. Physical Science Services C513). Map Library (Attn. Map Library C513). Doppler geodetic surveys (C18), tide information (C3), aerial photos C3415). Coast mapping (C34).</i>		Department of State Office of Geographer Bureau of Intelligence & Research 8744 State Department Bldg. 2201 C Street, NW Washington, D.C. 20520 Ph. 202-632-1428	USDS
U.S. Dept. of Agriculture USDA Aerial Photo. Field Office Geometrics Service Center PO Box 30010 Salt Lake City, UT 84107		Division of Realty Fish & Wildlife Service 555 Matomic Bldg. 1717 H Street, NW Washington, D.C. 20240 Ph. 202-343-4676	FWS
<i>Provides aenal photo and satellite imagery. Geometronics service in support of National Forest management activities.</i>		U.S. Forest Service Publications Office Office of Information Washington, D.C. Ph. 202-447-3957 (for aerial photos try)	USFS/PO
User Service EROS EROS Data Center U.S.G.S. Sioux Falls, SD 57198 Ph. 605-594-6511	EROS	U.S. Forest Service P.O. Box 2417 Washington, D.C. 20013 Ph. 703-235-8638	USF
<i>Provides access to imagery from landstat, skylab, U.S.G.S. aerial photography, NASA aircraft data, remote sensing products, and training.</i>		Office of Communications National Park Service	NPS
Bureau of Indian Affairs BIA Public Information Office 18th and C Street NW Washington, D.C. 20245	BIA		

3043 Interior Bldg.
18th and C Streets, NW
Washington, D.C. 20240
Ph. 202-343-6843

Soil Conservation Service
Education & Publication Branch
Information Division
U.S. Department of Agriculture
Washington, D.C. 20250
Ph. 202-447-5063

Government Printing Office
Assistant Public Printer
(Superintendent of Documents)
U.S. Government Printing Office
N. Capitol and H Streets, NW
Washington, D.C. 20402
Ph. 202-275-3345

Library of Congress
Geography and Map Division
845 S. Picket St.
Alexandria, VA 22304
Ph. 202-370-1335

National Archives & Record Section
Cartographic Archives Div.
Archives Bldg.
Pennsylvania, Ave. at 18th NW
Washington, D.C. 20408
Ph. 202-523-3062

Maps, charts, technical data, aerial photography associated with specific agency responsibilities.

Pacific Marine Center
NO Survey
NOAA
1801 Fairview Ave., E.
Seattle, WA 98102
Ph. 202-442-7657

Nautical Chart Sales (includes of estuaries) and geodetic data.

Real Estate Division
Oregon Dept. of Commerce
Commerce Bldg.
158 12th St. NE
Salem, OR 97310.
Ph. 378-8422

Info. on subdiv. control and on condominiums.

SCS/EPB

GPO

NA

NOS/NOAA

ORED

NCIC/Oregon Station
Oregon State University
Marine Science Center
Newport, OR 97365
Ph. 867-3011

Info. for coastal management-scientific and tech. data. Some maps.

Secretary of State
136 State Capitol
Salem, OR 97310
Ph. 378-4139

Info. on annexations

Secretary of State
Archives Division
1005 Broadway NE
Salem, OR 97310

Historical maps. Microfilm of deeds and other county records.

PRODUCT & INFORMATION SOURCES

The following guide will assist you in locating cartographic, photogrammetric, and technical information. ORS means the data is contained in the Oregon Revised Statutes; CA = county assessor's office; CC = county clerk; CS = county surveyor; CE = county engineer; CRD = county road department; RR = railroad company; PS = private surveyors; TC = title company. The other acronyms are listed with the preceding agency addresses.

INFORMATION OR PRODUCT	PRODUCE AGENCY	OBTAIN OR REFER.
Aerial photography	Most U.S. agencies	OSFD
	OSFD	OGMI
(some)		DOR
(county-wide)		CA
		DSL
	DOT	DOT
		OSU
(over 200,000 on file)		UO
		EROS
(some)		SS/AD

INFORMATION OR PRODUCT	PRODUCE AGENCY	OBTAIN OR REFER.	INFORMATION OR PRODUCT	PRODUCE AGENCY	OBTAIN OR REFER.
Aeronautical charts	NOS	NOS	County roads		CS
Beach vegetation line	DOT	DOT			DOT
		ORS			CRD
(some)		DOR			CE
(on cadastral maps)		CA	(on cadastral maps)		CA
Boundaries, taxing dist.		CA	(some data)		DOR
		CC	Donation land claims	BLM	BLM
		DOR	(microfilm)		DOR
		DOT	(survey field notes		CC
		SS	or)		CS
(cities of 2500 or more)	BC	GPO	(on cadastral maps)		CA
Boundaries, property		(Deeds)	(good survey ties)		BPA
		PS	(survey ties)		PS
(All on cadastral maps & records)		CA	(survey ties)		RR
		CS	Deeds		CC
(some on r/w maps)		BPA			CA
(some on r/w maps)		DOT	(some on microfilm)		DOR
(submerged & submersible lands)		DSL	(on microfilm)		SS/ AD
Boundaries, state		ORS	Digital map file	DOR	DOR
Boundaries, county		ORS		Lane Co.	CA
		CS		Marion Co.	CA
Boundaries, state parks	DOT		Estuary data	DSL	DSL
Boundaries, nat'l parks	NPS	NPS	(some)		DOR
Cadastral maps	DOR	DOR	Federal lands	BLM	BLM
	DOR	CA		NASA	NASA
	CA	CA	(Forests)	USFS	USFS
		TC	(National parks)	NPS	NPS
Census data	BC	BC	(State map of BLM lands)	BLM	BLM
		SS	(U.S. map of BLM lands)	BLM	BLM
City maps		LCDC	Flood plain maps	WRD	WRD
	DOT	DOT		NOS	NOS
(some(historical))		DOR		SCS	SCS
		Planning Commissions		USCE	USCE
City streets	cities		Forest maps (U.S.)	USGS	USGS
		CS	(state)	USFS	USFS
(ded. on subdiv.)		CC	(state)	OSFD	OSFD
		DOT	Geodetic control	BLiML	BLiM
Channels (nav. waters)	USCE	USCE	data	CS	CS
		DSL		USCE	USCE
Contours	USGS	USGS		USGS	USGS
	NOAA	NOAA	(Horiz. & vert. net)	NOS	NOS
	NOS	NOS	(some)	NOS	DOR
			Geologic maps	USGS	USGS
				OGMI	OGMI
					UO
					OSU

INFORMATION OR PRODUCT	PRODUCE AGENCY	OBTAIN OR REFER.	INFORMATION OR PRODUCT	PRODUCE AGENCY	OBTAIN OR REFER.
Geographic names	USGS	USGS	Railroads	RR	RR
(streams)	WRD	WRD	(good file)	RR	DOR
(highways and rds)	DOT	DOT	(some)		CS
(cities)	Oreg. Bluebook		(intersect R/W)	BPA	BPA
NOS	NOS		(intersect R!W)	DOT	DOT
Geographic maps	NOS	NOS	Reservoirs	USCE	USCE
(land use)	USGS	USGS	(general)	WRD_	WRD
Harbor lines	USCE	USCE	Riparian rights	DSL	DSL
	USCE	DSL	(some data)		DOR
(some data)	USCE	DOR	Soils	SCS	SCS
Highways (state)	DOT	DOT		CA	CA
	FHWA	FHWA	Subdivisions		CA
(some)		CE	(official file)	PS	CC
(some)		CS	(ref.)		ORED
	ODT	DOR	(survey info.)		CS
(on Indian lands)	BIA	BIA	(present ownership)	CA	CA
(on federal lands)	FHWA	FHWA	(approval)		CS
(map/U.S. system)	FHWA. _	GPO	(approval)		CA
Hydrographic	NOS	NOS	Topographic maps	USGS	USGS
	USCE	USCE		OSFD	OSFD
	USGS	USGS		NASA	NASA
(beach erosion)	USCE	USCE		WED	WRD
(tidal data)	NOS	NOS	(some)		
Indian reservations			Transmission line		DOR
(land surveys)	BIA	BIA	surveys	BPA	BPA
Land use	USGS	USGS	(some)	BPA	DOR
	SCS	SCS	(on cadastral maps)		CA
	ERSAL	ERSAL	Triangulation data	USCE	USCE
				NOS	NOS
(& planning commissions)		LCDC		USGS	USGS
				NOS	DOR
Mines	BM	BM		NOS	CS
(surveys)	BLM	BLM		DOT	DOT
(microfilm)	BLM	DOR		BPA	BPA
(surveys)		PS		PS	PS
(surveys)	PS	CS	Taxing dist. boundaries		DOR
(deeds)		CC			CA
Meander lines	ELM	BLM			CC
	BLM	DOR			DOT
		DSL			SS
		CS	Township & section		
Nautical charts	NOS	NOS	lines	BLM	
	USCE	USCE	USGS	BLM	
Ownership data	(deeds)	CC	USGS		
		CA	(R/W maps)	BPA	
		CS	PS	BPA	
(state hwy.)	DOT	DOT	PS		
(submersible/			(microfilm)	BLM	DOR
submerged)	DSL	DSL	(or GLO)	BLM	CS
(along R(Ws)	BPA	BPA	Water rights	WRD	WRD
(RR)	RR	RR			

Analysis of Data

After the surveys have been obtained they should be reviewed to determine which are *primary surveys* and which are *secondary surveys*. The surveys and their controlling elements should be indexed on a grid of the area to be mapped. For example, assume that the area we are mapping is of sections 1, 2, 11, and 12. The survey index (figure 12-2) need be nothing more than a sketch of the section lines, boundaries of surveys, corners located by survey and coordinates, subdivision names, county survey numbers, etc. The *secondary surveys* are noted and circled.

The rough index provides a plan for bridging the major components of this area. It also shows where information is missing. Figure 12-2 illustrates the importance of considering all surrounding surveys when developing control. For example, if our objective were to draw only section 12, it should be obvious that it would be a mistake to ignore the surveys of the abutting sections. Therefore, our compilation of surveys must extend beyond the boundaries of the area being mapped.

The next step is to compare the surveys to determine which are in harmony and which are maverick surveys. Once this is done the maverick surveys should be analyzed to see *why* each survey does not agree with abutting survey data. There

are several possibilities here. These are outlined in Chapter 6 (Surveys and Surveying).

It is possible that the survey traverse merely needs to be balanced. Or, possibly the surveyor's deflection angles and distances agree with the abutting surveys; only the bearings are different. In such cases it is possible that the surveyor has failed to convert the magnetic azimuth to true azimuth; or possibly it is only his base meridian that is in error. The main point to remember is do not *ignore the survey just because it fails to agree with abutting information*. Moreover, do not ignore *all* of the information of a survey just because part of the survey is found to be in error.

Explanation—Horizontal Control Elements. Analytical Bridging

In the surveying and mapping of large areas the exact curvature of the sea level surface of the earth must be taken into consideration. For this reason, the basic surveys of the U.S. are called *geodetic surveys*. There is an intricate net of precise geodetic surveys over the U.S. It comprises the equivalent of about a dozen east-west arcs of triangulation and about thirty north-south arcs, although they are by no means in a regular pattern, as this statement infers. The aim has been to have the main arcs spaced at regular intervals over the country

and to have intermediate areas well covered with supplementary arcs, and area triangulation. This precisely determined network serves as a basis for intermediate and local surveys and for all kinds of geodetic cartography.

Latitudes and longitudes have thus been determined for many thousands of marked stations scattered over the U.S. Surveys of small areas may be based on any of these marked points at any time with the assurance that they may be correctly coordinated in position with all precise surveys and maps of the entire country and with all local surveys so connected. The permanency of the results of surveys thus connected to the national net is also assured since any marked points that become lost or that lose their integrity may be duplicated by new surveys based on nearby stations.²

Figure 12-3 is a section of the “Yaquina Head to Columbia River” U.S.C. and G.S. (NOAA) triangulation chart. It serves to illustrate the tight map control that can be maintained through use of such information. Triangulation is a very efficient method for making surveys over extensive areas. It avoids the tedious, time-consuming, expensive operation of measuring the lengths of all lines that enter into a survey. It consists of a system of connected triangles with all angles carefully observed but with only an occasional length actually measured on the ground. Each measured length is known as a base. By use of these measured bases and angles, the lengths of all other sides can be computed by trigonometry (as explained in chapter 9 on Map Computations). If the latitude and longitude are known together with the azimuth to one of the other stations, the latitudes and longitudes of all other points and the azimuths of all other lines may also be derived. Moreover, the computed sides of such a network would provide ties from every station to all other stations; hence, in figure 12-3, lines could be drawn between all triangulation stations to produce a very extensive network of lines representing known distances (measured and computed).

Triangulation is a simple method when used over small areas where the earth’s curvature need not be considered, e.g., that illustrated in figure 12-3. It is further simplified by introduction of state plane-coordinate systems. In connecting the coordinated stations, surveyors and cartographers can ignore the geodetic factors of the area being controlled and consider only the plane coordinates, computing surveys on the simple cartesian coordinate system. Thus surveys will be coordi-

nated with the national net as if the more complex geodetic coordinates were used. Yet, latitudes and longitudes can be derived with little difficulty should the need arise.

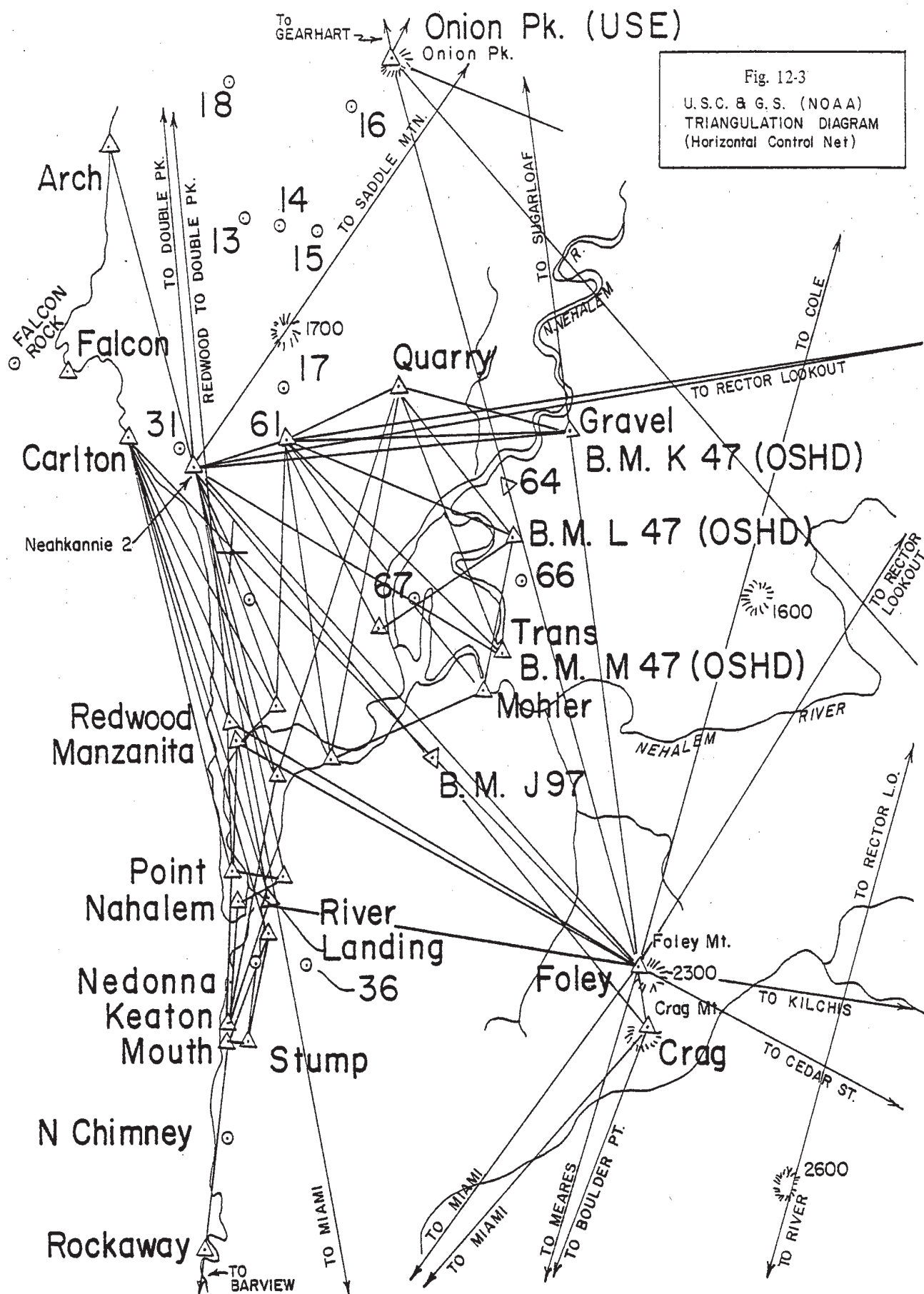
Figure 12-4 is an example of horizontal control data available from the U.S. Department of Commerce (NOAA). The data includes latitude and longitude, plane coordinates of the stations, a detailed description of the location of each triangulation station, and the lengths and azimuths of the lines between contiguous stations. This information is also on file in the Oregon Department of Revenue. One important caution should be observed. *Be careful not to confuse the geodetic azimuths of directions of the lines with the state plane coordinate directions.* The two kinds of azimuths may differ considerably since the convergence of the meridians is considered in deriving the geodetic azimuths; but the plane-coordinate, or coordinate grid, azimuths are strictly *rectangular* with reference to the central meridian (see Chapter 7).

Now that you understand the triangulation network concept, you can visualize a map triangulation net composed of the known points and measurements of the surveys you have assembled. Moreover, from these known points, angles, and measurements, it will be possible to compute the missing sides of many triangles. For example, from the surveys indexed in figure 12-2 a network of lines, angles, and triangles can be derived as shown in figure 12-5. From this data many other missing triangle sides can be computed. The network, in this case, is enhanced by the BPA and OSHD highway tie to the *Redrock* triangulation station.

The triangulation station, the BPA survey and the highway survey provide ties to the Oregon State plane coordinate system. This provides the data needed to compute the x-y coordinates of the other points of our network. Plotting these points will be a simple exercise of measuring the x and y distances from the coordinate grid points.

The application of triangulation procedures to develop cadastral map control is known as *analytical bridging*. It simply means “to analyze all available survey data, to establish the needed control data, and perform the necessary mathematics to establish needed angles and distances, for bridging certain points and parts of a map area.”

To obtain tight mathematical control over your geometric network, the lengths of the common sides of each triangle must agree with the sides



OREGON VOL III PAGE 716
QUAD 441231 STATION 1009
DREG 44 30' TO 45 00'
LONGITUDE 123 00' TO 123 30'
DIAGRAM NL 10-11 SALEM

HORIZONTAL CONTROL DATA

by the
Coast and Geodetic Survey
NORTH AMERICAN 1927 DATUM

NOV. 1969
U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY

FORM 325
(6-19-64)
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
QUAD NO. 44 123 /
DESCRIPTION OF TRIANGULATION STATION STA. NO.
NAME OF STATION: COR-9 (U.S.E.) STATE: Oregon COUNTY: Benton
CHIEF OF PARTY: L. P. Smith YEAR: 1969 DESCRIBED BY: W. E. Gloeprfl

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
COR-7 (U.S.E.)		00 00	00.0	
COR-8 (U.S.E.)		138 38	28.6	

The station is 4.4 miles southeast of the city of Corvallis on the east bank of the Willamette River.

To reach the station from the Corvallis Post Office, proceed north on S.W. 2nd Street for 0.3 mile to N.W. Van Buren Street (U.S. Highway 30); turn right and go east on U.S. Highway 30 for 1.15 miles to the Peoria Junction; turn right and go southeast on Peoria Boulevard for 1.0 mile to a side road right (County Road G121); turn right and go southwest on County Road G121 for 1.0 mile to a side road right which is the entrance to Brown's farm; turn right and go west for 0.2 mile on gravel road to wood line; turn right and proceed north on track road along east side of river on top of high bank for 0.7 mile. Turn left and go west from track road for approximately 230 feet to river bank and station.

The station mark, stamped "COR-9 1966", is a U.S. Engineers bronze cap on a 2 1/2 inch iron pipe set in concrete. It is 50 feet east of the river on top of a rock revetment, and 2 feet west of a witness post.

There were no reference marks established for this station.

✓ CHE

* Refer to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station. ‡ To accuracy of leveling only, when no trigonometric leveling is being used. USCGM-DC 27171-P-69

ADJUSTED HORIZONTAL CONTROL DATA

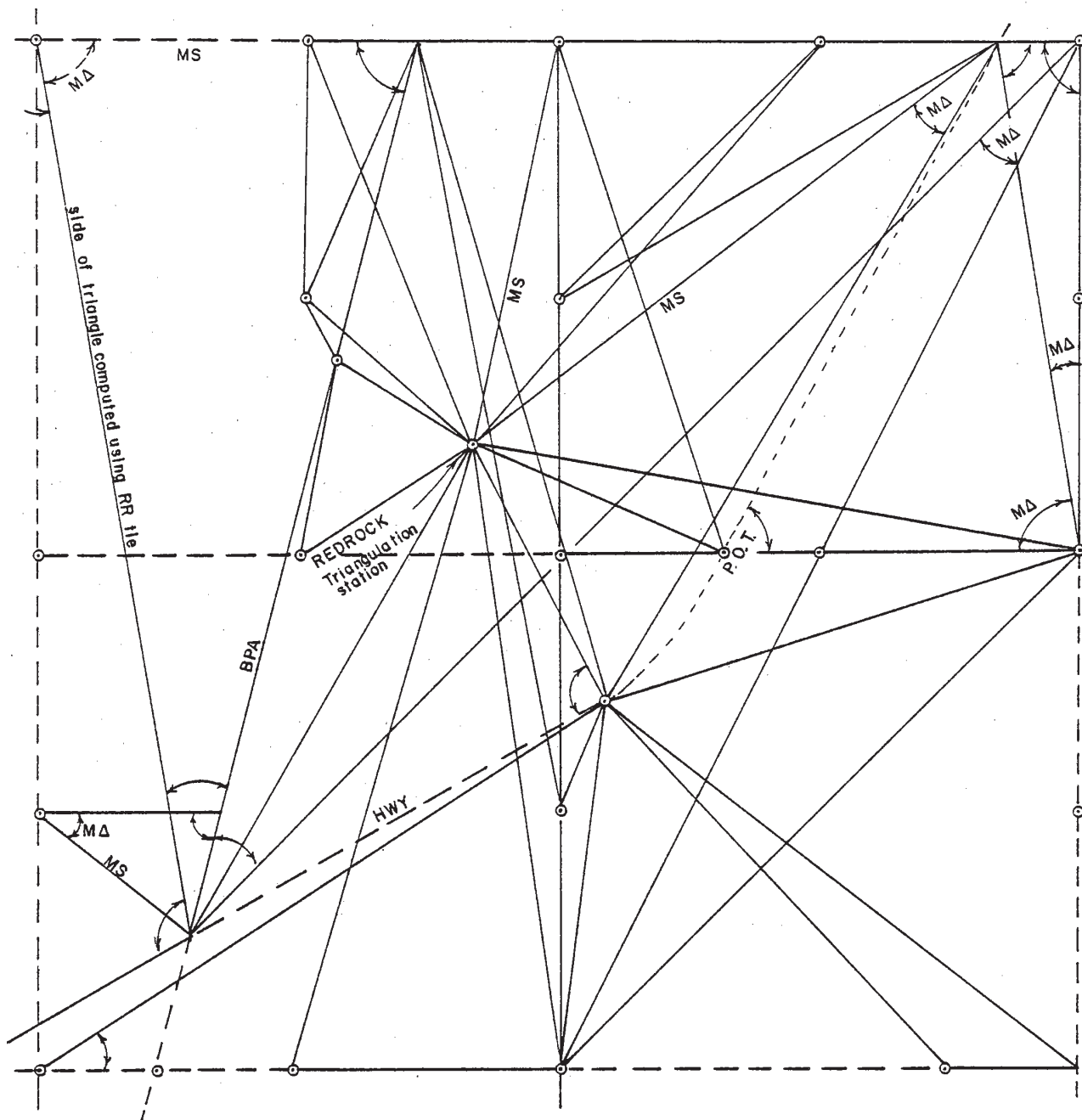
NAME OF STATION COR 9 USE
STATE OREGON YEAR 1969 SECOND
LOCALITY WILLAMETTE RIVER CORVALLIS OREGON
SOURCE G-14384 FIELD SKETCH OREG 142

GEODETIC LATITUDE	44 32 59.74401	ELEVATION	64.0 METERS
GEODETIC LONGITUDE	123 14 35.07242		210 FEET
STATE & ZONE	OREG. N.	CODE	3601
STATE COORDINATES (FTH)	A	Y	1 56 43

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ ION Δ θ FORMULA NEGLECTING THE SECOND TERM

TO STATION ON OBJECT	GEODETIC AZIMUTH FROM STATION	PLANE AZIMUTH FROM STATION	CODE
COR 7 USE	324 21 10.7	326 17 54	3601

NOTE: ELEVATION DETERMINED BY URECA INC



MS = Missing side of triangle that can be computed

MΔ = Missing angle that can be computed

Known Δ

MAP TRIANGULATION NETWORK OF AREA OF FIGURE 12-2

Figure 12-5

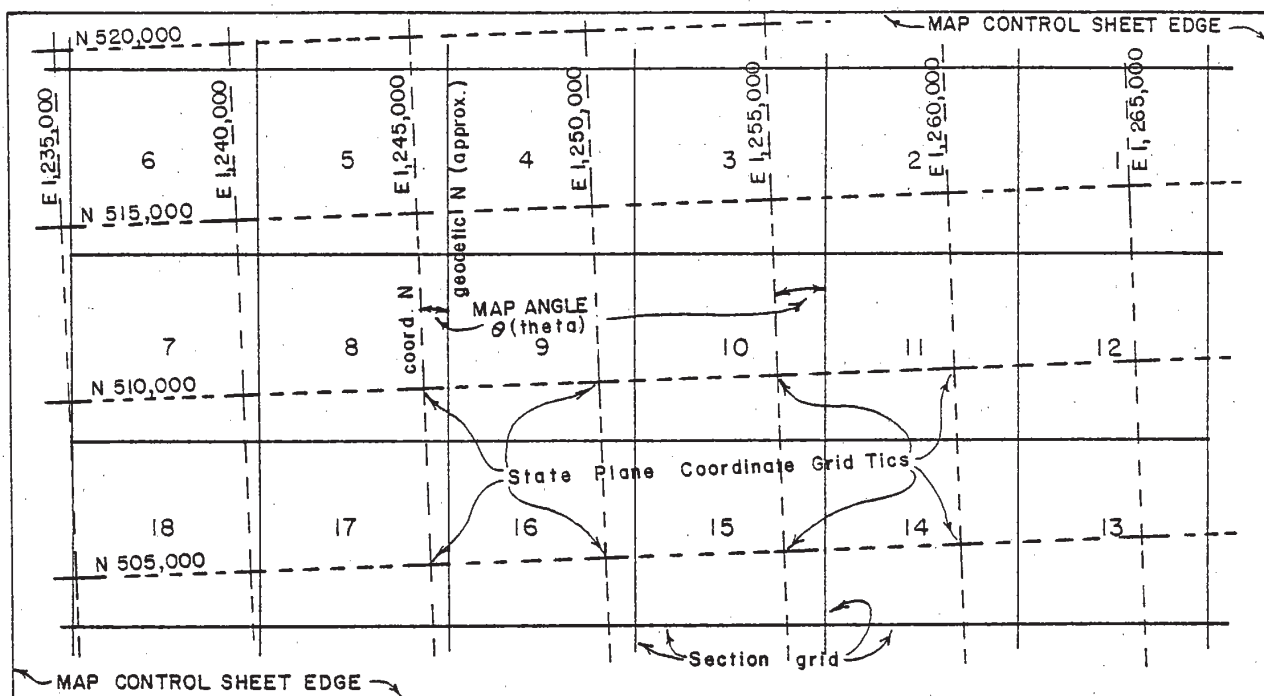


Illustration of State plane coordinate grid correctly positioned on the map control sheet to accommodate the township - section grid.

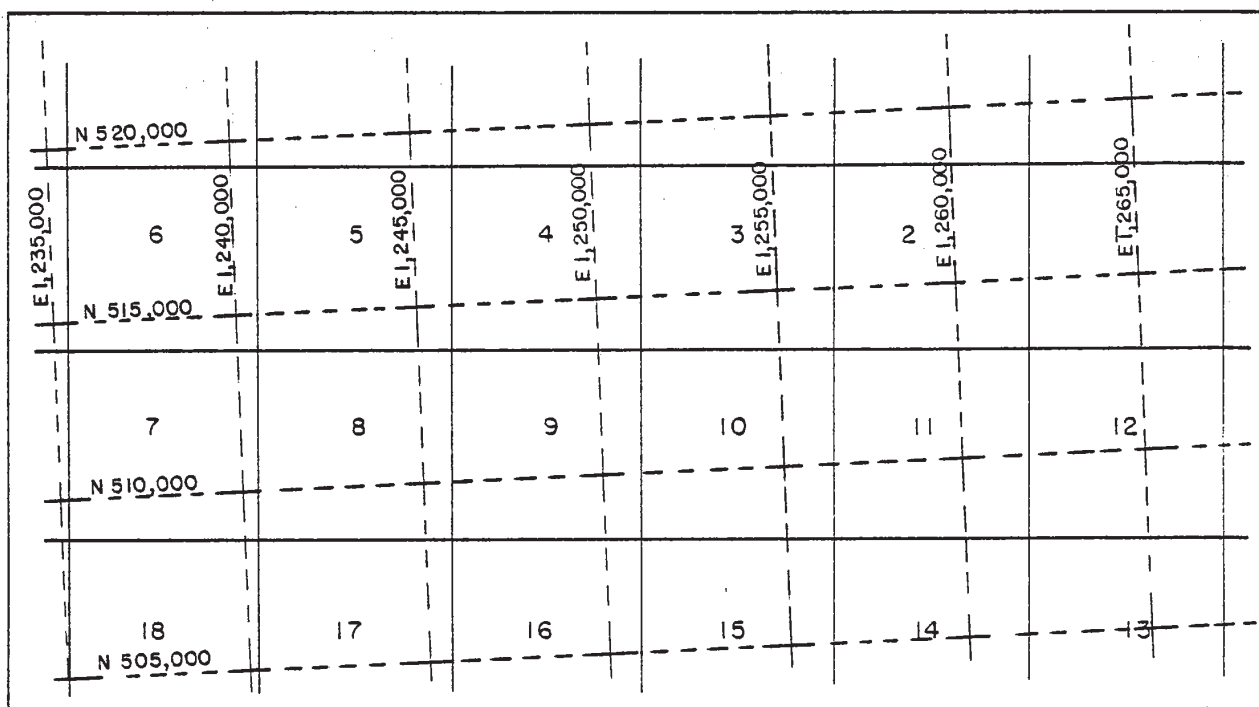


Illustration of State plane coordinate grid incorrectly positioned on the map control sheet. Result is that the township centerline lies off the control sheet.

Figure 12-6

of abutting triangles. Therefore, it is advisable to perform a side check for each side of each triangle critical to control. All side equations should be prepared either in a clockwise or counterclockwise order. When the signs are predominantly plus or minus, the error is sufficient to warrant further analysis of the survey data and recalculation. Serious errors warrant a field check by trilateration.³

The trigonometric computations of missing measurements are relatively simple; however, maverick surveys will complicate the task of establishing the reliability of available data, thus requiring a considerable amount of data manipulation. Certain triangle and quadrilateral sides must be considered as a reliable base for your network. For example, bench mark ties of BPA transmission line easements have proven extremely reliable for establishing an accurate base for map triangulation. (A word of caution. Although certain governmental surveys, such as those executed by BPA, have a reputation for being reliable, they are *not* infallible. Therefore, be willing to accept the fact that, on occasion, errors will be found in surveys executed by even the greatest of survey teams.)

Remember, to ensure adequate control of the area to be mapped, map triangulation *must* extend to points outside that area.

Where survey data is not available to compute the sides of certain needed triangles (or for that matter -- quadrilaterals), the deeds should be reviewed to see if they can supply the necessary measurements.

MAP CONSTRUCTION

Map Scale

Before plotting map control at $1'' = 200'$ scale and $1'' = 100'$ scale a pilot control map should be developed at a scale of $1'' = 400'$. All horizontal control should be plotted at this scale. This method allows you to check control over a wide area, and provides assurance that all abutting and adjacent control data has been analyzed and used. Even though your final map covers only $\frac{1}{4}$ of a section, the development of control over a section, several sections, over even one-half township (as is the practice in the Department of Revenue Mapping Unit) should not be considered as a wasted effort. The development of control over the **broader area can be used when it becomes necessary** to construct the abutting $\frac{1}{4}$ section maps.

Plotting The Coordinate Grid

Before you can begin plotting the x and y coordinate points established by analytical bridging, it is necessary to draft the coordinate grid on your control sheet. We recommend a cartesian grid of 1,000 feet for $1'' = 100'$ scale and $1'' = 200'$ scale maps, and a grid of 5,000 for $1'' = 400'$ scale and $1'' = 200'$ scale maps. The grid tics should be rounded to the thousand foot x, y position, e.g. N 505,000, E 1,250,000 (rather than N 505,200, E 1,250,900.28); see figure 12-6.

The edges of the control map must be oriented to the approximate geodetic cardinal bearings. Hence, they will generally run parallel to the township - section grid. This means that the coordinate grid will be on an angle to the edges of the map. That angle is commonly known as the *mapping angle (or map angle)*. It is equal to theta (θ) the angle correction. The mapping angle will differ slightly for each map (see Chapter 7). It can be obtained from the horizontal control data sheet (example in figure 12-4). Figure 12-6 illustrates the difference between the coordinate grid and the township section grid (rectangular survey grid).

Figure 12-6 also serves to point out one common error made in positioning a coordinate and on a control sheet. As the bottom illustration shows, if the coordinate grid is not correctly located on the sheet, part of the needed township -section grid will lie off the map. The top illustration shows the same coordinate grid positioned so as to accommodate the needed township-section lines.

The location of the grid lines can be planned by using the State plane coordinate grid of the USGS quadrangle maps to determine how that grid lies in relation to the township-section line grid. *When using the quadrangle map as a reference for the Oregon State plane coordinate grid, take care to not mistake the UTM or geodetic grid points for State plane coordinate grid points. The UTM grid is marked off in grads set at 1000 meters; the geodetic coordinates are marked off in degrees, minutes and seconds. The Oregon State plane coordinate grid is labeled in feet at one point on each map boundary, the other grid points being unmarked.* See figure 12-7.

Plotting The Control Points

All control points should be converted to the N, E state plane coordinate values (or the x and y values) so that they may be plotted from the coordinate grid you have constructed on the control sheet.

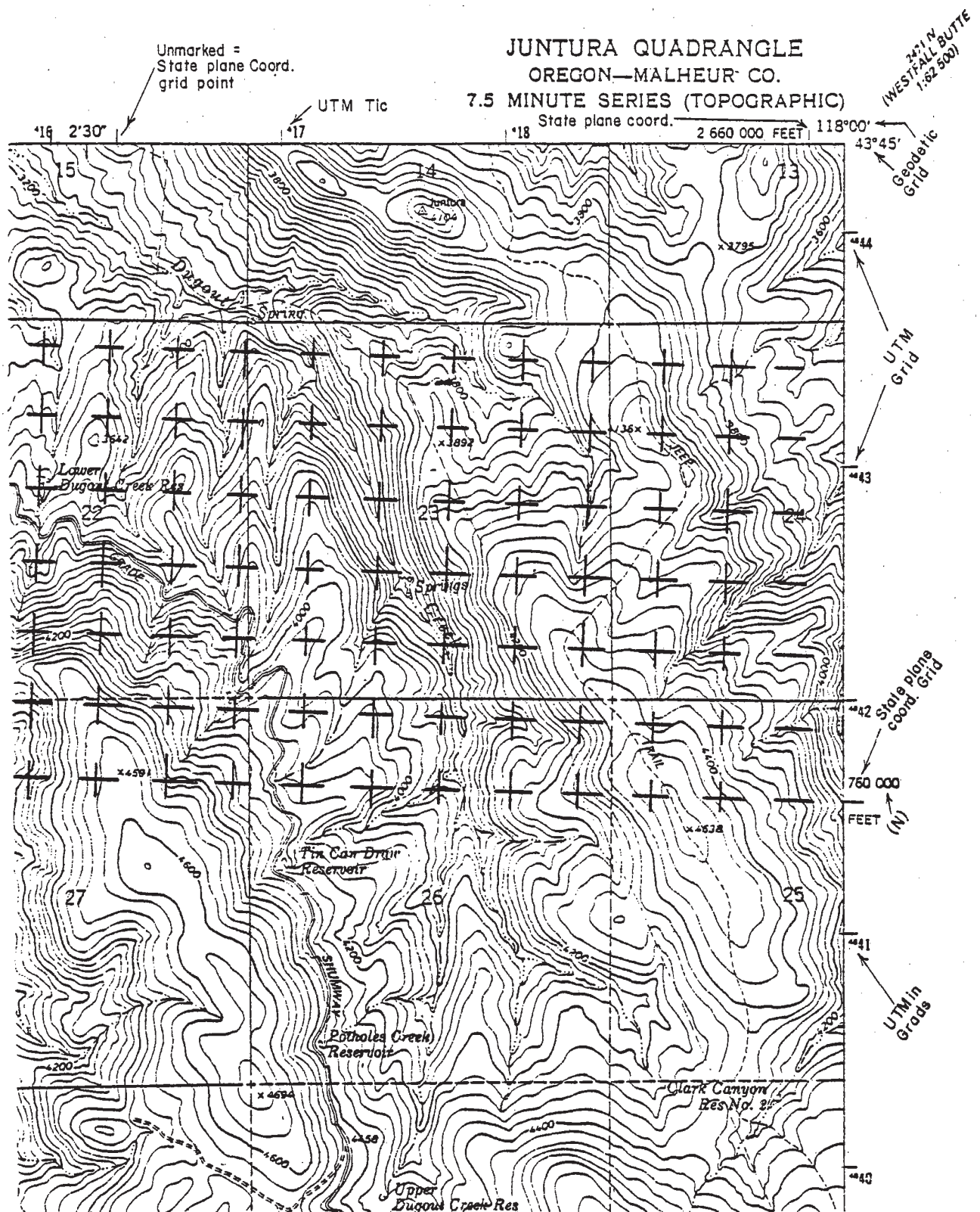


Figure 12-7

U.S.G.S. quadrangle used for determining location of State plane coordinate grid, and for determining approximate map angle (theta, or θ , the correction angle).

All plotting should begin with what you consider as the most reliable primary survey data. Plot only by measuring the x and y distances from the coordinate tics. Do not plot by bearing and dimension at this time. Plotting should follow this order:

1. Locate coordinated section corners. (This will ascertain that all of the township-section and will be contained on the control sheet.)
2. Locate the stations of the national control net.
3. Plot the transmission line points and important ties to 1/4 comers, 1/16 comers, Donation Land Claim corners, subdivision comers, railroads, road intersections, etc.
4. Plot the traverse of the state highways and secondary highways; locating important ties, intersections, etc. Also plot the surveys of roadside parks and stockpile sites.
5. Plot the traverse of railroads; including side-tracks and station site survey data.
6. Plot county road centerlines (beginning with the latest road surveyed).
7. Plot any major pipeline or ditch traverses and ties to important points.
8. Plot subdivision points and lines; beginning with the largest and most recent subdivisions.
9. Plot the governmental (federal, state, county and city) and private surveys; beginning with the largest and most recent.

As plotting progresses, the traverse lines should be added to connect the plotted points. After the lines are added the bearings and point to point dimensions should be measured to check the accuracy of the x and y plotting of points. When survey data conflicts with surrounding data, the conflict must be noted on the control map.

The next step is to check the geometry of your control map. Orthophotos, aerial photos and reliable topographic and planimetric maps can be used to check the spatial relationships of the map.

Completing Map Control

At this stage of the map construction operation it is essential to complete the section line grid; including meander lines of rivers and lakes, (see chapter 10), Donation Land Claim corners and lines, and patented mining claims. When all survey and reliable reference data is exhausted, use the DLC-BLM, surveys.

Be sure to identify found corners and coordinated comers. Note all comer offsets and discrepancies. Add survey and survey drawing numbers. All

engineering stations of right-of-ways should be located and labeled.

Next, note the centerpoint location of secondary surveys. This is done by using a red pencil to print the survey number in the approximate location on the control map.

Completion of the control map involves using photogrammetric methods to plot unsurveyed rivers, creeks, lakes, ponds, ditches, major logging roads and other major roads. Use a blue pencil for riparian lines and a red pencil for road lines. *Be certain to read Chapter 10 before plotting riparian boundaries.*

Finally, where several map areas are included on one control map, use a yellow pencil to outline the final map boundaries of each cadastral map. Chapter 2 provides the rules for determining map boundaries.

The control map should always be retained and maintained for future control problems. Therefore, it is essential that you not add unnecessary detail to that base. For example:

1. Subordinate right-of-way data of highways, county roads and railroads (such as curve data).
2. Interior subdivision data (such as lot, block and street lines, dimensions and numbers).
3. Secondary survey points, lines and dimensions.
4. Ownership data.
5. Deed boundaries, bearings and dimensions.
6. Tax lot numbers.
7. Code area lines and numbers.
8. Parcel acreages.

Map Lift-off

Once the map control is completed, each map area is transferred to an 18" x 20" layout sheet. When tracing the control lines, be sure to center the map area in accordance with the graphic standards (Chapter 2). All map detailing will be completed on this lift-off (or layout sheet).

MAP FINALIZATION

Map Detailing

To complete the cadastral map it is now necessary to plot the supplemental lines, points and data of the right-of-ways, subdivisions and primary surveys.

Next, plot the secondary surveys. Although they may have little effect on the final outcome of the map, they do represent *official* land ownership data; therefore, it is essential that they be recorded on the map. The inclusion of this information will simplify the plotting of the deeds because most secondary surveys represent existing or future parcels of real property. In effect, the survey is a *picture* of what the parcel polygon should look like, the deed description fails to accomplish this. Moreover, in most cases the survey controls the deed. This is in recognition of the fact that *the office of a deed description* is not to identify or locate *the land*, but to *afford the means of identification*. *Most courts rely on intent and on land surveys to accurately locate the property boundary.*⁴ (Even if the secondary survey appears to not represent the lines of any parcel of real property, it should still be recorded on the cadastral map. It may represent the boundaries of only an *interest* in real property.)

At this point in the map finalization operation the deed boundaries should be plotted. In this step we are developing the inventory of real property. All real property must be accounted for. The process includes the discovery and location of real property, and the solving of deed ambiguities (that is - for assessment purposes - not legal purposes). *Note: a supplemental chapter will be supplied on deeds, boundary control, and legal principles.*

Before tax lotting and acreage computation it is advisable to add the tax code area lines and numbers to the map. Do not treat this process lightly. It is essential to locate the code lines exactly as they have been legally established, described, approved, and recorded. This must be done accurately to make certain that no taxpayer is being assessed in the incorrect taxing district. It is as essential to equity as is any other assessment function.

The final stages of map detailing involve acreage computation (see chapter 9) and tax lotting. Tax lotting is the process of assigning parcel numbers to & parcels of real property of each map. The specifications for tax lotting are discussed in chapter 2, and are described in chapter 3.

After the taxlotting is completed, edit the map to see that the information and graphics conform to the standards and specifications of the standard cadastral map system. This is often done after the tracing has been produced.

Final Drawing

The last major step in the cadastral map is often executed incorrectly. This is the *Final drawing* or

the ink tracing. On the one hand we find excellent cadastral cartography lost in a sloppy, inaccurate tracing. On the other hand we have seen excellent tracings of extremely inaccurate maps; as if a *pretty picture* was all that counted. What we are seeking is a neat, well-executed tracing that accurately displays the points, lines and details of the cadastral map layout; and in accordance with the graphic standards defined in chapters 2 and 3.

Chapter 11 describes the drafting function of producing the final tracing. A supplementary chapter will be added to define tracing production by computer-assisted interactive plotters (CAMS - on Computer Assisted Mapping).

SPECIAL NOTES

The system of map control outlined in this chapter will work for any cadastral map, regardless of the area covered or the map scale. Moreover, it is as applicable in the maintenance operation as it is in initial map construction.

When developing map control for areas abutting your first control map, use the State plane coordinate ties of the first control map as the arid base for your abutting map. This will provide some assurance that the maps will match at their borders.

Map control can be greatly enhanced by use of computer-assisted-mapping systems (CAMS). The fact that data entry into CAM systems relies on rectangular coordinates means that the State Standard Cadastral Map system is ideally suited for CAMS applications. For example, traverse data in bearings, and dimensions can be entered into the central process unit, converted to x and y coordinates, and automatically plotted at any scale by the computer driven plotter. Any data already in x and y form can be entered directly and automatically plotted. Another advantage of CAMS is that plots can be made at any scale regardless of the scale of the original resource. When map control is hand plotted, the plotting process must be repeated by hand for each scale. When control is done via CAMS, the work need only be hand plotted once; the plotter will automatically reproduce the original work at any scale (including metric scales).

A supplemental chapter will be provided on CAMS concepts and application in cadastral cartography.

⁴ See *Gubser v. Town*, 273 P.2d 430, 202 (Corpus Juris Secundum).



CHAPTER 10

MAINTENANCE OF THE CADASTRAL MAP SYSTEM

INTRODUCTION

Proper maintenance of the cadastral map system is the culmination of all the concepts, principles, standards and specifications outlined in this manual. It is the one central operation that, if done without regard for standards and specifications, can destroy all of the time and effort invested in a set of standard cadastral maps. *Needless to say, it seems illogical to spend hundreds of thousands of dollars to develop a set of standard cadastral maps-only to have them destroyed by irresponsible and unprofessional cartographic practices.*

The deterioration of a county map system is usually a slow process. In all cases it begins by disregarding what *appears* to be small, *insignificant elements* of the map standards. This process of elimination continues, but at a steadily *increasing rate*. It eventually reaches a point where the cartographer assumes license to ignore all standards; including those dealing with accuracy and maintenance.

There are several factors that contribute to deterioration of a map system; the basic factor being the failure to grasp the importance of a uniform statewide cadastral map system. Other contributing factors are:

1. Too much time devoted to the *title* business. (Mis-directed priorities.)
2. Shortage of skilled cartographers. If the person charged with the responsibilities of maintenance lacks adequate cartographic training, he (or she) usually devotes more time to the *simple* maintenance tasks and less time to the complex activities. To justify this order of priority, *meaningless* rules and policies are assigned the simple tasks to make them appear complex; and the actual **essential maintenance tasks** are explained away as "**unnecessary.**" In most cases this diversionary tactic is so convincing that even the cartographer believes it.
3. Out-of-date rules and policies (many of which were developed as we have just mentioned under factor No. 2).
4. Management's lack of understanding of the cadastral map system, standards, concepts and procedures.
5. A failure to recognize the principle that *each small element of the map standards have been developed. or established for a purpose.*

This chapter is dedicated to the principle that the maps are the most essential element of the cadastral map system not the deeds, chain-of-title, recording, legality of ownership, or the flysheet. To reach this

objective, professional cartographic procedures must be employed to maintain the cadastral maps to:

1. state cadastral map standards;
2. be uniform, accurate, neat, and up-to-date with all cadastral data.
3. be reliable for determining the true area of each parcel of real property;
4. retain their usefulness for the discovery, location and identification of real property;
5. display as accurately as possible, the true special relationship of each parcel of real property;
6. retain their usefulness to the governmental and private map user community.

To accomplish this objective it will be necessary to cast off some of the preconceived rules, about deeds, title, and the transfer of real property. Many unnecessary rules and policies are so imbedded in some offices that some assessment officials view them as beyond doubt or question. We harbor no illusions that all of these rules and policies will be discarded; however, when your workload is such that you are considering reducing the quality of the maps, we suggest you *FIRST* examine and evaluate the rules dealing with acceptance of deeds, chain-of-title, recording, etc.

The technical procedures used in maintenance mapping are identical to those used in the original mapping. We have left these to the preceding chapters of this manual. The step-by-step administrative map maintenance procedures vary considerably between counties. This is expected because the workload, staffing, county organizational structures and budgets differ considerably between the counties. It would, therefore, be impossible to lay out one detailed maintenance outline that would be applicable in every county. Consequently, we will devote this chapter to those cadastral elements essential to *standard* map maintenance.

NOTE: All of the principles and policies defined here are presently applied to the maintenance of maps for the thirteen counties contracting for Department of Revenue map maintenance services. To demonstrate the effectiveness of the map maintenance program, four Department of Revenue cartographers are maintaining 3,667 maps and 99,362 accounts. Most maintenance is within one week of being current; all is within one month of being current (except Wallowa County which is done once a year). Keep in mind that the statutory assessment requirements for these counties are no different than for your county.

The elements of law discussed in this chapter are for assessment and cadastral mapping purposes *only*; not for the dispersal of legal, advice to taxpayers.

DEFINITIONS

ACTUAL NOTICE. The knowledge of facts which would naturally lead an honest and prudent person to make an inquiry.

ASSESSMENT CADASTRE. The inventory of real property, cadastral maps and records, appraisal records, soil class maps, assessment rolls, ownership lists, statements of value, etc. Used for the purpose of justly apportioning ad valorem taxes on real property.

CHAIN-OF-TITLE. In general, a chain-of-title is the successive conveyance commencing with the patent from the United States - or from some other source - and including the last instrument of conveyance to the one claiming title. In the context of this definition an unrecorded deed would be in the chain-of-title, except in the case where a subsequent *bona fide purchaser* (from the same grantor of the unrecorded deed) records first. In most legal cases, chain-of-title includes only recorded deeds (however, recording itself does not mean the deed is in the chain). The fact that a deed is not recorded (therefore, not in the *recorded chain-of-title*) does not mean that title has not passed to the grantee of the deed. In absence of a subsequent purchaser (who has recorded) the grantee of an unrecorded deed has nearly as good a title as one who has recorded. Chain-of-title is a matter for title companies, attorneys and the courts; *not the assessor*.

CHANGE IN OWNERSHIP. Includes transfers without valuable consideration by gift, inheritance or operation of law. *Ownership* means the right to immediate possession under a freehold estate of inheritance, i.e. a fee simple estate or an estate for life. Therefore, *change of ownership* would include the creation of a life estate or a joint interest. A *sheriff's deed* would also constitute a change of ownership, but only after expiration of the statutory period of redemption. *Does not include a leasehold, license, or easement*.

CONSTRUCTIVE NOTICE. Where there exists actual notice of matter, to which equity has added constructive notice of facts, which an inquiry after such matter would have elicited; and, where there has been a designed abstinence from inquiry for the very purpose of escaping notice.

DELIVERY AND ACCEPTANCE. The final conditions for title to pass. Title does not pass until a deed is delivered and accepted during the lifetime of the parties.

FLYSHEET. The record of names of the owners of each parcel of real property on a map. The flysheet is usually opposite the cadastral map in the map book.

Flysheets are not a mandatory part of the standard cadastral map system.

LAND PARCEL. A contiguous area of land capable of being described in a single description, by a closed traverse; or as one of a number of lots, blocks, townships, sections, or tracts in a subdivision, or of a township that is separately owned and capable of being separately conveyed. The largest possible parcel of land in the cadastral map system is the township (ownership either all in U.S. or all in the State of Oregon).

MEMORANDUM. As used in ORS 93, 640, an instrument that contains the date of the instrument being memorialized, the names of the parties, a legal description of the property involved, and the nature of. The interest created, which is signed by the person from whom the interest is intended to pass, and acknowledged or proved in the manner provided for the acknowledgement or proof of deeds. By ORS 93.640(1) a memorandum must contain the true and actual consideration paid for such a transfer as provided in ORS 93.030.

OWNERSHIP. The right of one or more persons to possess and use the property to the exclusion of others. However, others may have rights or interests that limit the control of the owner.

QUITCLAIM DEED. A simple deed conveying any claim or interest in real property that a grantor possesses. If the grantor possesses any claim to or interest in real property, the quitclaim deed acts to pass that claim or interest to the grantee. In Oregon a quitclaim deed (in the form as shown in ORS 93.865) has the effect of conveying whatever title or interest, legal or equitable, the grantor may have in the described property at the date of the deed but shall not transfer any title or interest which the grantor may *thereafter* obtain, nor shall it operate as an estoppel. A grantee taking title by way of quitclaim deed shall NOT merely because of his receipt of title by or through such a deed, *be denied the status of a good faith purchaser for value*. The State of Oregon, for example, often uses a quitclaim deed to transfer title. Note: It is possible for a quitclaim deed to be constructed so as to have the same effect as a warranty deed.

RECORDATION IN OREGON. A recorded deed is a *notice to the world* and to bona fide purchasers of what appears on its face. The notice, however, is only as effective as the deed. Oregon law does not require the recording of a deed as a condition to pass title (except in the case of subsequent purchasers). ORS 93.640 provides that: (1) *every conveyance, deed, land sale contract or other agreement or memorandum thereof affecting the title of real property within this state which is not recorded as provided by law is void as against any*

subsequent purchaser in good faith and for a valuable consideration of the same real property, or any portion thereof, whose conveyance, deed, land sale contract or other agreement or memorandum thereof is first filed for record, and as against the heirs and assigns of such subsequent purchaser. (2) Every assignment of sheriff's certificates of sale of real property on execution or mortgage foreclosure which is not recorded in the records of deeds in the county where the land is situated within five days after its execution is void as against any subsequent purchaser in good faith and for a valuable consideration of such certificate of sale, or the real property covered thereby, or any portion thereof, whose assignment is first recorded.

The statute defines one condition necessary to make the unrecorded deed ineffective. An example of that condition is where A conveys parcel 1 to B, then A conveys parcel 1 to C and C records his deed first. If C is a bona fide purchaser, B's unrecorded deed must yield to C's recorded deed. NOT, however, at the discretion of the assessor's office, but as determined by the courts. The assessor's office has *no authority* in such matters. In the above example, C is the *subsequent purchaser*. This situation is not the norm; moreover, the solutions to such cases are not as cut-and-dry as our example implies. Therefore, assessment rules and policies designed to police such matters (i.e. recording rule and chain-of-title rule) are not cost-effective.

STATUTE OF ANNE. The priority established by recording first is a modification to the common law rule that an estate which a grantor conveys cannot be affected by a subsequent conveyance. That modification is known as the *Statute of Anne* (1708).

TITLE TO PROPERTY. Generally, infers the evidence of one's right to land and real estate. In legal application it includes the extent of the interest in the land or real estate; the means whereby the owner is enabled to assert or maintain possession; the right of the owner considered with reference to the manner his right or interest has been acquired, or its capacity of being effectually transferred. An estate in fee.

NOTE: In law, many of the definitions of the above terms are extremely complex and involve matters too lengthy to discuss here. The definitions we have provided, however, will suffice for the purpose of maintaining the assessment cadastre.

OUTLINE OF MAINTENANCE ACTIVITIES

The reference sources listed in figure 12-1 (Chapter 12) are also the reference sources for map maintenance.

The following is how each is used to maintain the cadastral maps.

1. Receive and analyze copies of official government land surveys, e.g. highway maps, B.L.M. Public Land Surveys, etc., to check cadastral map geometry, detail and measurements.
2. Revise cadastral maps to conform to new government surveys; recording important lines and measurements on the map. This will simplify the plotting of the later deeds. In this activity any remapping should be scheduled for a time when there is sufficient new survey information to warrant new maps.

NOTE: Maps *should be revised as soon as possible to conform to any revised B.L.M. resurvey of a township, section or subdivision of a section. See Chapter 5.*

3. Receive and analyze copies of registered land surveys filed with county surveyors.
4. Revise cadastral maps to conform to new registered land surveys; recording all important lines and measurements on the map. The lines and measurements should be added to the map even if a deed does not exist to support the survey detail. The new survey could be considered as constructive notice to the cartographer that a new parcel has been created and a deed will follow, that your real property inventory of parcels is in error, or that the survey data is to correct erroneous information of a former deed. In this activity any remapping should be scheduled for a time when there is sufficient new survey information to warrant the new maps.
5. Receive and review new subdivision plats for approval as per ORS 92.095. This *must be done before any plat can be recorded.*
6. Analyze the new subdivision survey to determine the proper scale to be represented on the cadastral map (unless the area contained by the subdivision is already mapped at 1" = 100' scale). Do not show *new subdivisions on 1" = 2,000' or 1" = 400' scale maps. Most new subdivisions should be mapped at 1" = 100' scale as per guidelines provided in Chapter 2.*

NOTE: In most cases it will be more economical to map at 1" = 100' scale than to try to add the subdivision to a 1" = 400' scale map. Plotting at the larger scale is faster, and it is easier to record subdivision information on the larger scale map than to try to squeeze the data onto an existing 1" = 400' map. The only type of subdivisions applicable to 1" = 400' scale maps are *subdivisions with large acreage lots (or acreage tracts).*

7. Revise cadastral maps to conform to new subdivisions; making larger scale maps when needed. Map boundaries must conform to the graphic standards of Chapter 2. Record all required subdivision information on each map, e.g. lot and block lines, letters, numbers and dimensions; boundaries and boundary measurements; initial points; street names, traverse data, and widths, and the subdivision name.
8. Taxlot each new lot of the subdivision; assigning each a new parcel number or parcel segregation number. Be sure to number the park blocks and spite strips. (Refer to Chapter 3.)
9. Receive and review new condominiums (unit ownerships) for approval as per ORS 91.512.
10. Analyze the new condominiums to determine the proper scale to be represented on the cadastral map. See figures 2-45 and 2-46 (Chapter 2).
11. Revise cadastral maps to conform to new condominiums; making new larger scale maps (or supplemental maps) when needed. Be sure to show and label common areas.
12. Taxlot each unit of the condominium as per Chapter 3. *Remember, it is also necessary to assign a parcel number to the land designated as "common property."*
13. Honor, receive and review *all deeds and other instruments of conveyance* recorded in the county deed records, or *filed with the assessor*.

NOTE: To honor such records means that you will accept them as evidence that a revision of the assessment cadastre might be in order. It does not mean that you can always act on the instrument. TO NOT HONOR A DEED BECAUSE IT IS UNRECORDED IS TO REJECT A REFERENCE SOURCE THAT IS NOT ONLY LEGAL, BUT VALUABLE TO THE ASSESSMENT CADASTRE, An unrecorded deed is constructive notice to the assessor that the interest in a parcel of real property is changing. Refection of the deed by the assessor does not alter the legality of a property transfer.

14. Revise the cadastral map to conform to new information supplied by a new deed. Revise assessment cadastre to reflect new changes in the ownership of real property, i.e. name changes.
15. If the deed represents a new parcel of land, compute the area of that parcel (in acreage) and assign it a parcel number.
16. Receive new right-of-way deeds, vacation ordinances, right-of-way abandonments, etc.
17. Revise the assessment cadastre to reflect the new changes in highway, street, and county

road right-of-ways. Most right-of-way deeds are preceded by surveys and maps. These should be obtained and processed at activity 1.

18. Receive changes in taxing district boundaries that conform to the provisions of ORS 308.225.
19. Revise the assessment cadastre to reflect the new taxing district boundary changes.

Each of the above activities are part of the *updating* element of cadastral map maintenance. The maintenance includes, but is not limited to, updating of the cadastral maps, the parcel identifier, the tax lot record, the flysheet, and the journal voucher. The updating of additional assessment cadastre records, by the mapping section, is acceptable as long as it does not interfere with maintenance of the cadastral maps and supporting map records.

Cadastral Map Upgrading

Part of the job of the county cartographer is to *improve* the maps. Map updating is one important method of improving the cadastral maps; especially those updating activities involving governmental and private surveys. In addition to the use of surveys to improve the accuracy of the maps, map upgrading should include:

1. Reviewing new maps to spot changes and corrections that would affect the cadastral maps (e.g. U.S.G.S. quadrangle maps, State Highway Division road and highway index maps, B.P.A. Transmission Line surveys, drainage basin maps, etc.)
2. Reviewing new aerial photography and revising the (non-surveyed) cultural and natural features on the cadastral maps to conform to the new photography. Special attention should be given to the natural features associated with the riparian boundaries. (See Chapter 10.)
3. Reviewing complaints about the cadastral maps and records. Be cautious of verbal taxpayer claims based on *adverse possession*, or *possession*; these are matters for the courts.
4. Correcting maps and records when the evidence supports a correction. *Surveys executed by private persons that are not registered surveyors or registered engineers are not acceptable evidence for making map changes.*
5. Remapping areas where the map life has expired and/or where new data supports such remapping. All remapping should be carefully planned and coordinated with the staff of the assessor's office.

NOTE: When remapping it is common to encounter situations where the border areas do not match the abutting

existing maps (because the existing maps were based on out-of-date information). If you are sure the borders of your new maps are correct, do not attempt to adjust either the new maps or the existing maps. Merely note the conflict on the existing maps and adjust the borders when they are remapped.

PRINCIPLE. Confine remapping to a planned area. Abutting areas can be corrected when they are remapped.

In conclusion, your central maintenance function is to show the up-to-date location of the lines of real property on the map, and in the exact same geometric proportions as the lines exist on the ground; and to maintain an inventory of real property and real property ownerships and special interests. There should be no rules, regulations or policies to prevent performing that function.

USE OF SURVEYS TO UPDATE AND UPGRADE CADASTRAL MAPS

In this section we are placing special emphasis on surveys because they are presently being ignored in most county map maintenance operations. In such cases *matters of title* seem to consume the time that should be allocated to map updating and upgrading by surveys.

Surveys are the building blocks of the cadastral map. They supply the angular and linear measurements necessary for obtaining accurate map geometry. The surveys fortify the cadastral map by supplying substantial evidence that is needed to convince taxpayers, attorneys and other map users that the lines, points and measurements are reasonably accurate and reliable.

In the maintenance operation, *new surveys* function to update and upgrade the cadastral maps. These surveys supply refined measurements that are the result of new surveying technology. It seems absurd to ignore such a wealth of information as that provided by new governmental and professional private surveys. Yet some cartographers seem content to waste time wrestling with the problems of deed ambiguities when their task could be simplified by using the survey. What these cartographers fail to understand is that the survey *usually presents a clear picture* of what the author of a deed has had a difficult time expressing verbally. It has been proven that a professional cadastral cartographer, armed with a survey plat, can usually plot the boundaries of a parcel of land faster and more accurately than when supplied with only a deed.

The new surveys also offer the BEST chance of success in establishing the true location of property lines on cadastral maps. This is because the surveys are executed by a professional who possesses the skills and abilities of the science of boundary measurements, boundary control, and the legal principles associated with surveying. The survey of the *registered land surveyor* has not been executed with the same indifference, verdancy, and negligence that is reflected in *many* deeds. The surveyor usually executes his (or her) survey armed with all the documentary evidence that is available. The resulting survey is the conclusion of the facts, evidence, field measurements and professional observations.

Surveys vs Deeds

It is important to understand that our emphasis on surveys is not to dispose of the importance of deeds, but to convey the concept that *surveys* provide the information needed to display accurate special relationships of *overall* map geometry and of the interior polygons. The deeds cannot provide that *quality* of information as consistently as the surveys. But the deeds tell us who owns the interior polygons, and they provide many of the essential elements needed to establish title. In other words, the survey and deed *each* play an important part in the cadastral map, and for the most part should *not* be played one against the other by the cartographer. This must be left to the courts.

To illustrate this concept, figure 13-1 shows the relationship of deeds to surveys. The dimensions are from a new B.L.M. dependent survey of section 12. *The dependent survey is designed to restore the original conditions of the official GLO survey according to the record.* The original survey plat showed section 12 to be an 80 chain x 80 chain section with 20 chain x 20 chain subdivisions. The new survey shows the true measurements between the corners as they were set in the ground. The deed descriptions were constructed as though the section was 80 chains square (with 20 chain square one-quarter quarters).

In such cases the deeds will suffice to afford the means of identification. The courts would say that the deed descriptions were adequate to pass title. But as far as defining the *exact* location and size of each parcel, the courts usually rule that the deeds yield to the survey. In our example, the differences between the original and new surveys seem inconsequential. However, such differences have often resulted in costly, time consuming litigation between owners; sometimes, with the assessor in the middle. Moreover, it is the seemingly *unimportant* differences that, if ignored can result in many cartographic headaches. On the other hand, recognition of such surveys does not destroy the usefulness of the deeds because the intent of the



Therefore, even though the measurements contained in a deed description differ from those of the survey, it does not mean that the deed and survey are in conflict. To be in conflict, a deed would seem to describe a boundary different from that represented by a survey. When this is the case the cartographer does not automatically use the survey and reject the deed; or automatically use the deed and reject the survey. But he should keep in mind that the survey was *probably* made because of a defect in the deed. If the defect was considerable, making the language of the deed am-

The deed description would not close. Moreover, it seemed to be in conflict with the properties abutting on the east and south. As is often the case with ambiguous deeds, a solution was not sought until many years after the parcel was purchased. In 1977

Mr. Miller had the land surveyed and the surveyor filed his survey with the county surveyor. A correction deed could not be filed because the grantor of the Miller parcel was deceased.

Assuming that the survey is not faulty, the deed and survey are not in conflict because the survey is consistent with the wording of the deed description - even though the actual distances of the survey differ from those of the deed.

The survey of our example seems to agree with aerial photos, deeds, other surveys, etc. Moreover, it resolves some of the cartographic problems in this part of the cadastral map. It should be used to correct the boundaries of Miller's parcel and the abutting parcels of the cadastral map. It is *not* necessary to have a correction deed to make the change.

What we have done, at this point, is to use the survey data to correct the lines of the map. We have not made a determination of title, legality of title, or legality of the survey. These are matters for the courts and/or the parties involved in any dispute over boundaries, ownership and title. However, we have analyzed the survey to see that it is not in serious conflict with the abutting information. In this process it is important to have a good understanding of the controlling elements of deed descriptions, and the concept of junior and senior rights and the controlling elements of junior and senior surveys.

Surveys of New Parcels

If a survey contains lines not shown on a map it could be a survey such as that in figure 13-2. If it appears to be the lines of a new parcel, the lines and survey information should be added to the map. The lines should be dashed. Always note the survey number. When a new deed is filed on the parcel represented by the survey, the processing of the deed will be simplified because the boundaries (from the survey) will already be displayed on the map.

It is possible that the survey is to lay out the boundaries of some partial interest in the land, or some use of a certain parcel of land (lease, rental, etc.). It is still advisable to use such surveys to update your map. Partial interest or special uses of part of a larger parcel of land are good candidates for future sales and/or litigation. The point to keep in mind is that your map should be a record of all cadastral information.

Route Surveys

Highways, railroads and transmission lines are constantly being altered to accommodate safety requirements and increased traffic. Therefore, it is a good policy to request notices and surveys of any changes

to the major routes (especially to highways because highway right-of-way lines are usually property boundaries rather than easement lines). See Chapter 8 for information on surveys and plotting.

The new surveys will continue to supply information to refine map control, map lines and the measurements recorded on the map.

Rectangular Surveys

The Bureau of Land Management has the authority to execute retracement surveys of townships or partial townships. Figure 13-4 is a dependent resurvey of the same township displayed in the original plat shown in figure 13-3. This is an official plat representing a retracement and reestablishment survey designed to restore the corners in their *true original locations* (as placed on the ground by the original surveyor). It would be highly illogical to not recognize the new survey and leave the boundaries as incorrectly displayed by the original plat. This is what the Department of Justice says about use of the surveys:

"The statutes reflect the generally accepted rule that a resurvey is evidence, although not conclusive evidence, of the location of the original line, and the question of whether the resurvey accurately retraces the original survey is a question of fact. United States v. Hudspeth, 384 F2d 683, 1967."

"Although some practical problems may arise, I see no legal reason why the assessor may not employ the resurveys in preparation and maintenance of his maps, as the resurveys offer the best information available."

"Surveys made by authority of the United States or the State of Oregon may be considered as evidence in any court in this State, and unlike private surveys, need not be attested"

The following ruling is very important to cadastral cartography:

*"Where there is a discrepancy in a government survey, between the monument and the distances given in the field notes (or on the plat) the monuments will control."*¹⁴

And,

*"It has ever been held that the marks on the ground constitute the survey. The courses and distances are only evidence of the survey."*¹⁵

As regards boundary disputes between private parties:

*"Official government surveys are not open to attack between private parties in boundary disputes."*¹⁶

Use of Maverick Survey

Nothing in this chapter is meant to imply that *every* survey is correct or that every survey can be plotted.

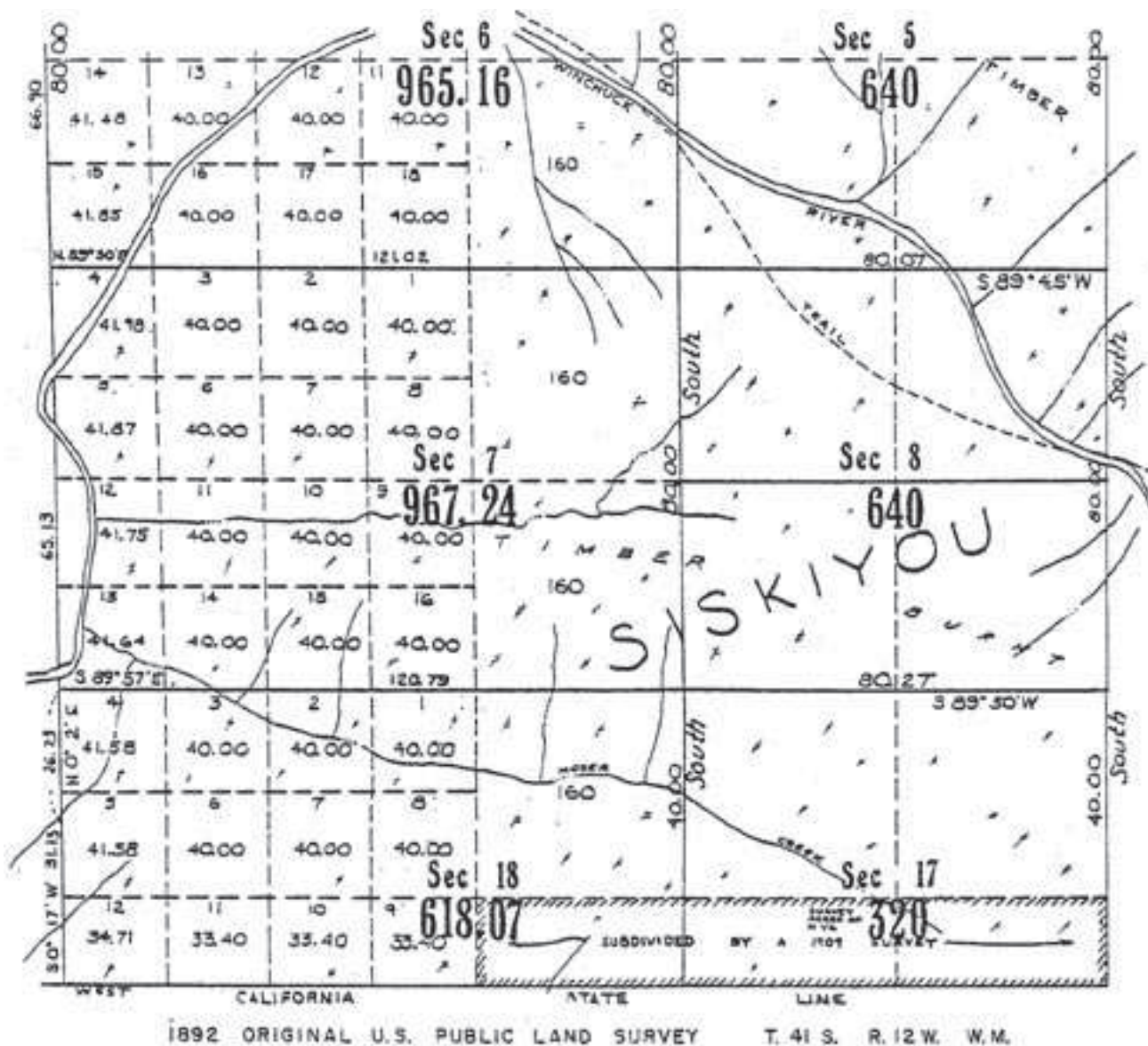


Figure 13-3

But *most* new surveys are correct, and when not in harmony with existing information there is an excellent chance that the older information is incorrect.

When it is evident that the new survey is correct, yet to use it would require replotting a cadastral map – or several maps, we suggest recording the survey number on the map. Make a side note that the survey does not conform to the information on the map. File such surveys for later use. At that point in time when enough data has accumulated to justify remapping, these surveys will be needed.

SUBDIVISIONS

ORS 92.095 requires that: (1) No plat shall be recorded unless all ad valorem taxes and all, special assess-

ments, fees, or other charges required by law to be placed upon the tax roll have been paid which have become a lien upon the subdivision or which will become a lien during the calendar year." This and the responsibilities outlined in the statements of figure 13-4 are what the Department of Justice suggests are the assessor's statutory responsibilities regarding subdivisions. The opinion reads as follows:

"Or Laws 1965, ch. 393, added a new statute (requested by many assessors), requiring payment (and even prepayment) of property taxes appertaining to a proposed subdivision. In the interest of uniformity throughout the counties, the forms set out below" [Figure 13-5] "are proposed In preparing the forms, consideration has been given to brevity, to the statutory duties of the assessor, the varying situations arising from the time of year in which

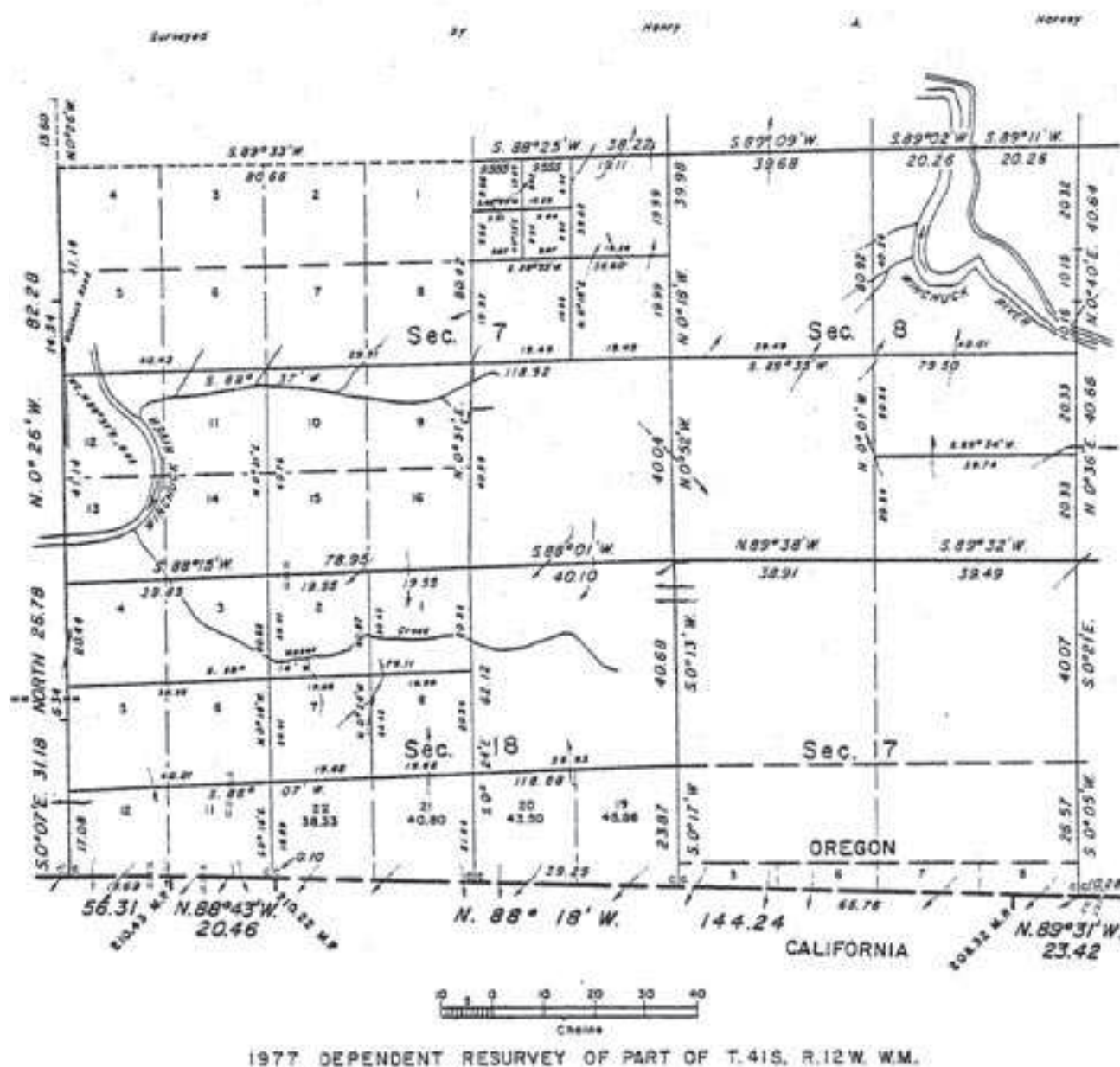


Figure 13-4

the application is made, and the fact that records in both the assessor's and tax collector's office are involved" ¹⁷

When reviewing a subdivision for approval, the cartographer should first check to make certain that the name complies with ORS 92.090(1). No tentative plan or plat of a subdivision shall be approved which bears a name using a word which is the same as, similar to or pronounced the same as a word in the name of any other subdivision in the same county, except for the words "town," "city," "place," "court," "addition" or similar words, unless the land platted is contiguous to and platted by the same party that platted the subdivision bearing that name

or unless the party files and records the consent of the party that platted the subdivision bearing that name.

Therefore, "Smythe Court" would be unacceptable where an existing subdivision was named "Smith Court." However, if there was no existing "Smith" or "Smythe Subdivision" the party filing "Smythe Court" could change the name to "Smythe Subdivision." Another example of an unacceptable subdivision name would be "Fir Court Subdivision" where an existing subdivision was named "Fir Court," but without the name "Subdivision."

The second item to review is the lot and block numbering. First, ORS 92.090(1) requires that: *All plats must continue the block numbers of the plat of the same name last filed.* Second, ORS 92.050 requires that: *Each lot shall be numbered and each block shall be lettered or numbered.*

Although P.T.L.A. 92.095 p.1 does not mention streets, it is advisable to see that each street is named (SS 4 of ORS 92.050) and that the streets and roads are laid out so as to conform to the plats of subdivisions and maps of major partitions already approved for adjoining property as to width, general direction and in all other respects unless the city or county determines it is in the public interest to modify the street or road pattern (ORS 92.090). The streets and roads held for private use must be clearly indicated on the tentative plan and all reservations or restrictions relating to such private roads and streets must be shown on the plan (SS 2b ORS 92.090).

ORS 92.050(3) also requires that *"streets and roads for public use are dedicated without any reservation or restriction other than revisionary rights upon vacation of any such street or road and easements for public utilities."*

The boundary of the subdivision plat is a registered survey boundary. It should be checked to see that it does not conflict with the boundaries of the abutting properties. In case of a conflict the problem must be carefully analyzed to determine whether it is the map, deeds abutting surveys, or the subdivision that is in error. If the conflict cannot be rectified in this

manner, get an opinion from a third party, i.e., the county surveyor.

Property Tax Law Annotations

ORS 92.090 was amended to provide that all, taxes be paid ".....which have become a lien upon the subdivision or *which will* become a lien during the calendar year," before a plat is approved for recording. Does this apply to taxes during the calendar year or does it also include taxes due for a whole fiscal year? The Department of Justice has held that the taxes due for the whole fiscal year must be paid before the approval of a plat is recorded, since they have become a lien within the current calendar year. In that regard it is not necessary that they become due; it is only that they become a lien.¹⁸

It should be noted here that 92.090(1) does not necessarily require that the property be segregated in order for the taxes to be collected. Rather, it provides for the payment of the actual taxes which have been assessed against the property or which will become a lien against the property, and provides a means for a payment of an estimate of those taxes or for posting a bond to insure that all of the taxes are paid. (Note: figure 13-4 contains a suggested form of certification of subdivisions of plats.)¹⁹

"ORS 92.090, as amended by ch. 393, Or Laws 1965, does not require the advance payment of ad valorem taxes as a condition of filing the final declaration establishing a condominium unless that condominium creates such interest in land as would bring it under

ASSESSOR Pursuant to ORS 92.090 and 92.100 I hereby certify that according to the records of this office, the exterior boundaries of this plat do not conflict with the boundaries of abutting properties; and that the name adopted for said plat and the numbering of the lots and blocks conform to the requirements of the law. Pursuant to ORS 92.095(1)(a) I further certify (check one applicable box): ☐ That all ad valorem taxes and all special assessments, fees and other charges required by law to be placed on the 19____-19____ tax roll total \$_____, which amount became a lien on this subdivision or will become a lien during this calendar year. ☐ That the amount of ad valorem taxes and all special assessments, fees and other charges required by law to be placed on the 19____-19____ tax roll cannot be computed at this time. The subdivider has the option (1) of paying the estimated amount due of \$_____ which has been computed using the value on the 19____-19____ assessment roll for such subdivision and the previous year's rate percent of levy of _____, increased by 10 percent plus my best estimate of special assessments, fees and other charges; or, (2) depositing with the tax collector a bond in the amount of \$_____ which I consider adequate to insure payment of the taxes to become due, and which does not exceed twice the amount of the previous year's taxes, special assessments, fees and other charges upon such subdivision. Date: _____ Signed: _____	
TAX COLLECTOR Pursuant to ORS 92.095(2) I certify (check one applicable box): ☐ That all ad valorem taxes and all special assessments, fees and other charges required by law to be placed upon the tax roll in the amount of \$_____, as computed by the assessor, which became a lien on this subdivision and that are now due and payable have been paid. ☐ That I have received payment in the amount of \$_____, which represents the assessor's best estimation of the (total amount that will be due).** ☐ That a good and sufficient bond as requested by the assessor in the amount of \$_____ has been received by this office, guaranteeing the payment of the 19____-19____ taxes, special assessments, fees and other charges. Date: _____ Signed: _____ *or use "total amount that will be due" to correspond to the second box. **or use "total amount of taxes, assessments, fees and charges that will be due." in both second and third items.	

Figure 13-5

the definition of a subdivision" ("garden type" condominium).²⁰

Do the provisions of ORS 92.095 also apply to the improvements located on the land to be divided? ORS 92.095 makes *no distinction between taxes assessed against the land and taxes assessed against the improvements.*

Therefore, before the plat is approved all taxes must be paid.²¹

A plat was submitted to the assessor's office for approval on December 15, 1970. At the time of approval no taxes were a lien on the property. The assessor indicated that the approval would not be valid until after 1-1-71, unless taxes were collected according to ORS 92.095(2). When the plat was submitted to the clerk for recording on 1-15-71, he did record the plat in spite of the fact that the taxes due during 1971 *were not collected*, nor a bond provided under ORS 92.095. *Can the county clerk cancel the plat which he recorded in violation of the statute?* The Department of Justice held that he *can not*. The county clerk, of his own initiative cannot cancel the plat. He is merely the custodian of public records and he cannot destroy such records without proper authority. *It is the court of record which is in charge over its records and it can direct the correction of clerical errors.* The county clerk with the assistance of the District Attorney should apply to the circuit court in a suit to cancel the plat.²²

Approval - ORS 92.100

ORS 92.100 requires that: *All plats must also be approved by the county assessor and the governing body of the county in which the property is located before recording.* This is in reference to the approval of ORS 92.095. It does not require approval of any additional subdivision elements by the assessor.

UNIT OWNERSHIPS— CONDOMINIUMS

ORS 91.506 "In order to submit any property to the provisions of ORS 91.500 to 91.671 and 91.990, the owner thereof shall record a declaration in the office of the recording officer of the county in which such property is located." It shall be executed in accordance with ORS 91.509 and acknowledged by the owner of the property.

Assessor's Responsibilities

ORS 91.512 provides that before a declaration or an amendment may be recorded, it must be approved by the county assessor, the tax collector and the Real Estate Commissioner.

ORS 91.512(2) *The county assessor of the county in which the property is located shall approve a declaration or amendment thereto if: (a) the name complies with subsection (3) of ORS 91.509; and (b) the plat and floor plans comply with the requirements of ORS 91.515*

ORS 91.509(5) *No property shall bear a name which is the same as or deceptively similar to: (a) the name of any other property submitted to the provisions of ORS 91.500 to 91.671 and 91.990 which is located in the same county; or (b) the name of any other property or subdivision not submitted to the provisions of ORS 91.500 to 91.671 and 91.990 which is located in the same county, unless the name of the property includes the word "condominium" or is followed by the words "a condominium." (formerly 91.530.)*

ORS 91.515 provides that the person offering a declaration for recording file an exact copy (certified to be a true copy by the recorder or county clerk) with the county assessor. The floor plans of buildings described in the declaration must be recorded simultaneously with the declaration. The plans must show the vertical and horizontal boundaries of each unit in each building, the location of each unit, the dimensions of each unit and the common elements accessible to each unit. The plans must include a statement of a registered architect, registered professional land surveyor or registered professional engineer certifying the plans to fully and accurately depict the boundaries of the units and floors of the building and the date of construction of such units and buildings depicted on floor plans and date plat was completed. (See ORS 91.515 1979 rev.)

ORS 91-515(3) requires that a plat of the land described in the declaration, complying with ORS 92.080 and *based upon a survey*, shall be recorded simultaneously with the declaration. *The plat shall show the bearing and length of each line, the initial point of the survey giving ties to a corner or corners of record or to monuments set and found and, the location of all buildings, roads, roadways and other improvements.* The plat must include a surveyor's affidavit that complies with ORS 92.070. Subsection 4 requires the floor plan to be part of the plat. Subsection 5 requires assessor's approval of amendments to plans and plats before they are recorded. Such amendments must be accompanied by an amendment to the declaration *authorizing such amendment to the plat or floor plans. The county assessor shall approve an amendment to the floor plans if the amendment complies with subsection (2) of this section and shall approve an amendment to a plat if the amendment complies with subsection (3) of 91.515*

Miscellaneous Provisions

ORS 91.536 requires a deed of a condominium unit to contain: (1) The name of the property, and the re-

ording index numbers and date of recording of the declaration and in case of a staged condominium, the applicable supplemental declaration. (2) The unit designation of the unit. (3) Any further details the grantor and grantee may consider desirable.

ORS 91.561. *“While property is submitted to provisions of ORS 91.500 to 91.671 and 91.990, a unit may be conveyed and encumbered and may be the subject of ownership, possession or sale and all types of juridic acts Inter Vivos or Mortis Causa,²³ as if it were sole and entirely independent of the other units of which they form a part, and the corresponding individual titles and interest shall be recordable. Subsection 2 provides that each unit owner shall be entitled to the exclusive ownership and possession of his unit.*

All condominiums have general common elements owned in common by every unit owner, e.g. an elevator in an apartment-type condominium or the sidewalks in a garden-type condominium ORS 91.563 provides each unit be entitled to an undivided interest in the common elements in the allocation expressed (as a fraction or percentage of undivided interest in the common elements) in the declaration. This allocation shall not be altered unless all unit owners having an interest in the particular common element agree thereto and record an amendment to the declaration setting forth the altered allocation of each unit having an interest.

The law also provides that the undivided interest in the common elements shall not be separated from the unit to which it pertains and shall be conveyed or encumbered with the unit even though such interest is not expressly mentioned or described in the conveyance or other instrument.

ORS 91.581(l). *Each unit with its percentage of undivided interest in the common elements shall be considered a Parcel of real Property, whether leased or in fee simple, subject to separate assessment and taxation by any taxing unit in like manner as other Parcels of real property. A unit based upon a declaration filed by the owner of a leasehold estate shall be assessed in the name of the unit owner and not in the name of the owner of the fee or of the leasehold estate upon which the declaration is based. NEITHER THE BUILDING, THE PROPERTY NOR ANY OF THE COMMON ELEMENTS SHALL BE CONSIDERED A SEPARATE PARCEL FOR PURPOSES OF TAXATION.*

ORS 91.581(4). *The Department of Revenue shall have the authority to make rules and regulations prescribing methods best calculated to secure uniformity according to law in the appraisal and assessment of units constituting part of a property submitted to the provisions of ORS 91.500 to 91.671 and 91.990.*

If the property is removed from the provisions of ORS 91.500 to 91.671 and 91.990, as provided by ORS 91.584 and 91.587, the property shall be considered owned in common by all the unit owners. The respective interest of a unit owner shall be the total of the fair market value of his unit and common element interest appertaining to such unit immediately before termination of the condominium. ORS 91.591(l)(1a) and (1b) describes procedure for determining the proportion of any unit owner's interest in a condominium to that of all unit owners.

Property Tax Law Annotations

ORS 92.090 as amended by ch. 393, Or Laws 1965, does not require the advance payment of ad valorem taxes as a condition of filing the final declaration establishing a condominium unless that condominium creates such interest in land as would bring it under the definition of a subdivision (garden type condominium).

A condominium recorded what purports to be a declaration of unit ownership on December 15, 1971. Neither the county assessor nor the tax collector had approved the declaration. What legal action should be taken by the assessor? ORS 91.535 requires that before a declaration submitting property to unit ownership may be recorded, it must be approved by the county assessor and the tax collector of the county in which the property is located. ORS 91.540 states that when a declaration is made and approved as required, it shall, upon the payment of the fees provided by law, be recorded by the recording officer. (THE ASSESSOR SHOULD ACT UPON THE PROPERTY AS THOUGH NO DECLARATION FOR UNIT OWNERSHIP HAD BEEN FILED.) **Since the declaration had not been filed in accordance** with the law.... it is not a recorded declaration (as far as the assessor and tax collector are concerned). This would mean that the property would remain on the roll in the ownerships shown prior to approval of the unit declaration Any unit deeds to the condominium units shall also be disregarded.

Unit Ownership Plat Requirements

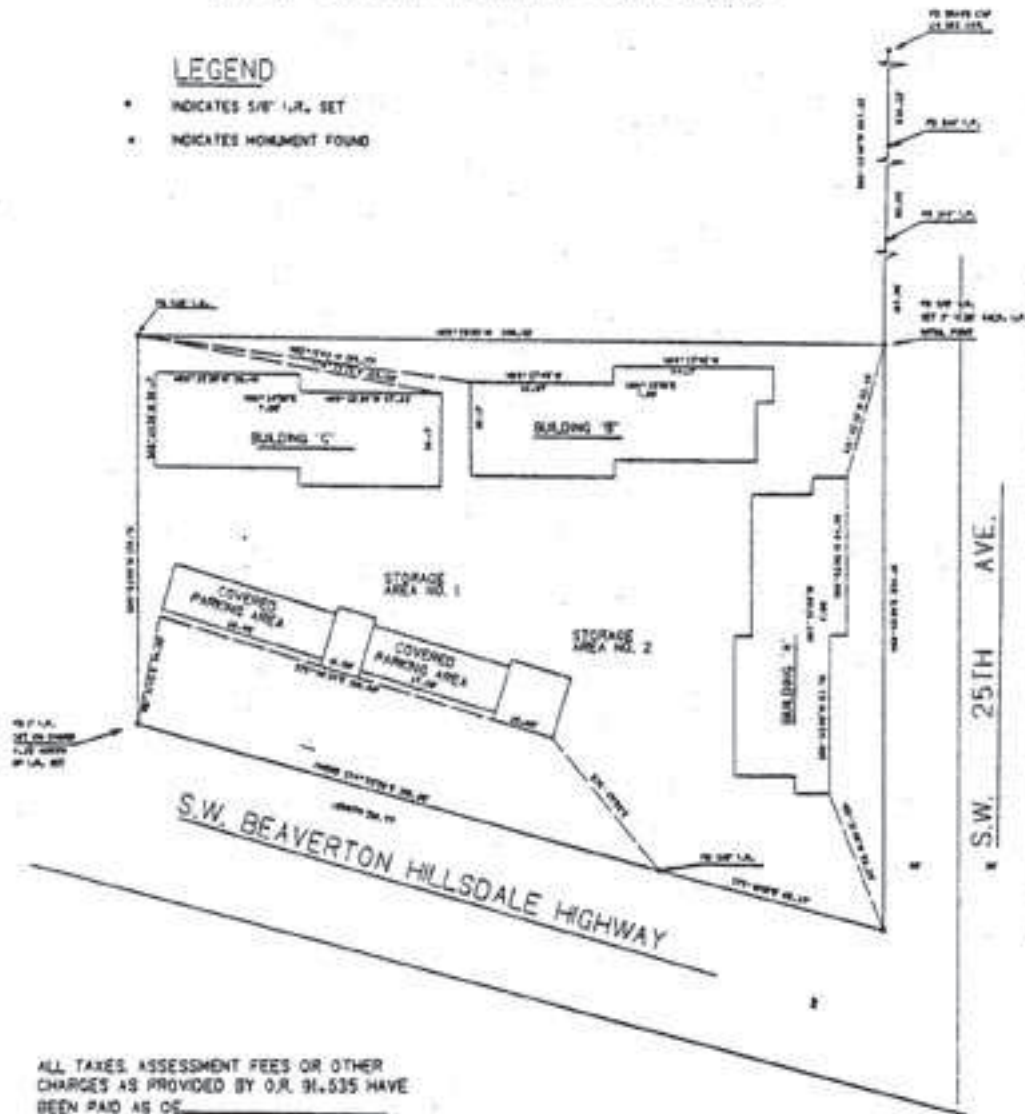
At least three copies of the plat, and an exact copy in black india ink on transparent film or linen (of high dimensional stability) should be submitted to the assessor for approval. A transparent film based or linen based photocopy will suffice for the black india, ink copy. (The term “india ink” is used to define any black tracing ink, i.e., Pelican T, that is used on film or linen tracings.) The engineer or surveyor who made the original plat must make an affidavit that the tracing or photocopy is an exact copy of the plat.

HILLSDALE LAURELS

TAX LOT 64 IN THE SE 1/4 SEC. 17 T.1S. R.1E. OF THE WILLAMETTE MERIDIAN
CITY OF PORTLAND, MULTNOMAH COUNTY, OREGON

LEGEND

- INDICATES 5/8" I.R. SET
- INDICATES MONUMENT FOUND



See next page

ALL TAXES, ASSESSMENT FEES OR OTHER CHARGES AS PROVIDED BY O.R. 91.535 HAVE BEEN PAID AS OF

HERBERT A. PERRY

DIRECTOR, DIV. OF ASSESSMENT & TAXATION
MULTNOMAH COUNTY, OREGON

BY _____
DEPUTY

ATTEST
COUNTY RECORDING OFFICE
MULTNOMAH COUNTY, OREGON

BY _____
DEPUTY

APPROVED _____
CITY OF PORTLAND

BY _____

APPROVED _____
COUNTY ENGINEER
MULTNOMAH CO., OREGON

BY _____
DEPUTY

EXAMPLE OF UNIT OWNERSHIP PLAT CONTAINING REQUIRED INFORMATION

See Right - Hand Page

Figure 13-6

SURVEYOR'S CERTIFICATE:

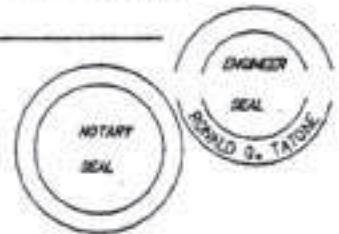
I, RONALD G. TATONE, BEING FIRST DULY SWORN, DEPOSE AND SAY THAT I HAVE CORRECTLY SURVEY AND MARKED WITH PROPER MONUMENTS THE LANDS REPRESENTED ON THE ADJOINING MAP TO BE KNOWN HEREOFORTH AS "HILLSDALE LAURELS" LOCATED IN THE SOUTHEAST ONE QUARTER OF SECTION 17, TOWNSHIP ONE SOUTH RANGE ONE EAST OF THE WILLAMETTE MERIDIAN IN THE CITY OF PORTLAND, MULTNOMAH COUNTY, OREGON. THAT AT THE INITIAL POINT OF "HILLSDALE LAURELS" I SET A 2 INCH GALVANIZED IRON PIPE 38 INCHES LONG, DRIVEN 8 INCHES BELOW THE SURFACE OF THE GROUND AT A POINT OF THE EASTERLY LINE OF SAID SECTION 17, AT A POINT THAT IS SOUTH 00°03'00" WEST A DISTANCE OF 887.22 FEET FROM THE EASTERLY QUARTER CORNER OF SAID SECTION 17, SAID POINT BEING THE SOUTHEASTERLY CORNER OF THAT PARCEL OF LAND CONVEYED TO THE CITY OF PORTLAND AND RECORDED JULY 22, 1962 IN BOOK 1548, PAGE 496, RECORD OF DEEDS, MULTNOMAH COUNTY, OREGON.

THENCE FROM SAID INITIAL POINT NORTH 89°29'00" WEST ALONG THE SOUTHERLY LINE OF SAID CITY OF PORTLAND PROPERTY A DISTANCE OF 300.83 FEET TO THE SOUTHWESTERLY CORNER OF SAID CITY OF PORTLAND PROPERTY; THENCE SOUTH 00°03'00" WEST PARALLEL WITH THE EASTERLY LINE OF SAID SECTION 17, A DISTANCE OF 158.51 FEET TO A POINT ON THE NORTHERLY LINE OF SOUTHWEST BEAVERTON HILLSDALE HIGHWAY; THENCE SOUTHEASTERLY ALONG SAID NORTHERLY LINE, ALONG A SPIRAL CURVE TO THE LEFT, AN ARC DISTANCE OF 238.37 FEET (THE LONG CHORD OF SAID CURVE BEARS SOUTH 74°32'28" EAST A DISTANCE OF 238.58 FEET) THENCE CONTINUING ALONG SAID NORTHERLY LINE SOUTH 75°00'15" EAST A DISTANCE OF 93.37 FEET TO THE INTERSECTION OF SAID NORTHERLY LINE WITH THE EASTERLY LINE OF SAID SECTION 17. THENCE NORTH 00°30'00" EAST ALONG SAID EASTERLY LINE A DISTANCE OF 238.19 FEET TO THE INITIAL POINT OF BEGINNING OF THE ABOVE DESCRIBED PLAT OF "HILLSDALE LAURELS".

I HEREBY CERTIFY THE ACCOMPANYING TRACING TO BE AN EXACT COPY OF THE ORIGINAL PLAT OF "HILLSDALE LAURELS".

SUBSCRIBED AND SWORN BEFORE ME THIS _____ DAY OF _____, 1976.

MY COMMISSION EXPIRES _____
NOTARY PUBLIC FOR THE STATE OF OREGON



DECLARATION:

KNOW ALL MEN BY THESE PRESENTS THAT RALPH H. GREENE AND ROBERT T. GREENE DO HEREBY MAKE, ESTABLISH AND DECLARE THE UNINDEXED MAP TO BE A TRUE AND CORRECT MAP OF THE LAND OWNED AND LAYED OUT BY THEM AS "HILLSDALE LAURELS", A CONDOMINIUM, SAID LAND BEING MORE PARTICULARLY DESCRIBED IN THE SURVEYOR'S CERTIFICATE HEREBY ANNEXED AND THEY DO HEREBY COMMIT SAID LAND TO THE OPERATION OF THE UNIT OWNERSHIP LAW AS LAYED OUT IN CHAPTER 96, OREGON REVISED STATUTES.

RALPH H. GREENE

ROBERT T. GREENE

ACKNOWLEDGEMENT:

STATE OF OREGON
COUNTY OF MULTNOMAH S.S.

BE IT REMEMBERED THAT ON THIS _____ DAY OF _____, 1976, BEFORE ME THE UNDERSIGNED, A NOTARY PUBLIC IN AND FOR THE STATE OF OREGON, PERSONALLY APPEARED RALPH H. GREENE AND ROBERT T. GREENE, KNOWN TO ME TO BE THE PERSONS NAMED IN THE FOREGOING DOCUMENT, WHO BEING FIRST DULY SWORN DID ACKNOWLEDGE TO ME THAT THEY EXECUTED THE FOREGOING DOCUMENT FREELY AND VOLUNTARILY, IN TESTIMONY WHEREOF I HAVE HEREBY SET MY HAND AND AFFIXED MY OFFICIAL SEAL THE DAY AND YEAR FIRST IN THIS CERTIFICATE WRITTEN.

NOTARY PUBLIC FOR THE STATE OF OREGON



NOTE:

- IRON RODS SET ARE 3/8" X 30" LONG WITH AN ALUMINUM CAP STAMPED "CAROLINGO-TATONE P.E. 3815" AND DRIVEN TO GROUND SURFACE.
- THE EAST LINE OF SECTION 17, BETWEEN MONUMENTS FOUND WAS TAKEN AS S00°03'00"W TO CONFORM WITH PREVIOUS RECORDED SURVEY.

See Left - Hand Page

Figure 13-6

**"HILLSDALE LAURELS"
BUILDING "A"**



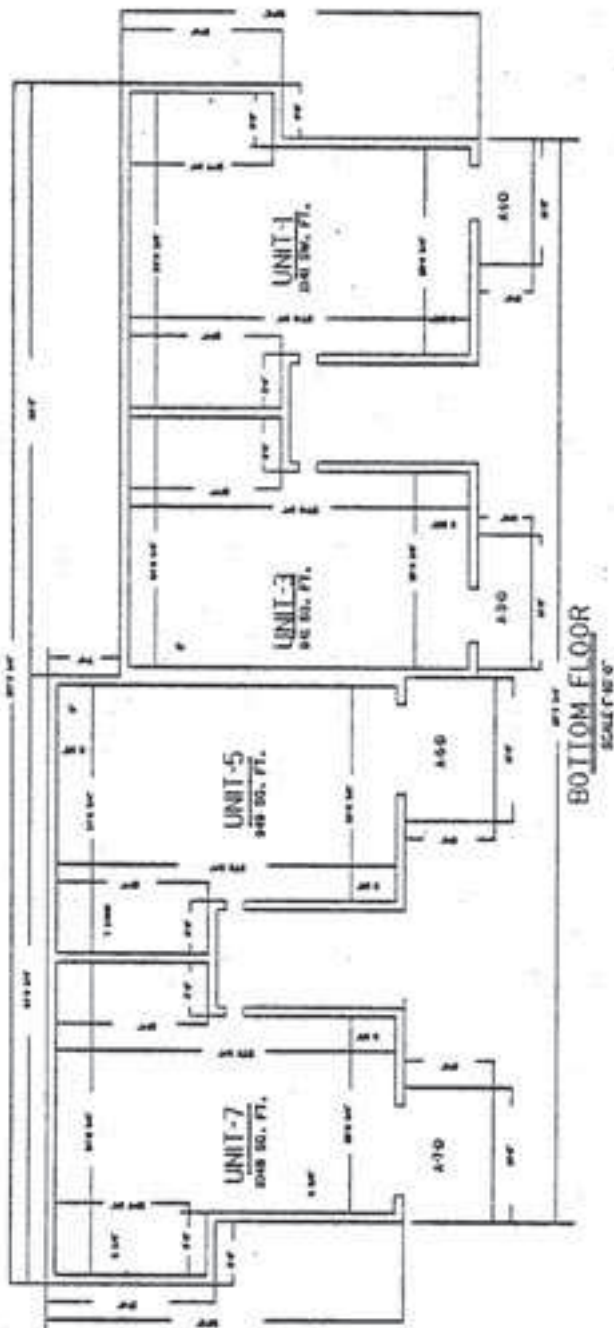
See next page

EXAMPLE OF UNIT OWNERSHIP FLOOR PLAN CONTAINING REQUIRED INFORMATION

See Right-Hand Page

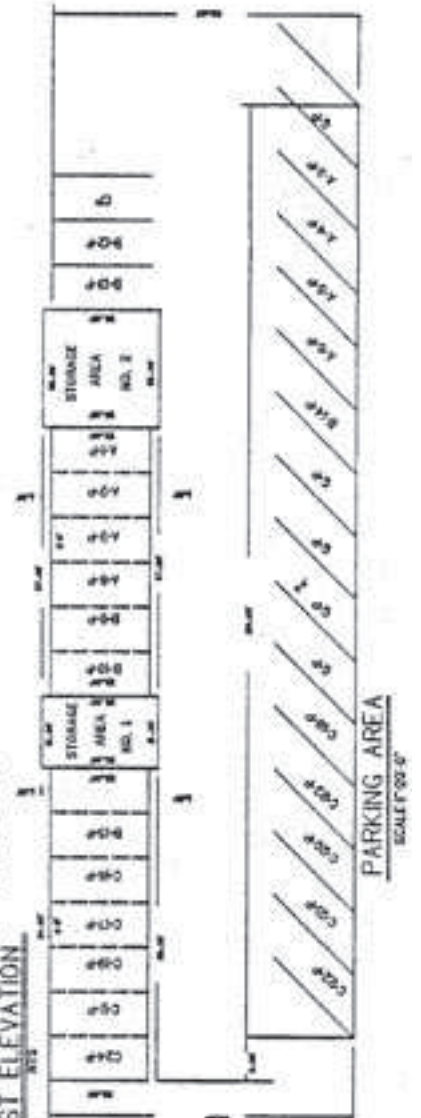
Figure 13-7

See prior page



NOTE:

RELASE DIMENSIONS TAKEN FROM FIELD MEASUREMENT
AND RECONSTRUCTION OF AS BUILT DRAWINGS.



See Left - Hand Page

Figure 13-7

Oregon law requires the plat to be 18" x 24". The copy to be recorded is required to be on material suitable for binding and copying with strength and permanency as a city or county may require under ORS 92.044. It must also be in india ink, and be of a scale that provides clear legibility of lettering and lines must be within a 16" x 22" area on the sheet; this will allow a one inch margin along each edge of the sheet. The plat may be placed on as many sheets as is necessary; however, a face sheet and index page is required where the plat is on two or more sheets. The plat must meet the requirements of ORS 91.515(3). See p. 364.

ORS 91.515(3) requires a plat to include a surveyor's affidavit that complies with ORS 92.070, i.e. that he has correctly surveyed and marked with proper monuments the lands as represented, that he marked a proper monument as provided in ORS 92.060 indicating the initial point of such survey, and giving the dimensions and kind of monument, and its location with reference to some known corner established by the United States survey, or giving two or more objects for identifying its location and accurately describing the tract of land upon which the lots and blocks (or units and buildings) are laid out.

ORS 91.515(4). For the purpose of recording the floor plans of a building, as required by subsection (2) of this Act, the plans shall be made part of the plat.

The assessor should get verification from the Real Estate Commission, Co. Surveyor and Planning Commission that the unit ownership documents are correct and officially accepted.

Note on the Word "Declaration"

You will note that the plat contains the word "Declaration." This is *not* the same declaration referred to in ORS 91.506. The plat declaration is merely a statement that the map *is a true and correct map of the land owned, and laid out (by the owners) as Hillsdale Laurels, a condominium, being the land described in the surveyors certificate of the plat.* And, that the owners commit the land to the operation of the unit ownership law as laid out in Oregon Statutes.

Floor Plans

Figure 13-7 (left and right) is an example of a well prepared floor plan for one of the buildings of Hillsdale Laurels.

DEEDS

The treatment of deeds in the maintenance program is probably the most controversial element of the cadastral map system. The deeds (especially the

recorded deeds) have reached a level of importance that is truly undeserving. The rules about deeds that have been formulated over the years by maintenance and clerical personnel have reached such proportions as to be counterproductive to not only the cadastral map program but to the entire assessment program as well. *None* of the rules have any effect on the legality of title or the legality of a deed; *few have any precedent in Oregon Law.*

Principle - *Nothing in Oregon Law invests any assessment official with the power to establish the legality of deeds in this state.*

The Department of Justice has held that *the assessor is under no obligation to determine the validity of a conveyance.*²⁸

Department of Justice and Department of Revenue attitudes toward deep involvement in the legality of conveyances are reflected in the following speech presented by Mr. Donald C. Seymour, Assistant Attorney General.²⁹

"A new deed has been recorded which is fair on its face, but you know that the new grantee is a shady operator. Five reputable people tell you that the deed was obtained by fraud. You know that the grantor is a 95-year old widow and her competency is questionable. You also know that the grantor only received \$50 for the property and you have it on the rolls as worth \$10,000. There is no question in your mind that the grantor could get the property back if she went to court. What should you do?"

In your official capacity there is nothing you can do. *"Assess the property in the name of the new grantee. Maybe nothing will happen. Always rely on the record. It will save you a lot of heartache."*

ORS 308.215 says that the assessment roll shall contain, according to the best information obtainable, the name of the owner or owners; or where applicable by statute, the name of the agent or representative that will receive the statement.

If the best information available is an unrecorded deed, *it must be used.*

ORS 308.215 requires that the assessment roll also include a description as required by ORS 308.240. Nothing in that statute requires *chain-of-title, recording, warranty deeds, etc.* Subsection 2 of ORS 308.240 contains the wording "Where the name of the true owner, or owner of record..." This implies that a source other than the record is acceptable to determine an owner's name. The *key point* of ORS 308.240(2) is that *if the property is correctly described, no assessment shall be invalidated by a mistake in the name of the owner of the real property assessed or by the omission of the name of the owner or the entry of a name other than that of the true owner.*

ORS 308.240(1) “Real property may be described by giving the subdivision according to the United States survey when coincident with the boundaries thereof, or by lots, blocks and addition names, or by giving the boundaries thereof by metes and bounds, or by reference to the book and page of any public record of the county where the description may be found, or by designation of tax lot number referring to a record kept by the assessor of descriptions of real properties of the county, which record shall constitute a public record, or in such other manner as to cause the description to be capable of being made certain. Initial letters, abbreviations, figures, fractions and exponents, to designate the township, range, section or part of a section, or the number of any lot or block or part thereof, or any distance, course, bearing or direction may be employed in any such description of real property.

(2) If the owner of any land is unknown, such land may be assessed to “unknown owner,” or “unknown owners.” If the property is correctly described, no assessment shall be invalidated by a mistake in the name of the owner of the real property assessed or by the omission of the name of the owner or the entry of a name other than that of the true owner. Where the name of the true owner, or the owner of record, of any parcel of real property is given, the assessment shall not be held invalid on account of any error or irregularity in the description if the description would be sufficient in a deed of conveyance from the owner, or is such that, in an action to enforce a contract to convey employing such description, a court with jurisdiction to grant equitable remedies would hold it good and sufficient.

(3) *Any description of real property that conforms substantially to the requirements of this section shall be a sufficient description and designation in all proceedings of assessment and taxation, levy and collection of taxes, foreclosure and sale for delinquent taxes or assessments, and in any other proceeding related to or connected with the taxation of such property.”*

Nothing in ORS 308.240 requires *chain-of-title*.

Chain-of-Title

There prevails a rule in some counties that *to be legal a deed must be recorded*. This rule is closely associated with the *chain-of-title* rule that thrives under the misconception that to be legal there must be a chain of recorded deeds that descend from the first recorded deed to a parcel of land to the last recorded deed to that parcel.

In one case the property of Jane Doe was transferred to X. The deed did not include Jane Doe as one of the several grantors. There was no recorded deed that conveyed Jane’s interest in the land. It, therefore, appeared that there was a break in the chain-of-title.

However, all that we know for sure is that there was only a break in the chain of *recorded* deeds. The assessor asked if he should change the assessment records and whether he is required to determine the *legality of the transfer*.

The Department of Justice held that *if the description of the property is correct, it will make no difference which name, Jane Doe or X, appears on the roll. THE BEST PROCEDURE WOULD BE TO CHANGE THE NAME ON THE ASSESSMENT ROLL TO THAT OF THE RECORD OWNER AS EVIDENCED BY THE LATER DEED.*³⁰

The deed to X would not be used if it was an old deed being recorded to clear title (this is often the case). Moreover, many apparent breaks in the chain-of-title are the result of errors in the deed description, e.g. “lot 2, block 5” instead of “lot 5, block 2.” The above opinion is based on the assumption that this possibility has been considered.

We do not suggest blind acceptance of deeds, nor do we suggest blindly ignoring breaks in the chain-of-title. However, if the conveyance is new and there is no proof of an error in any part of the deed, go ahead and use the deed to revise the assessment cadastre.

Principle - *If the ownership is sufficiently shown in the document, the assessor should accept it. The failure to record or the failure to state consideration is a matter concerning officers other than the assessor.*³¹

Recorded & Unrecorded Deeds

The rule that unrecorded deeds cannot be used to maintain the assessment cadastre is ill founded, counterproductive to maintenance of the real property inventory, and unjustifiable. In general, this rule contends that unrecorded deeds do not contain any useful information on property boundaries and the ownership of real property. The implication of this rule is that title does not pass if a deed is unrecorded. The fact is, unrecorded deeds can pass title (except in the case of subsequent purchasers. See chain-of-title, recordation in Oregon, and the Statute of Anne definitions at the beginning of this chapter).

Why the heavy reliance on recorded deeds? Why not? Since the beginning of the assessment program the deeds were one of the best sources of ownership information; and the recorded deeds were right there in the court house, easy to get to, and always available. Most people who used the deeds naturally assumed that the law required every deed to be recorded. It was only natural that, down through the years, rules would be designed and compounded to make grantees adhere to the *assumed* recording laws. Moreover, deeds that were not recorded were assumed to be something short of legal. *The fact is there are very few*

states that demand that deeds be recorded. Oregon does not place a stipulation that deeds be recorded to be legal, however, ORS 93.640 spells out the consequence of not recording (in the case of subsequent purchasers).

Therefore, although we suggest using unrecorded deeds as well as recorded deeds to maintain the assessment cadastre, we do think it an excellent policy to **inform taxpayers of the importance of recording**, but, do not tell them that their deed is illegal because it is not recorded. Recording not required (Opinion 150-25-303-01719; 150-25-R-303-0086).

Recording Statutes of Interest

See the definition of *Recordation in Oregon*, at the beginning of this chapter, for ORS 93.640 on “unrecorded instruments affecting title or unrecorded assignment of sheriffs certificate of sale void as to subsequent purchaser.”

MEMORANDUM. In addition to the laws dealing with unrecorded instruments being void as against subsequent purchasers, ORS 93.640(1) defines *memorandum* as an instrument that contains the date of the instrument being memorialized, the names of the parties, a legal description of the real property involved, and the nature of the interest created, which is signed by the person from whom the interest is intended to pass, and acknowledged or proved in the manner provided for the acknowledgement or proof of deeds.

CONSIDERATION. Subsection one of ORS 93.640 also requires that *a memorandum of an instrument conveying or contracting to convey fee title to any real estate shall state on its face the true and actual consideration paid for such transfer as provided in ORS 93.030.*

ORS 93.030. All instruments conveying or contracting to convey fee title to any real estate, and all memoranda of such instruments, shall state on the face of such instruments the true and actual consideration paid for such transfer, stated in terms of dollars. As used in this section, consideration includes the amount of cash and the amount of any lien, mortgage, contract, indebtedness or other encumbrance existing against the property to which the property remains subject or which the purchaser agrees to pay or assume. However, if the actual consideration consists of or includes other property or other value given or promised, neither the monetary value nor a description of such other property or value need be stated so long as it is noted on the face of the instrument that other property or value was either part or the whole consideration.

(2) The statement of consideration as required by subsection (1) of this section shall be made by a grantor

or a grantee. Failure to make such a statement does not invalidate the conveyance.

(4) No instrument conveying or contracting to convey fee title to any real estate nor any memorandum of such an instrument shall be accepted for recording by any county clerk or recording officer in this state unless the statement of consideration required by this section is included on the face of the instrument.

(5) This section applies to instruments executed on or after January 1, 1968.

The Department of Justice has held that the assessor report to the District Attorney, any situation where the monetary consideration has not been properly stated.

In cases where a deed has been recorded without the statement of consideration, the assessor should proceed under ORS 308.316 to obtain the necessary information as to the sale of the property. Cases where the instrument does not contain the consideration might have to be submitted to the district attorney.³³

Must the consideration be stated on unit “deeds” of a condominium, which convey only a leasehold interest, before they can be recorded? The answer is *no*. Here, no fee title is being conveyed, but only a leasehold interest.

ORS 93.630. Index of records of deeds and mortgages.

ORS 93.635. Acknowledgement and recording of land sale contracts. (1) All instruments *contracting to convey fee title to any real property, at a time more than 12 months from the date that the instrument is executed and the parties are bound, shall be acknowledged, in the manner provided for acknowledgement of deeds, by the conveyor of the title to be conveyed. Such instruments, or memorandum thereof, shall be recorded by the conveyor of the title to be conveyed. Such instruments, or a memorandum thereof, shall be recorded by the conveyor not later than 15 days after the instrument is executed and the parties are bound thereby.*

(2) “Instruments contracting to convey fee title to any real property” as used in subsection (1) of this section shall not include: (a) earnest money or preliminary sales agreements; (b) options; or (c) rights of first refusal.

The assessor must recognize a recorded memo as a property transfer and change records accordingly. He also has to divide the property as per ORS 311.280 (described later in this chapter) where sufficient information is presented. *The assessor cannot refuse to recognize a recorded memorandum as a property transfer.* In the case a memorandum submitted does not state the consideration, the assessor probably could be compelled to accept filing and make the requested division since ORS 311.280 does not specify any requirements for a division other than that the person

calling for the division must own or hold a mortgage or other lien, on the part of the area on which he desires to pay taxes. If *the ownership is sufficiently shown on the document, the assessor should accept it. The failure to record or the failure to state the consideration is a matter concerning officers other than the assessor.*³⁴

ORS 93.690. Recording of instruments evidencing passage of title to land from the United States to the State of Oregon.

ORS 93.710. Instruments or memoranda creating certain interests in realty; effect of recording.

Conveyances- Laws

Conveyances of lands, or of any estate or interest may be made by deed, signed by the person of lawful age from whom the estate or interest is intended to pass, or by his lawful agent or attorney, and acknowledged or proved, and recorded without any other act or ceremony. No seal of the grantor, corporate or otherwise, shall be required on the deed.³⁵

However, by common law a deed must be *delivered and accepted* before title transfers. (See DOJ of 1331; 8-11-70.)

ORS 93.110. A deed of quitclaim and release, of the form in common use, is sufficient to pass ALL THE ESTATE WHICH THE GRANTOR COULD LAWFULLY CONVEY by a deed of bargain and sale.

ORS 93.120. The term "heirs," or other words of inheritance, is not necessary to create or convey an estate in fee simple. Any conveyance of real estate passes all the estate of the grantor, unless the intent to pass a lesser estate appears by express terms, or is necessarily implied in the terms of the grant.

ORS 93.130. No grant or conveyance of lands or interest therein is void for the reason that at the time of its execution the lands were in the actual possession of another claiming adversely.

ORS 93.180. Tenancy in common, when created; joint tenancy abolished in this state.

ORS 93.230. Copy of State Lands Division deed or patent when original is lost.

ORS 93.250. Effect of conveyance creating fee simple conditional or fee simple tail.

ORS 93.260. Requires that (1) all instruments prepared for the purpose of conveying or contracting to convey fee title to any real estate shall contain on the face of such instruments a statement in substantially the following form:

Until a change is requested, all tax statements shall be sent to the following address:

(2) Failure to contain the statement does not invalidate the conveyance and if the instrument is recorded without the statement required by this section, the recording is valid.

(3) This section applies to all instruments executed after January 1, 1974.

ORS 93.280. Manner of conveyance to create joint property rights. Grantor may name himself as one of the grantees. Subsection (2) allows two or more grantors to name one or more than one of all such persons as grantees.

Deed Descriptions- Laws

The following are the rules for construing descriptions of any conveyance of real property, *when the construction is doubtful, and there are no other sufficient circumstances to determine it.*³⁶

ORS 93.310(1) Where there are certain definite and ascertained particulars in the description, the addition of others, which are indefinite, unknown or false, does not frustrate the conveyances, but is to be construed by such particulars, if they constitute a sufficient description to ascertain its application.

ORS 93.310(2) "When permanent and visible or ascertained boundaries or monuments are inconsistent with the measurement, either of lines, angles or surfaces, the boundaries or monuments are paramount." (That is, those boundaries or monuments control.)

A monument is a *tangible* landmark. Some of the tangible objects that are monuments are streams, rivers, lakes, ponds, shores, rocks, streets, alleys, highways, trees, ditches, etc.; that is - objects that are permanent in character and found on the land.

ORS 93.310(3) Between different measurements which are inconsistent with each other, that of angles is paramount to both.

ORS 93-310(4) When a road or stream of water *not navigable* is the boundary, the rights of the grantor to the middle of the road, or the thread of the stream, are included in the conveyance, except where the road or stream is held under another title.

Keep in mind that subsection 4 relates to descriptions that are doubtful - not descriptions that clearly call to the specific line of a road or stream and thence specifically along that line of a road or stream. Hence, a description that runs "to the left bank" of the stream, thence "along the said left bank" of the stream conveys rights only to the left bank of the stream. On the other hand, a description that runs "to the bank" of a stream, thence up "the stream" carries rights to the center of the non-navigable stream. In the first case it is clear that the boundary is the left bank of the river; in the latter - "thence up" the

stream leaves a question as to what line of the stream the description was calling for.

ORS 93.310(6). When the description refers to a map, and that record is inconsistent with other particulars, it controls them, if it appears that the parties acted with reference to the map; otherwise the map is subordinate to other definite and ascertained particulars.

See Chapter 7 for information on Oregon Coordinate Statutes. ORS 93.320 to 93.380.

Warranty Deeds

ORS 93.850 provides that "(1) Warranty deeds may be in the following form:

_____, Grantor, conveys and warrants to _____ Grantee, the following described real property free of encumbrances except as specifically set forth herein: (Describe the property conveyed).

(if there are to be exceptions to the covenants described in paragraph (c) of subsection (2) of this section, here insert such exceptions.) The true consideration for this conveyance is \$ _____. (Here comply with the requirements of ORS 93.030.)

Dated this _____ day of _____, 19____

(2) A deed in the form of subsection (1) of this section shall have the following effect:

(a) It shall convey the entire interest in the described property at the date of the deed which the deed purports to convey.

(b) The grantor, his heirs, successors and assigns, shall be forever estopped from asserting that the grantor had, at the date of the deed, an estate or interest in the land less than that estate or interest which the deed purported to convey and the deed shall pass any and all after acquired title.

(c) It shall include the following covenants, each of which shall run in favor of the grantee and his successors in title as if written in the deed:

(A) That at the time of delivery of the deed the grantor is seized of the estate in the property which the grantor purports to convey and that he has good right to convey the same.

(B) That at the time of the delivery of the deed the property is free from encumbrances except as specifically set forth on the deed.

(C) That the grantor warrants and will defend the title to the property against all persons who may lawfully claim the same.

(3) If the grantor desires to exclude any encumbrances or other interests from the scope of his covenants, such exclusions must be expressly set forth on the deed."

Special Warranty Deeds

ORS 93.855 provides that (1) Special Warranty deeds may be in the following form:

_____, Grantor, conveys and specially warrants to _____, Grantee, the following described real property free of encumbrances created or suffered by the grantor except as specifically set forth herein: (Describe the property conveyed.)

(If there are to be exceptions to the covenants described in this section, here insert such exceptions.)

The true consideration for this conveyance is \$ _____. (Here comply with the requirements of ORS 93.030.)

Dated this _____ day of _____, 19____

(2) A deed in the form of subsection (1) of this section shall have the same effect as a warranty deed as described in ORS 93.850, except that the covenant of freedom from encumbrances shall be limited to those encumbrances created or suffered by the grantor and the covenant of warranty shall be limited to read: That the grantor warrants and will defend the title to the property against all persons who may lawfully claim the same by, through or under the grantor.

(3) If the grantor desires to exclude any encumbrances or other interests from the scope of his covenants, such exclusions must be expressly set forth on the deed.

Bargain and Sale Deeds

ORS 93.860 (1) Bargain and sale deeds may be in the following form:

_____, Grantor, conveys to _____ Grantee, the following described real property: (Describe the property conveyed.)

The true consideration for this conveyance is \$ _____. (Here comply with the requirements of ORS 93.030.)

Dated this _____ day of _____, 19____

(2) A deed in the form of subsection (1) of this section shall have the following effect:

(a) It shall convey the entire interest in the described property at the date of the deed which the deed purports to convey.

(b) The grantor, his heirs, successors and assigns, shall be forever estopped from asserting that the grantor had, at the date of the deed, an estate or interest in the land less than that estate or interest which

the deed purported to convey and the deed shall pass any and all after acquired title.

(3) A bargain and sale deed shall not operate to provide any covenants of title in the grantee and his successors.

Quitclaim Deeds

Quitclaim deeds can and do pass title. (Refer back to our subsection of this chapter on “Conveyances -Laws.”) The State of Oregon often conveys good title by quitclaim deed where the State has legal or equitable title to convey. ORS 93.865 provides that quitclaim deeds *may* be in the following form. (TAKE SPECIAL NOTE OF SUBSECTIONS 2 and 3.)

_____, Grantor, releases and quitclaims to _____, Grantee, all right, title and interest in and to the following described real property: (Describe the property conveyed.)

The true consideration for this conveyance is \$_____ (Here comply with the requirements of ORS 93.030.)

Dated this _____ day of _____, 19____

(2) A deed in the form of subsection (1) of this section shall have the effect of conveying whatever title or interest, legal or equitable, the grantor may have in the described property at the date of the deed but shall not transfer any title or interest which the grantor may thereafter obtain nor shall it operate as an estoppel.

(3) A grantee taking title by way of a quitclaim deed shall not, merely because of his receipt of title by or through such a deed, be denied the status of a good faith purchaser for value.

Note: ORS 93.850 to 93.865 are permissive and *not* mandatory. Other forms of deeds may be used for the conveyance of real property.

Trust Deeds

A *trust deed* is a deed executed in conformity with ORS 86.705 to 86.795, and conveying real property to

a trustee in *trust* to secure the performance of an obligation owed by the grantor or other person named in the deed to a beneficiary.

By Oregon Law, a trust deed is deemed to be a mortgage on real property and is subject to all laws relating to mortgages on real property except to the extent that such laws are inconsistent with the provisions of ORS 86.705 to 86.795 in which event the provisions of ORS 86.705 to 86.795 shall control. *For the purpose of applying the mortgage laws, the grantor in a trust deed is deemed the mortgagor and the beneficiary is deemed the mortgagee.* See figure 13-8.³⁸

The recording and indexing of trust deeds are governed by the statutory provisions applicable to mortgages. Therefore, the trust deeds are recorded and indexed in the mortgage records.⁴⁰

The only purpose of a trustee is to establish a fiduciary with the authority to sell the property directly without a mortgage foreclosure. Otherwise, the trustee has no duties of ownership under the trust deed. This is because the trust deed is not a conveyance of property rights similar to other types of deeds. The trustee only holds legal title for the benefit of the beneficiary in the event that the obligation undertaken by the grantor is not satisfied.

The Department of Justice has held that the grantor of a trust deed is liable for the real property taxes; therefore, the grantor is the name that should appear on the assessment roll. Lands are not taxable while held in trust for Indians by the United States (*McCurdy v. United States*. 264 US 484, 44 S Ct 345, 68 L Ed 801 1923).^{41A}

Note: A trust deed may contain a provision creating the grantee as agent for receipt of the annual tax statement as permitted by ORS 311.250.⁴²

Memorandum of Real Estate Agreements & ORS 311.280

Under the provisions of Oregon Laws 1975, ch 618, any instrument contracting to convey a fee title to

COMPARISON - TRUST DEED WITH DEED AND MORTGAGE			
INSTRUMENT	BUYER	SELLER	TRUSTEE
DEED	GRANTEE	GRANTOR	_____
MORTGAGE	MORTGAGOR	MORTGAGEE (BENEFICIARY)	_____
TRUST DEED	GRANTOR (Name on assess. roll)	BENEFICIARY	TRUSTEE

Figure 13-8

real property at a time more than two months after the date of execution whereby the parties are bound, must be recorded by the grantor within 15 days after execution, and a failure to do so subjects the offender to being charged with a Class B misdemeanor.

The Department of Justice is of the opinion *that a memorandum must state the consideration to be entitled to recordation. The assessor must recognize a recorded memo as a property transfer and change records accordingly. The assessor must divide property if a memo is recorded and also if filed where sufficient information is presented.* The assessor has no right to determine whether an instrument is entitled to recordation.⁴³

As previously stated, an assessor must divide property as per ORS 311.280 if a memorandum is recorded. It might be argued that a different situation exists where a memorandum is presented to him for filing, which fails to state the consideration. But the assessor would probably be compelled to accept the filing and make the division since ORS 311.180 does not specify any requirements for a division other than that the person calling for the division *must own or hold a mortgage or other lien on the part of the area that he desires to pay taxes. IF THE INSTRUMENT PRESENTED FOR FILING SUFFICIENTLY SHOWS SUCH OWNERSHIP, THEN THE ASSESSOR SHOULD ACCEPT IT.* The failure to record or the failure to state consideration is a matter concerning officers other than the assessor."⁴⁴

ORS 311.280(l) Any person desiring to pay taxes on any part of any real estate assessed as one parcel or tract may do so by applying to the county assessor or his deputy, who shall determine the relative or proportionate value such part bears to the value of the whole tract assessed, and shall file his statement thereof with the tax collector, on which basis the assessment shall be divided and taxes shall be collected accordingly. *However, the assessor or deputy shall not be required to divide an assessment unless the person calling for the division of assessment owns, or holds a mortgage or other lien on that part ONLY of such area on which he desires to pay the taxes, and has filed with the assessor a true copy of the deed, contract of sale, mortgage or other instrument evidencing his interest, providing that whenever such instrument is otherwise recorded in the county records, such filing shall not be required.* When filed with the assessor only, such instrument shall not constitute a public record.

Some county assessors have construed ORS 2 11 .280 to mean unrecorded documents filed for tax segregation purposes are confidential and therefore not subject to public inspection. Such records, however, are not secret or confidential in nature, and would be available for proper use by other public agencies even if not public records.⁴⁵

It is also the State Attorney General's opinion that notwithstanding the public record phrase of ORS 3 11 .280(1), "under ORS 192.410(4) *the documents are public records for purposes of the later enacted public records law, and must be made available for inspection on request.*"⁴⁶ ORS 311.280 simply does not designate such documents as confidential. The Attorney General is of the opinion that the statement "shall not constitute a public record" to mean that the mere filing of an unrecorded deed or contract with an assessor does not have the same legal effect, i.e., public notice to all, as recording in the county records provides. That is, it is just a caveat to a purchaser that the mere filing of an unrecorded document with a county assessor does not have the same effect as recording it in the county deed records.

ORS 311.280 goes on to require: In the case of property within the jurisdiction of a city or county which has adopted minor land partition regulations pursuant to ORS 92.046, the assessor or his deputy *shall not divide an assessment unless the person calling for the division of assessment has filed with the assessor evidence that the division has been approved as required by such regulations.*

A taxpayer asked to have the assessment of a parcel of real property divided pursuant to ORS 311.280, because the property is now sold in portions. However, the taxpayer refused to submit copies of the contract (which was not recorded) unless he could strike out certain parts of the contract and the sales price. *In such cases the assessor is not required to, divide an assessment.*⁴⁷

Does the failure to obtain approval by the body administering minor land partition regulations (ORS 92.046) preclude the assessor from dividing the land and taxes as provided for in ORS 311.280, when the person *SEEKING THE DIVISION* has a recorded deed, an unrecorded deed, a recorded contract or an unrecorded contract? The answer is *yes* in all cases where the person is requesting a division by ORS 311.280. *However, this does not mean that the assessor cannot recognize the division or minor land partition in preparing the next assessment roll.* It is also not up to the assessor to decide whether failure to obtain the necessary approval of a minor land partition in those cities or counties which have minor land partitions regulations pursuant to ORS 92.046 voids the transfer stated in the recorded deed, recorded contract, or unrecorded contract. *IT IS ONLY WHEN A PERSON COMES TO HIM TO HAVE THE TAXES APPORTIONED UNDER ORS 311.280 IS HE REQUIRED TO HAVE APPROVAL OF THE GOVERNING BODY.*⁴⁸

Is the assessor required to divide an assessment upon the request of the owner when the property is leased to two different tenants but where no copy of the lease has been recorded in the county or where no copy has been furnished to the assessor (pursuant to ORS 311.280)? The assessor may divide the property if he so desires but he does not *have to* divide the property.⁴⁹

STREET AND ALLEY VACATIONS

All street and alley vacations must be made in accordance with ORS Chapter 271, whether incorporated areas or unincorporated areas. References to the key vacation statutes are as follows:

ORS 271.010. Vacation procedure in unincorporated areas and in municipalities not exercising corporate functions; filing of petition; fee; and notice of hearing. (Other than state highway or county road.)

ORS 271.020. Necessity for consent of adjoining owners and holders of interest in vacation of road, highway, street or alley; vacation without consent; costs of search.

ORS 271.030. Grant of petition.

ORS 271.040. Vacation of townsite or contiguous lands which have been laid out.

ORS 271.060(2). A vacated road, highway, street or alley shall be attached to the lots or ground bordering thereon and all right or title thereto shall vest in the persons owning the property on the side thereof, in equal proportions, according to the length or breadth of such lots or around as the same may border on such road, highway (NOT STATE HIGHWAY), street or alley. (Clarification supplied) This statute is subject to the same restrictions as ORS 271.140.

ORS 271.140. The title to the street or other public area vacated shall attach to the lands bordering on such area in equal; *except that where the area has been originally dedicated by different persons and the fee title to such area has not been otherwise disposed of, original boundary lines shall be adhered to and the street area which lies on each side of such boundary line shall attach to the abutting property on each side.* If a public square is vacated the title shall vest as provided in ORS 271.060(3). (See the subsection of this section on *reversionary rights*.)

Reversionary Rights

The *Baker City* case. Baker City ordinance no. 2041, section 3, provides that:

"The vacated property shall vest in the abutting properties in equal proportions..."

The City officials contended that the City Ordinance controls over ORS 271.140, because ORS 271.170 provides:

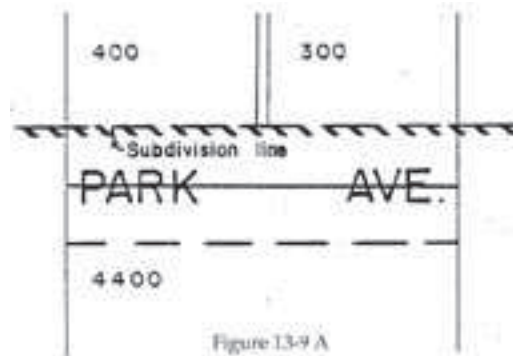
"The provisions of ORS 271.080 to 271.160 are alternative to the provisions of the charter of any incorporated city and nothing in those statutes shall in anywise affect or impair the character or other provisions of such cities for the

preservation of public access to and from transportation terminals and navigable waters."

ORS 271.060(2) merely expresses the common law rule that adjoining owners hold title to the middle of a street or road. The Baker City Ordinance and the first portion of ORS 271.140 also express the same common law rule. The rule, however, is based on the presumption that the adjoining owners, or their predecessors in title, *contributed equally to the road, BUT WHERE THE FACTS ARE TO THE CONTRARY, AN EXCEPTION TO THE RULE APPLIES, I.E.:*

Principle - Where the street is contributed entirely by one owner and is substantially vacated, TITLE TO THE WHOLE STREET REVERTS TO THE ORIGINAL OWNER OR HIS GRANTEEES.⁵¹

Based on their interpretation of ORS 271.170, that Ordinance 2041, section 3 controlled the reversionary rights policy of the city, the city vacated Park Avenue (that was entirely in one subdivision, and that was dedicated by one person) giving the north one-half of the street to the owners of parcels 300 and 400 and the south one-half to the owner of parcel 4400. The problem with that action was that the street was dedicated by the predecessors in title of the owner of parcel 4400. See figure 13-9A.



City's distribution of Park Ave.
(INCORRECT)

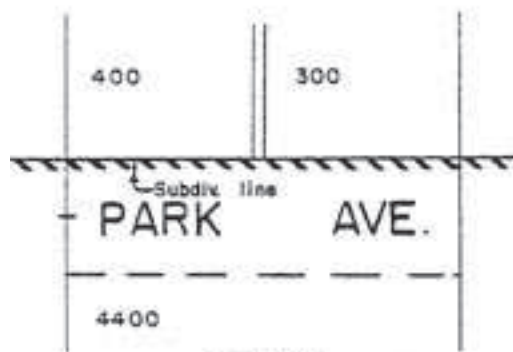


Figure 13-9 B
CORRECT DISTRIBUTION OF PARK AVE.

In the *Neil v. Independent Realty* case, the court held that the defendant (who had received half of a dedicated street as did parcels 300 and 400 in figure 13-9A) was not entitled to any part of the vacated street, as neither the defendant nor its predecessors in title had contributed to the street. The court said:

“...The common law rule to the effect that adjoining owners had title to the middle of the highway rested on the presumption that they had contributed equally to the road, but if the facts showed to the contrary, the rule did not apply. In other words, the fact would govern rather than mere presumption. Out of this grew the rule that if the highway was taken *wholly* from one man's property and such highway is vacated, the land in fee reverts to the original owner, or his grantees, free from the public use or easement.⁵²

The reason is that in the absence of a statutory provision to the contrary, the public acquires only an easement by dedication. *The fee to the street is not vested in the public, but remains with the original dedicator and passes from him to his successors.* Therefore, since the public does not own the underlying fee, it cannot dispose of the fee upon vacation of the street.

Moreover, no Oregon Statute gives cities fee title to a dedicated street or alley, and it has long been held that the public acquires only an easement in a street which has been dedicated or condemned for its use.⁵³

The statutes and ordinances must be construed together and be given a construction which violates *no constitutional provision*. The Department of Justice held that the City of Baker could not vest title of that part of the N½ of vacated Park Avenue, lying south of the subdivision line, to the owners of parcels 300 and 400 because neither of these owners, nor their predecessors in title, dedicated any of that part of Park Avenue. The map must be shown as illustrated in figure 13-9B.⁵⁴

Although subdivision lines provide the first clue as to the reversionary rights in vacated streets, they are not the governing factor. As we have stated, the governing factor is *the person or persons who dedicated the street*. Therefore, although a street lies entirely in a subdivision (forming one border of the subdivision), it could revert to the owners on both sides of the street if the person that dedicated the street owned the land on both sides of the street at the time of the dedication.

For example, A. J. Smith owns parcel 400 (figure 13-10).

In 1941 A. J. Smith decides to subdivide half of parcel 400. He calls this A. J. Smith's First Addition (figure 13-11).

In 1956 A. J. Smith decides to subdivide the remainder of his original parcel. This becomes Cyprus Heights (figure 13-12).

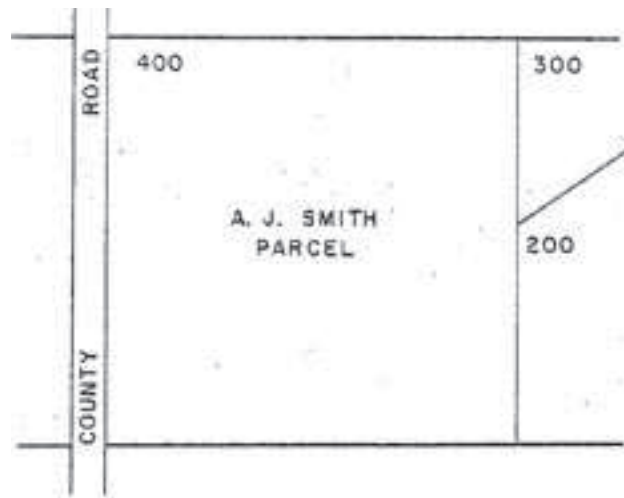


Figure 13-10

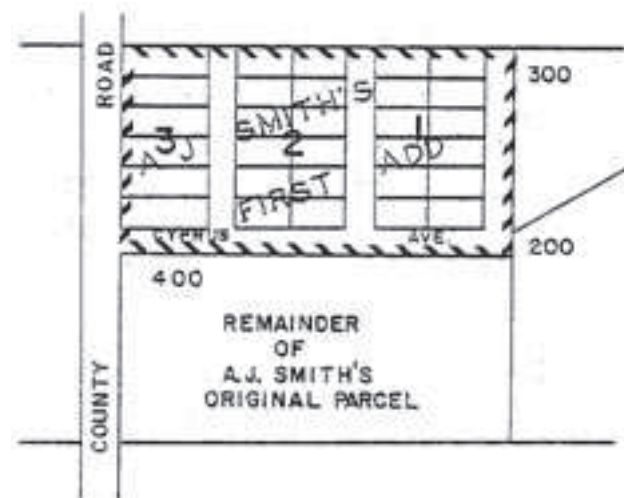
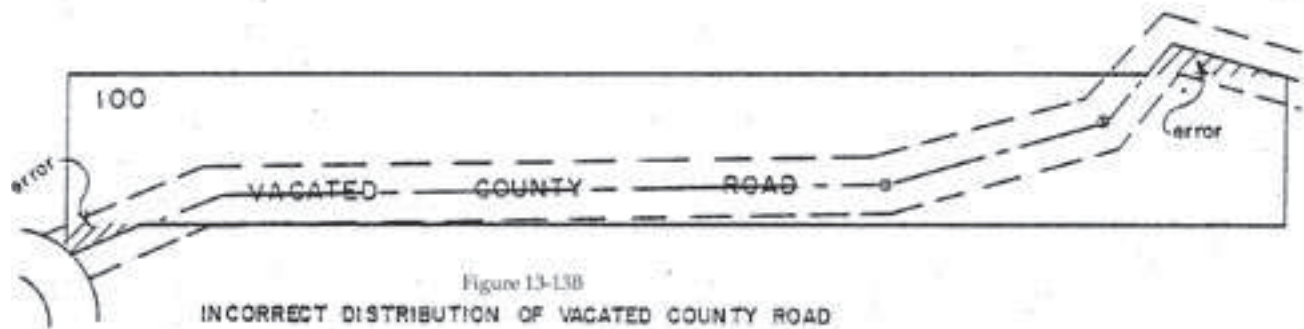
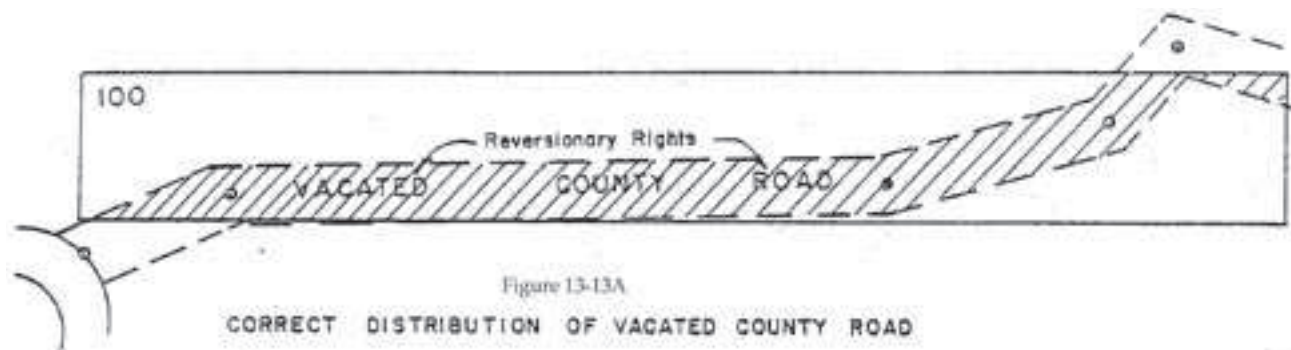


Figure 13-11



Figure 13-12



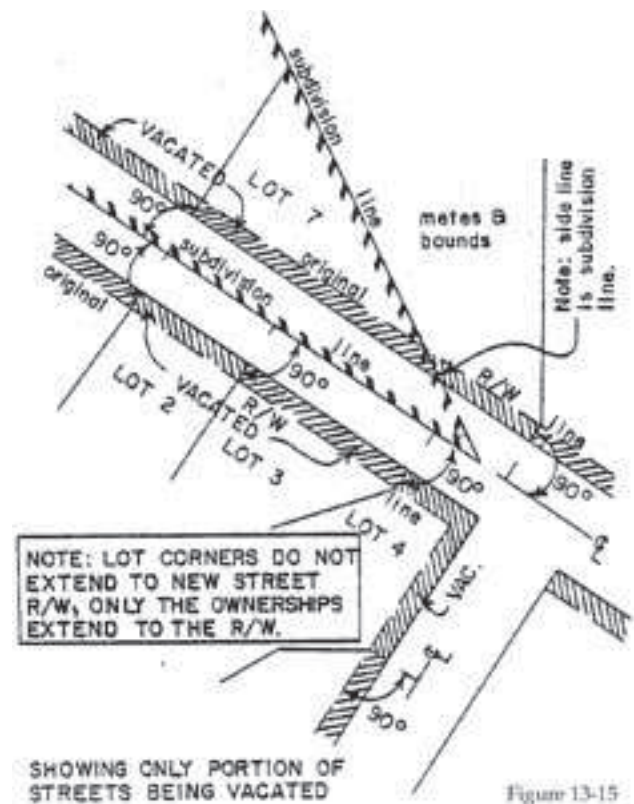
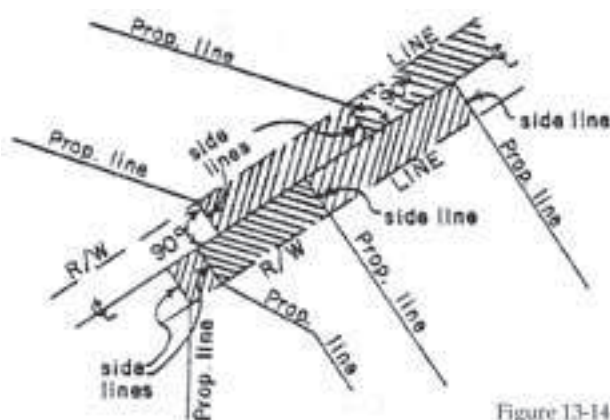
In the 1970's an industrial firm purchased all of A.J. Smith's First Addition for a plant site; and in 1977 Cyprus Avenue was vacated. Cyprus Avenue was dedicated by the same person that owned the land on both sides of the street; therefore, the N $\frac{1}{2}$ of Cyprus Avenue (vacated) would revert to the owners of south lots of blocks 1, 2 and 3 of the A. J. Smith's First Addition. The S $\frac{1}{2}$ of Cyprus Avenue (vacated) would revert to the owners of block A of Cyprus Heights. In this case, the subdivision line was not the controlling factor.

Remember, the principle of reversionary rights is that the land of the vacated property is returned to the person (heirs or grantees) contributing the land in the first place; but no more land should be returned than was originally contributed. Therefore, the vacated road through parcel 100 would revert as shown in figure 13-13A rather than as shown in figure 13-13B.

The side lines of an apportioned area of a vacated street run at right angles to the center-line of the

street. This is the rule for vacated portions of streets as well as for streets that are vacated from one right-of-way line to the opposite right-of-way line. See figures 13-14 and 13-15.

If the street being vacated is circular, the side lines of apportioned areas extend from the termination of the property line, on a radius line (a line connecting the



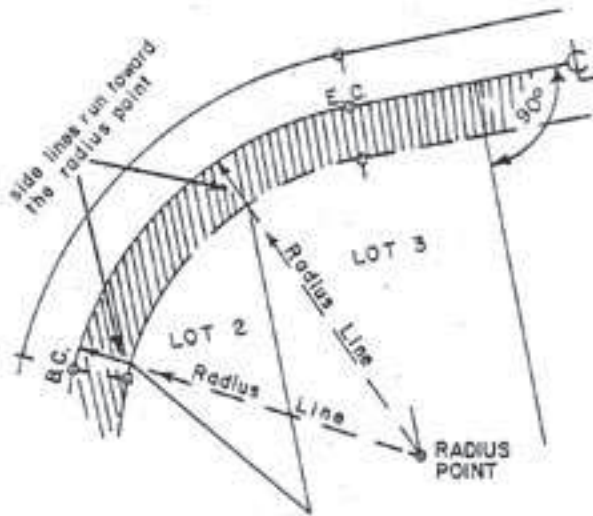


Figure 13-16

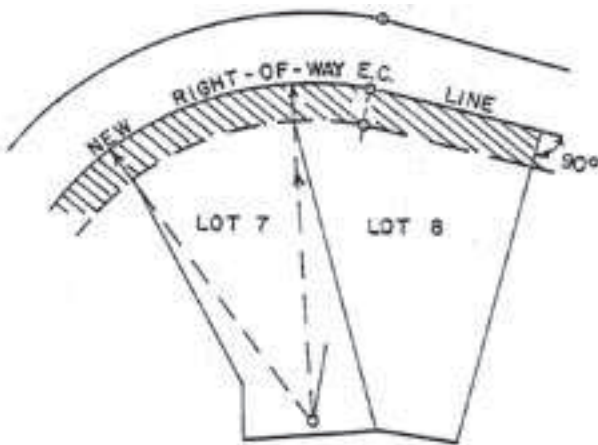


Figure 13-17

PORTION OF STREET VACATED. SIDE LINES TO BE ON RADIUS LINES.

arc of the curve to the radius point of the curve) to the center of the street, or to the outside boundary of the vacated area. (Figure 13-16 and 13-17.)

In figure 13-17, the owners of lots 7 and 8 have obtained new street frontage that is proportionate to the old (or original) street frontage. This is one of the basic rules when apportioning vacated strips that result in a new street right-of-way line.

Rule: Where a vacation results in the creation of a new street right-of-way line, the apportionment of the vacated area should secure in the abutting owners, street frontage that is proportionate to the original street frontage. In such cases frontage is the controlling factor, not land area.

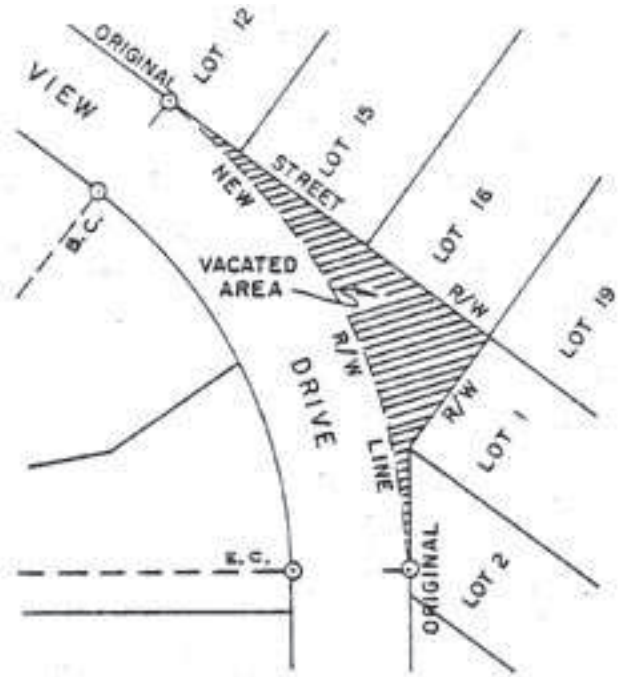


Figure 13-18 A

HOW SHOULD THE VACATED AREA BE APPORTIONED

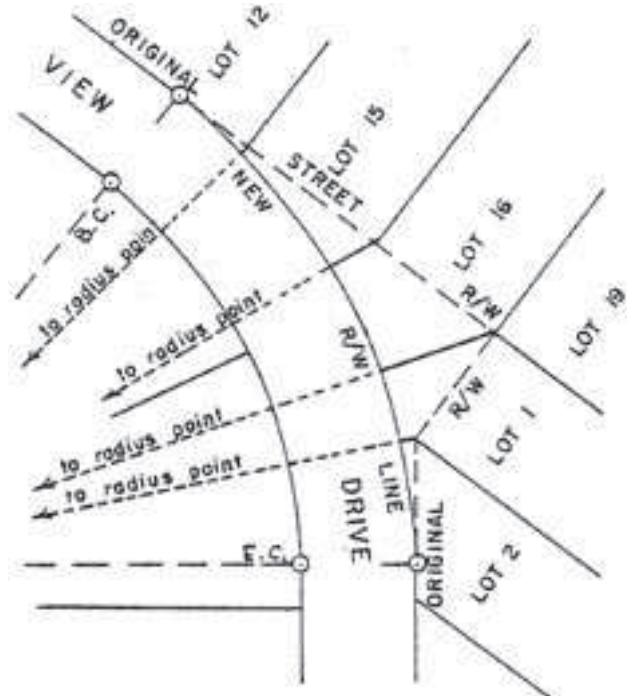


Figure 13-18 B

FIRST SOLUTION

Solutions to apportionment problems will be simple if you keep in mind the fact that the solutions are not unlike those dealing with the apportionment of riparian lands. To illustrate this, figure 13-18A shows a street vacation that defies the apportionment methods used in figures 13-14 through 13-17.



Figure 13-18 C

ALTERNATE SOLUTION

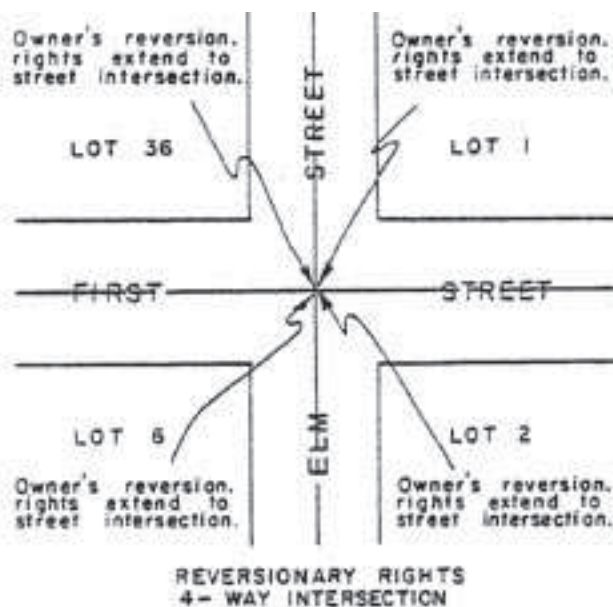


Figure 13-19

The crux of the problem is: *how to determine the center line of View Drive* (that is, the center line between the original right-of-way Lines); and, once the center Line has been determined *how do we apportion the vacated area so as to secure street frontage that is proportionate to the original street vacation?*

It is not unusual to find the courts divided about the methods to be used in cases such as that illustrated in figure 13-18A. One opinion suggests that the side lines of the apportioned areas be on radius lines (of

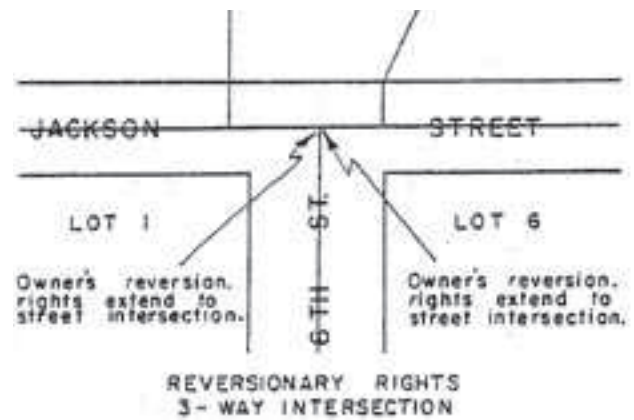


Figure 13-20

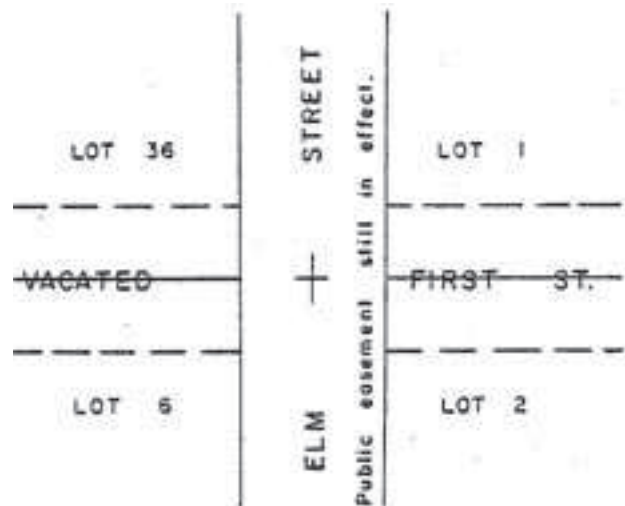


Figure 13-21

the central curve) that extend from former lot lines to the new right-of-way line created by the street vacation (figure 13-18B).

A court of equity could decide in favor of the solution of figure 13-18B; however, this approach does not provide street frontage proportionate to the original frontage. A better solution would be as Clark 55 suggests for apportioning accretions between a new shore line and an old shore line; that is, to measure the length of the old line and measure the length of the new line. Then use these measurements to compute the proportionate parts of the new line to the parts of the old line. This is illustrated in figure 13-18C.

Street Intersections

Revisionary rights extend to street intersections in the manner illustrated by figures 13-19.

Special Note:

The term *reversionary rights* is misleading. As figures 13-19 and 13-20 show, the rights of abutting owners in streets exist at all times, regardless of whether or not

the streets are vacated. Therefore, how can a right that already exists revert to an owner that already possesses that right? “Reversionary rights” is used because, while the public easement to a right-of-way is being exercised the abutting owners do not have *full rights*. Once the public easement is extinguished, *the public’s rights to the right-of-way revert to abutting owners*.

Therefore, if First Street (figure 13-19) is vacated, but the public still retains its easement to Elm Street, that easement includes the former intersection of First and Elm. The abutting owners still lack full rights to that part of First Street that is now Elm. The cartographer must apportion First Street as shown in Figure 13-21.

(In this illustration the intersection area is still subject to use by the public and is, therefore, not accessible, to the abutting owners.)

Abutting Property Owned by Public Agency

The public has the same rights in property as does a private owner. Therefore, the principle, of reversionary rights applies to abutting property of the public or public agency (cities, counties, the state, the U.S. Government, and taxing districts).

Deed Descriptions Do Not Have to Mention Vacated Streets or Alleys In Order for Title to Pass

Many deed descriptions do not contain wording that includes the rights to a vacated street or alley. In such cases, does title to the vacated street or alley pass to the grantee? The answer is *yes*. In the case of *Fahey v. City of Bend* the court held:

“...it has been held in some jurisdictions that a conveyance made after the vacation of the street carries with it the street portion of the lot. We concur with this view. No distinction should be made between conveyances made before and conveyances made after the vacation of the adjoining street; in both cases the adjoining strip should be held to pass by the deed in the absence of the manifestation of a contrary intent.”

And, in *McAdam v. Smith*,⁵⁸ the court held that:

*“Where the description does not mention the street, river or other similar boundary but the deed describes the parcel so that, in fact, it is adjoining, the title to the bed passes the same as (if) mentioned (citing cases).”*⁵⁹

The above opinions, however, are on the condition that the street was not separated from the abutting property by a prior conveyance.

Hence, if the deed to lot 1 (figure 13-22) merely read “Lot 1, Block 2”

with no mention of the street and in absence of an express reservation of title to the street, title to the street would pass to the grantee of lot 1 (subject, however, to any prior conveyance of lot 1).

The court in the *McAdam v. Smith* case reasoned that title to the street should pass in order to “prevent the existence of innumerable strips and gores of land, along the margins of streams and highways to which title, for generations, shall remain in obedience, and then, upon the happening of some unexpected event, and one, consequently, not in express terms provided for in the title deeds, a bootless, almost objectless, litigation shall spring tip ‘to vex and harass those, who in good faith had supposed themselves secure from such embarrassment.’” (*Buck v. Squires*)⁶⁰

Watch for prior conveyances of the street before you automatically apportion that street. Hence, in figure 13-22 the owner of lot 1 is not entitled to the vacated street because it was conveyed by a prior owner who had owned abutting property on both sides of the vacated street.

(Note: In such cases, the conveyance of the street could be made prior to the street vacation as well as subsequent to the vacation.)

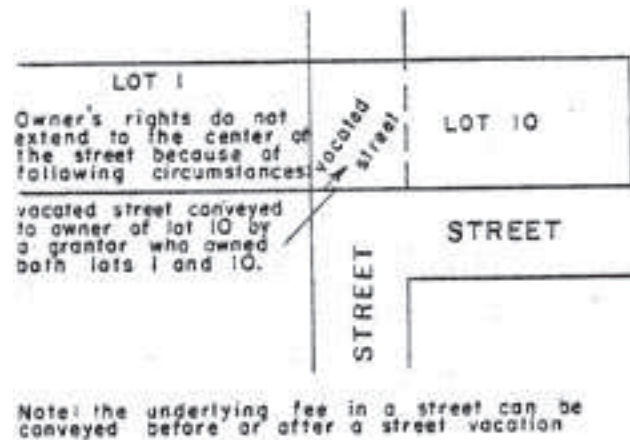


Figure 13-22

Alleys

The principles of reversionary right and apportionment of vacated streets apply, in every way, to vacated alleys.

How Are Lots Affected By Street or Alley Vacations?

When a street is vacated, the ownership of lots extends to the center of the street or new right-of-way line of the street; however, *the lots DO NOT extend beyond their original location as shown on the recorded subdivision plat*. That is, the center of the street, or

new right-of-way line, *does not become the new lot lines*. NOTHING BUT A REPLAT OR RESUBDIVISION CAN CHANGE THE ORIGINAL SIZE AND SHAPE OF THE LOTS. The vacation *does not* create an amended plat.

The principle followed in legal cases involving the vacation of streets and alleys and boundary control is that principle adhered to in the cadastral map program. In *Earl v. Dutour*⁶¹ the court held that “*vacations or openings* (creating additional public right-of-ways) *do not alter the original lot lines*.” The court indicated that if the lot corners were to be any place other than the original street right-of-way lines (which they are not) it would be at the center of the street. Figure 13-23 illustrates what the result would be if lot lines and corners followed the street vacations.

From that illustration it is evident what problems would be created if lot corners followed *each new street right-of-way line* after each new vacation. First, after vacation no. 1, the southwest corner of lot 7 would suddenly shift south 10 feet. The south-east corner of lot 10 would shift south 10 feet. A few years later an additional 10 feet are vacated (vacation no. 2). Again, the south corners of each lot would shift south; however, the southeast corner of lot 10 would shift southeast. Vacation no. 3 would result in further changing of the lot lines and corners.

If this were the case, the interpretation of deeds with beginning points being any of the south corners of lots 1 through 10, would be impossible. The grantees, courts, title companies, cartographers, etc. would have the problem of deciding “which corner is the southwest corner of lot 7? The original corner? The corner after vacation no. 1? After vacation no. 2? Or after vacation no. 3? Or, which line would represent the south line of lot 8, when we need to interpret a description beginning on the south line of lot 8?”

Fortunately, the courts and authorities are of the opinion that “the lot corners *never change*.” This should have

been clear after our discussion on reversionary rights. If it were true that the lot lines and lot corners moved with street vacations, there would be few problems with reversionary rights and apportionment.

Vacation of Subdivision

The vacation of the lots and blocks of a subdivision does not vacate the streets and alleys of the subdivision *unless clearly expressed as doing so in the vacation ordinance*. To vacate the streets and alleys in a subdivision, when only the lots and blocks have been previously vacated, the parties petitioning for a vacation, must go through the public street vacation proceedings as required by statute.

Although a replat of a subdivision over an older subdivision automatically vacates that part of the older subdivision, the replat *does not automatically vacate the streets and alleys*. The streets and alleys still must be vacated as per statute. This must be done to extinguish the public’s easement.

EASEMENTS FOR ROAD PURPOSES

An easement is a non-possessory property interest and *not a separate estate*. “The person to whom the easement is granted owns the *dominant estate*; the easement being the *dominant tenement*. The land over which the easement runs is the *servient tenement*; that is it is subject to *servitude* (the easement).”

The Department of Justice and the Department of Revenue have held that easements *cannot be assessed and taxed as an interest in real property separate from the servient estate* (that is, from the real property itself).⁶³ The statutes make no provision for the assessment of an easement *as such* in the name of the owner of the dominant tenement.

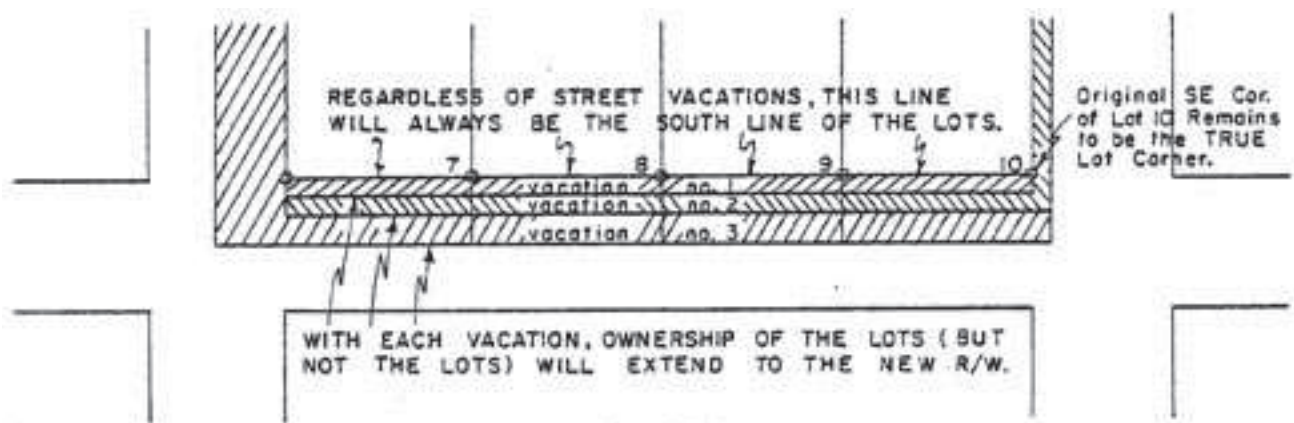


Figure 13-23

In one case the federal government condemned a perpetual easement to be used as a right-of-way road over certain private lands. The assessor asked whether he should segregate the property lying, within the easement since the owner of the easement is a tax exempt entity. The Department of Justice held that *there is no statute under which the property can be removed from the assessment roll. The easement did not create an exemption under ORS 307.200.*⁶⁴ (However, the fact that the federal government owns a perpetual easement exempt from taxation under ORS 307.040 is a factor which may affect the value of the fee interest belonging to the private parties involved.)

Principle. A perpetual easement is merely an easement, and like easements, is a non-possessory interest and not a separate estate.

Does the grantor retain fee title, or a mere easement, by means of the following language?

1. Except the east 25 feet reserved for roadway.
2. Except therefrom a strip 30.0 feet wide along the easterly line for road purposes.
3. Except and reserving a strip of land (specified width) for road purposes.

In the case of *Rall v. Purcell*⁶⁵ the Oregon Supreme Court held that the following wording left in Rall (the grantor) an easement only.

"Excepting from this conveyance a strip of land 15 feet in width along the north side thereof to be used as a roadway."

The Supreme Court said at page 22: "4,5. If the provision in question had contained the words 'excepting from this conveyance a strip of land 15 feet in width along, the north side thereof and had not contained the words 'to be used as a roadway' there would be no question but that the provision was intended to be an exception and not a reservation of an easement only over the strip for roadway purposes, and in that case the entire strip would have been excepted from the grant and the title to the freehold and the soil would have been excepted from the grant and would have remained in the grantor as of his former title and right as fully as if the deed had not been made. However, by the use of the words 'to be used as a roadway' (if those words are to be given any meaning at all) then it is necessary to construe this provision as constituting a reservation of an easement only over said strip as a roadway. *The deed itself is to be construed as a whole and we are not at liberty to disregard the words 'to be used as a roadway.'* They were inserted for some purpose and to give them proper meaning requires that they should be construed as a reservation of an easement and not as an exception of the entire strip for any and all purposes by the grantors, their heirs and assigns."

In other words, it is, not the custom for grantors to spell out the use of land when conveying fee title; when it is spelled out it is for a purpose, and the wording is meant to restrict the use of the land.

Therefore, whenever a deed contains language, indicating that a strip of land is to be retained "for a road," "as a road," "for road purposes," etc., it should be assumed that the grantor does not retain fee title to the strip, but an easement only, whether the provision be termed a reservation or an exception.

In as much as the specific language of 1, 2, and 3 indicates that the strips are to be used "for roadway" and "for road purposes," it would follow that the grantor in each case would retain a mere easement with fee title passing to the grantee.⁶⁶

Land Reserved in Deeds as Public Roads

Many deeds contain wording similar to the following:

"Excepting and reserving a 40' strip of land along the south side for public road purposes."

Does this qualify as a public road or county road where, in fact, no road exists? The Department of Justice is of the opinion that *a mere reservation to the public for road purposes does, not suffice to qualify as a county road since there must be actual delivery and acceptance before it can be classed as a public way.* (ORS 368.546.)⁶⁷

Note: This points out the fact that land that is blindly conveyed does not transfer unless the instrument of conveyance is delivered and accepted.

Under a common law dedication contained in deeds with the foregoing wording, the public may acquire an easement in the land for the purposes only for which it was dedicated. The fee, however, is retained by the owner,⁶⁸ and he has the right to use the property in any manner so long as it can still be used for the purpose for which it was dedicated. At the time when the public wished to exercise its rights contained in the dedication, Oregon follows the common law rule. This right is preserved by statute as to the vacation of land.⁶⁹ Therefore, *do not treat deed reservations as "public ways" which are exempt under ORS 307.200 unless there has been a proper and valid dedication and acceptance by the proper body of public officials.*

Public Easement Roads. Are "public easement roads" exempt from assessment and taxation by ORS 307.200? They are not exempt. The roads established under the 1903 law (General Laws of Oregon, 1903, page 269-270, section 20-24) are commonly referred to as "roads of public easement," meaning a road which not only the petitioner has the right to use, but also the general public.⁷⁰

Current statutes providing for the establishment of “ways of necessity”⁷¹ are directly descended from the 1903 law which has undergone little basic change over the years. The current statutes indicates that “public easement roads” and “ways of necessity” are the same thing.

The Department of Justice is of the opinion that *while ways of necessity may be public roads in the sense that they are open to the public, they do not qualify as a “county road” within the meaning of ORS 307.200 unless they are accepted by the County Court as a ‘county road.’*”⁷²

Dedicated Streets Not Yet Open to Public Travel

Are dedicated streets that are not open to public travel (not constructed and used by the public) subject to taxation? Yes.

ORS 307.200 provides that “all lands within the boundary of any county road, and all dedicated streets and alleys in any incorporated or unincorporated city or town, or town plat, within this state, are exempt from assessment and taxation *while used for such purposes.*” (Emphasis supplied.)

Oregon has long followed the common law rule that when a road or street is dedicated the underlying fee remains in the abutting owners. As we have discussed, title to a street that is vacated attaches to the lands abutting the street. In the case of *Point Pleasant Manor Building Company v. Brown*,⁷² we find the following:

“Taxes, of course, are due on property until the public body accepts the dedication.”

In Oregon, a street or roadway may be accepted by the governing body either by formal acceptance or long usage. Normally, there is no acceptance by the governing body until a street is improved by the developer to the standards of the accepting body (however, this was not true when many earlier subdivisions were established). However, whether the unimproved streets have or have not been accepted is unimportant as to whether they are subject to taxation. *As long as the public is not using the streets for its dedicated use, the area should be assessed to the owner of the fee.*⁷⁴

It should be noted, however, that although the unimproved street is subject to taxation, a foreclosure for nonpayment of the taxes would not destroy or imperil the public easement.⁷⁵

Likewise the foreclosure of a tax lien on private lands does not cut off easements that have been carved out of one property for the benefit of another (whether or not the easement is in the public or a private person).⁷⁶

LAWS PERTAINING TO COUNTY ROADS—ROAD WIDTHS

One problem common to mapping and map maintenance is the determination of the widths of county roads. The following guide will assist in making determinations of road widths; however, when a county road survey or recorded plat or survey conflicts with these laws it is advisable to use the survey or plat. Unless, however, the county road master, road engineer, or county engineer advises that the legal road width be used.

BUSH CODES. Territorial Government. All county roads were to be 60 feet in width, unless the county commissioners, upon the prayer of the petitioners, determined a lesser number of feet.

OREGON LAWS. Effective in 1861. The Bush Code was incorporated into Oregon Law except that the “county court” was substituted for “county commissioners.”

COUNTY ROAD LAW AMENDED. 1889. All county roads were to be 60 feet in width, unless the county court, upon the prayer of the petitioner, determined a different width which was not to be less than 40 feet or more than 80 feet.

1915 AMENDMENT. All county roads were to be 60 feet in width, unless the county court, upon the prayer of the petitioners, determine on a different width, which was not to be less than 30 feet or more than 80 feet.

1917 AMENDMENT The county road law was amended to omit the phrase “upon the prayer of the petitioners” and for the first time, giving the county courts the right to establish roads by resolution, as an alternative to the petition system.

SUPREME COURT DECISION. 1927.⁷⁷ Until the year 1931 it was not required in the documents establishing county roads that the width be specified in the road documents. Consequently, most of the documents up to this time did not specify the road width. The *Latourette v. Clackamas County* court decision clarified this point. The court held:

“The law prescribes that all roads shall be sixty feet wide, unless otherwise ordered by the county court... this provision must be considered part of the resolution unless a different width is specified therein. It would not confer a jurisdiction on the county court to alter the road so as to establish a different width.”

1931. Ore. Laws 1931 Ch. 326. Since June 6, 1931 it is required that the county court determine the width of county roads, subject only to a minimum width, which width shall not be less than 30 feet. The proposed width was to be stated in all petitions, notices, orders or resolutions. *From this date to the present it is required that the road width be stated in all documents relating to roads.*

1947 AMENDMENT. 1931 law amended. Ore. Laws Chapter 498. "All county roads established after the effective date of this act shall be of such width as the county court shall determine, which width shall not be less than 50 feet; provided that the county court shall have the authority to accept any dedicated circular road or street less than 30 feet in width not exceeding one mile in length, and maintain such road or street as a county road for one-way traffic. The proposed width to be stated on all documents."

1951 AMENDMENT 1947 law amended. Ore. Laws Chapter 132. "All county roads established after the effective date of this act shall be of a width as the county court shall determine, which width shall not be less than 50 feet; provided that the county court shall have authority to accept any circular road or street of not less than 30 feet in width and not exceeding one mile in length and to maintain such road or street as a county road for one-way traffic only. The proposed width shall be stated in all documents.

1953 OREGON LAWS. Chapter 229.

(1) "Subject to subsection (2) of this section, all county roads established after August 2, 1951, shall be of such width as the county court shall determine, which width shall not be less than 50 feet. The proposed widths shall be stated in all petitions notices, orders, or resolutions relating to any county road."

(2) "The county court, by majority vote, may accept as a county road any highway, road, or street, irrespective of its actual platted width, if such highway, road, or street was dedicated to the public as a highway, road or street before January 1, 1948. After acceptance, the county shall maintain such highway, road, or street as a county road."

OREGON LAWS-1978. Ch. 368

ORS 368.415. "(1) subject to subsections (2) and (3) of this section, all county roads shall be of such a width as the county court shall determine such width shall not be less than 50 feet unless the court finds compliance with the standards adopted pursuant to subsection (3) of this section. The proposed width shall be stated in all petitions, notices, orders or resolutions relating to any county road."

"(2) The county court by majority vote, may accept as a county road any highway, road, or street, dedi-

cated to the public as a highway, road, or street, if it is found to comply with the standards adopted pursuant to subsection (3) of this section. After acceptance the county shall maintain such highway, road, or street as a county road."

"(3) The county court may, by resolution, adopt standards for county roads less than 50 feet in width. Such standards may include, among other things, width, length, design and construction, limitations on access, and restrictions of on-street parking."⁷⁸

ORS 368.425. "All streets and alleys in unincorporated towns in this state are declared to be public highways."

COUNTY ROADS ESTABLISHED BY PRESCRIPTION

The Oregon Supreme Court in *Huggett v. Moran*⁷⁹ held that county roads may be informally established: "*The rights to use of way arising by prescription arise not out of the formality of a conveyance, but by informality; not by formal gift, grant, or dedication, but by open, notorious, hostile, adverse use, based on the assumption of prior dedication or action by duly constituted authority.* Thus a roadway so established is not controlled by the statutory requirement of formal acceptance, and unless required by statute, no formality is necessary to a valid acceptance."

"Whenever a statute prescribes the minimum width of Public roads to be established in the future, and a public road is established by prescription, the width thereof is the minimum necessary to the establishment of a legal road in the absence of evidence of taking a greater amount."⁸⁰

EXAMPLE-GENERAL MAINTENANCE PROCEDURES

1. Receive new surveys from county surveyor, state highway department, BPA, B.L.M., U.S.G.S., etc.
2. Check maps for conformance to the new surveys. If possible the new survey should be added to the map - noting the survey number. If the survey lines do not represent property lines they should be shown as dashed lines. If the survey cannot be used at present, note the number on the cadastral map and file the survey for use at a time

when remapping is done. All surveys should be maintained in a special file (microfilm would be acceptable).

3. Receive new aerial photos.
4. Review cadastral maps with the photos to see if there have been any changes in roads or riparian boundaries. If changes are present, the cadastral map should be revised to conform to the photos.
5. Maintain file of aerial photos.
6. Receive recorded (and unrecorded) instruments of conveyance (deeds, etc.).
7. Read deeds to see if they represent a segregation of a parcel of land or merely a change in ownership (name change).
8. If a deed represents a name change, the corresponding cadastral records should be revised (flysheets, assessment roll, tax lot card, etc.). (In some administrations this is done by sections other than mapping.)
9. If a deed represents a new segregation, the cartographer pulls the cadastral map and tax lot record. Next the parent tax lot number is identified. The cartographer then plots the boundaries on the cadastral map, computes the acreage of the new parcel and assigns it a new tax lot number in accordance with the standards defined in Chapter 3 of this manual. Next a new tax lot record is created for the new parcel.
10. The parent number is reserved for the parent account in the case of segregations. The parent tax lot record is next revised to reflect the new segregation, reference number of the new parcel and revised acreage. This is illustrated in figure 13-26.
11. Next, the journal voucher is initiated for the new segregation. This is mandatory so that all proper changes will be made in the assessment cadastre. The journal voucher of figure 13-24 exemplifies the format used by most counties.
12. In some counties, the cartographer initiates the sales data card. If your work load is such that this can easily be accommodated, this practice is acceptable; however, filling out a sales card is not really a cartographic task. If your work load is greater than you can handle, the sales data card should be filled out by another section.
13. New prints should be made of the revised cadastral map and inserted in the map book and distributed to other officials and agencies on the map distribution list.

Note: It is the practice of many agencies to redraw the new segregated, parcel on the map, book map,

appraisers map, etc. This should be minimized if at all possible. A new map print is cheaper than redrawing the segregation. Appraisal data should be on an overlay so that it can be used with the revised map to produce a new appraisal map. This method saves the time of recopying appraisal data each time a new print is made. The same procedures can be used for soil class maps.

14. Receive ordinance for vacation of streets and alleys. Revise cadastral maps in accordance with procedures described in this chapter. Revise the assessment cadastre to reflect the changes. Be sure to use the Journal Voucher to ensure that all changes are made.
15. Receive ordinances vacating parts of subdivisions. Revise maps and records to conform to the new ordinances. Be sure to note all ordinances on the cadastral map. Subdivision data should be retained on cadastral map if existing deeds and records refer to lots, blocks or tracts of that subdivision.
16. Receive and review new subdivisions and condominiums in accordance with Oregon Laws and procedures spelled out in this chapter.
17. Approve subdivisions that conform to the subdivision statutes (including minor and major land partitions).
18. Receive and review the required condominium (unit ownership) documents in accordance with Oregon Laws and the procedures spelled out in this chapter. Make it a policy of directing any questions on new condominiums to the Oregon Real Estate Division.
19. Revise cadastral maps and the assessment cadastre to conform to the new subdivisions and new condominiums. Be sure that these are mapped at proper scales spelled out in Chapter 2 of this manual. *Use a journal voucher for each new account.*
20. Receive annexations, formations, mergers, consolidations and withdrawals of taxing districts. These must be approved by the Department of Revenue (ORS 308.225) before they can be changed on the assessment roll.
21. Plot new taxing district lines on the code maps and cadastral maps. Assign proper code numbers to maps and records. Be sure to use a journal voucher for every change.

Note: In addition to a *notice to taxing districts* of approval or disapproval by the Department of Revenue, the assessor must have filed with him a copy of the description and map of the taxing district boundary change. (ORS 308.225) This must come from the taxing district, but can be filed by any agency or agent

ASSESSOR'S JOURNAL VOUCHER

COUNTY, OREGON

Check Above When Completed and Ready to File Account Number { Code: ☐	PRESENT ACCOUNT				NEW ACCOUNT				
	NAME OF OWNER				NAME OF OWNER				
Assessment Years Affected		That part of TL _____ in Cd. _____ (Bal. _____)				That part of TL _____ in Cd. _____ (Bal. _____)			

PRESENT RECORD		NEW RECORD		NEW ACCOUNT		CHANGES TO ROLL	
CLASS	Acres	Value	Acres	Value	CLASS	Acres	Value
LAND					LAND		
IMPROV.					IMPROV.		
EXEMP.					EXEMP.		
TOTAL		TOTAL		TOTAL		TOTAL	

Reason for Change	Check	Changes	Needed (Check)	Completed (Initial)	PERSONAL PROPERTY			Change to Roll Inc. (Dec.)
					Class	Present Value	Revised Value	
1. Name Change		1. Counter Map			1. Inventories			
2. Acreage Change		2. Map Tracing			2. Farm & Equip. In Cont. Use			
3. Value Change		3. Tax Let Card			3. Farm Mach. and Equip.			
4. Segregation		4. Fly Sheet			4. Other Mach. and Equip.			
5. Consolidation		5. Appraisal Map			5. Livestock	Head		
6. Code Change		6. Soil Class Map			a. Horses			
7. Omitted Property		7. Timber Map Print			b. Cattle			
8. Double Assessment		8. Sales Date Card			c. Sheep			
9. Clerical Error		9. App. Exp. (Value)			d. Swine			
10. Cancellation		10.			e. Poultry			
11. Exemption Change		11. Addressograph Plate, Change			f. Miscellaneous			
12. Per. Prop. Value Change		12. Addressograph Plate, New			TOTAL			
13. Per Prop. New Account		13. New Forms			INSTRUMENT RECORD			
		14. New Tax Roll and State to Collector			VOL.	PAGE	DATE	
		15. Assessment Roll			TYPE:			
		16. Index Card Filed			REMARKS:			
		17.						
		18.						
		19.						
		20. Copy to Appraisal Section						
		21. Copy to Collector						

DATE:	Prepared by:	TAX COLLECTOR'S OFFICE	CONFIRMED:
Collector's J.V. No.	Tim Roll Corrected	Statement Corrected	Telephone ☐ Mail ☐ Counter ☐

DOR PT-C-29 (Rev. 6-70)

Figure 13-24

(such as an attorney for the district). However, it is the ultimate responsibility of the taxing district to comply with ORS 308.225.

22. Receive new highway right-of-ways deeds. This comes from the Oregon Department of Transportation, Highway Division.
23. When the right-of-way change is a *taking*, a copy of the complaint should be received. (See figure 13-25.) When the case is closed a final judgment is received (this may have to be obtained from the county recorder or county clerk's office). After the final judgement is received, or after possession is taken (whichever is earlier), the change should be made throughout the assessment records and cadastral maps. Refer to Dept. of Justice opinion 150-25-303-00849; 79-22; March 19, 1979.
24. Prepare new maps to conform to the graphic standards of Chapter 2. See the subsection of this chapter on cadastral map upgrading.

TAX LOT RECORDS

There are two acceptable tax lot record formats. The first is the older form as illustrated in figures 13-26 and 13-27. Figure 13-26 is a parent account showing cadastral map and record changes, by date. Figure 13-27 is a new account resulting from a map enlargement of section 17 of T.36S R14W.W.M.

The tax lot card of figures 13-26 and 13-27 have four basic handicaps. First, they require retyping of the description and typing of each change. Second, they do not show the description as it appears on the deed (a constant complaint by taxpayers). Third, they do not show the abstract of owner names. Finally, they require filing and retrieval which often results in loss of the card.

A better type of tax lot record (developed by Washington County) solves all of the problems of the tax lot card of figures 13-26 and 13-27. That record (figures 13-28 and 13-29) consists of an actual copy of the deed with room for owner abstracts and record changes on the reverse side (figure 13-29). This cuts out all typing. The information of the reverse side is entered in freehand. Moreover, the description satisfies taxpayers that *his or her* deed was used to update maps and records.

The tax lot records are retained in a special notebook binder. This provides for easy reference, thus reducing the problems associated with filing and retrieval. Moreover, all changes may be made without removing the record from the binder. The tax lot record binders are by map book number.

SUPPLEMENTAL INSTRUCTIONS

Any specific instructions relating to dates, specific duties, form numbers, and special rules should be added to this manual by the county.

At some future date this information can be used to update this chapter.

SPECIAL NOTE

It is important to note that each of the solutions we have discussed in this chapter, that are based on legal cases, legal opinions and court rulings, are for *ASSESSMENT PURPOSES AND CADASTRAL MAP PURPOSES ONLY*. They are not intended as a substitute for legal counsel, nor have they been included to encourage the dispensing of the advice and consultation that must be provided by an attorney.

OREGON STATE HIGHWAY DIVISION

HIGHWAY BUILDING • SALEM, OREGON • 97310

COUNTY ASSESSOR

Enclosed is a copy of a complaint being mailed this date for filing by the State Highway Commission in your county to acquire certain described land and/or easements, as the case may be, for highway purposes. This copy is furnished for your information and to assist you in keeping your records and tract books up to date as to ownership.

The provisions of ORS 311.410 through 311.414 specifically cover the effect of acquisition of property by the State by eminent domain proceedings on taxes for prior and current fiscal years in cases where there is a partial taking as well as an entire taking.

You will note that in ORS 311.414 the date of acquisition of real property by the State in eminent domain proceedings for tax purposes is the date of taking possession by the State, or the date final judgment is entered, whichever is the earlier. Of course, if final judgment is taken before possession, appropriate action by the Court will be taken to segregate the tax responsibility. However, there is the possibility that possession may be taken by the State long prior to the final judgment, in which event no assessment should be made the following fiscal year.

To facilitate keeping your assessment roll in order, this office will advise you of the date possession is taken, if such be prior to final judgment. We hope this service will be of assistance to you and that you will accept it as being an attempt on the part of this office to cooperate with you in this matter of interest to both your office and ours.

Yours very truly,

D. H. MOEHRING
Right of Way Engineer

By
A. L. RIVENESS
Condemnation Counsel

Enc.

41	13	9	3	4700		17-9	OFFICIAL RECORD OF DESCRIPTIONS OF REAL PROPERTY CURRY COUNTY ASSESSOR'S OFFICE				
TWP.	RGE.	SEC.	1/4	1/4	PARCEL NUMBER	Type	Spec. Int. in	CODE AREA NUMBER	FORMERLY PART OF		
MAP NUMBER					TAX LOT NUMBER						
INDENT EACH NEW COURSE TO THIS POINT					DESCRIPTION AND RECORD OF CHANGE			Date of entry on this card	Dead Record Vol. PG.	Acres Remaining	
Bat NW cor of land belonging to Revis Costelloe, S side of County Road, S 12.10 chains to N line of land belonging to Heiberger; th W 8.26 2/3 chs; th N 8.93 3/4 chs; th E 3.16 1/2 chs; th N 3.16 1/2 chs; th E 5.10 5/12 chs;									16 BR 2 606 BR 22 868-9		
Exc:											
TL 4600 (DV 36-591) 4.72 ac								1-1-59		5.28	
Co Rd R/W (BR 30-265) 0.43 ac					D			9-6-73		4.85	
TL 4701 (BR33-474) JVO 75-3493 0.50 ac					WD			5-7-74		4.35	
Exc:											
Parcel 4702 (BR39-237) 0.43 JVO 76-280								6-11-75		3.92	
Also: Co Rd 0.43								9-22-75		4.35	
Exc:											
Parcel 4703 (BR 41-88) JVO 77-1067 0.59										3.76	
Co Rd 0.37										3.39	
Also: Co Rd 0.37								11-17-75		3.76	
Exc:											
Parcel 4704 0.50										3.26	
Also: (Formerly Parcel 4601 desc as fols); Baap 963.6' N & 250' E m/l from M.C. bet sec 8 & 9 sd pt also being the c/l of Co Rd desc in BR 30-265; th E 215' m/l to the SE cor Parcel 4600 as desc in BR 5 169; th N 446' m/l to c/l of Co Rd; th SWly alg c/l of rd to POB. 1.08										4.34	
Exc:											
Co Rd 0.48										3.86	
Exc:											
Parcel 4705 (BR46-591) JVO78-2922 0.50					WD			9-1-76		3.36	

COUNTY FORM 103-048 (Rev. 12-72)
OREGON DEPARTMENT OF REVENUE

Figure 13-26

36	14	17		1300		3-4	OFFICIAL RECORD OF DESCRIPTIONS OF REAL PROPERTY				
TWP.	RGE.	SEC.	1/4	1/16	PARCEL NUMBER	Type	Spec. Int. in REAL PROP.	CODE AREA NUMBER	CURRY COUNTY ASSESSOR'S OFFICE		
TAX LOT NUMBER								FORMERLY PART OF 36 14 2170			
Indent each new course to this point		DESCRIPTION AND RECORD OF CHANGE					Date of entry on this card	Deed Record Vol. PG.		Acres Remaining	
FTLPO											
T36S R14W WM											
W $\frac{1}{2}$ NW $\frac{1}{4}$; SW $\frac{1}{4}$; NW $\frac{1}{4}$ SE $\frac{1}{4}$ W of Wly r/w li of Old Oregon Coast Hwy: Lot 2											
Also:											
Baap on the Wly bdy li Old Oregon Coast Hwy 2016.2 ft S & 2400.4 ft W of the NE cor of Sec 17;											
th N 88°45'W 669.3 ft;											
th due S 660 ft;											
th N 88°45'W 789.6 ft to SW cor of the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Sec 17;											
th N 0°27'W 2651.2 ft to the NW cor of NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Sec 17;											
th due E 1080. ft m/l;											
th S 21°06'E 540 ft m/l;											
th S 2°19'E 384 ft;											
th S 26°34'W 375.8 ft;											
th S 76°43'E 540.7 ft to the Wly bdy of Oregon Coast Hwy;											
th Sly alg sd bdy to POB.								50	332	371.85	
Exc:											
Hwy R/W (DV 19-311)		4.57				10-18-68 9-7-71			367.28		
JVO 73-9577 & 9578						9-16-71					
JVO 74-1097 CORPORATE NAME CHANGE						10-18-72			367.28		
Exc:											
Parcel 1301 (BR45-19)		120.00	cont			5-25-76			247.28		

COUNTY FORM 363-048 (Rev. 12-72)
OREGON DEPARTMENT OF REVENUE

Figure 13-27

BARGAIN AND SALE DEED

KNOW ALL MEN BY THESE PRESENTS, That BENJAMIN ARCHIE McVAY and DORIS McVAY, husband and wife, Grantors, in consideration of the sum of One (\$1.00) Dollar only, and for no other consideration, to them paid by the PORT OF BROOKINGS, a municipal corporation, Grantee, do hereby grant, bargain, sell, and convey unto the said PORT OF BROOKINGS, a municipal corporation, its successors and assigns, all of the following real property situated in the County of Curry and State of Oregon, and more particularly described as follows, to-wit:

A tract of land lying in the North $\frac{1}{4}$ of Section 8, Township 41 South, Range 13 West, W.M., Curry County, Oregon, described as follows:

Beginning at a point which is South 83.36 feet and West 1757.97 feet from the Northeast corner of said Section 8; thence North 29 degrees 53 minutes West 80.0 feet; thence South 60 degrees 07 minutes West 172.35 feet to the true point of beginning;

Thence South 60 degrees 07 minutes West 127.65 feet; thence South 29 degrees 50 minutes West 1400.0 feet; thence South 60 degrees 10 minutes East 400.0 feet; thence North 29 degrees 50 minutes East 1400.0 feet; thence North 29 degrees 53 minutes West 185.0 feet; thence South 60 degrees 07 minutes West 30.0 feet; thence North 48 degrees 0 minutes West 168.34 feet to the true point of beginning.

This conveyance is subject to prior easement to the U.S.A. for entry, exit and maintenance of jetties.

TO HAVE AND TO HOLD To the Grantees, its successors and assigns forever but on the special limitation hereinafter set forth. The estate herein granted to the said Grantee shall continue only so long as Grantee shall maintain and use the herein-granted premises solely as a boat basin for the mooring of commercial and sport boats, boat ramps, picnic area and parking area, and only so long as no other commercial enterprise of any nature is maintained thereon by Grantee, its successors or assigns. In the event that the Grantee

1 - BARGAIN AND SALE DEED

Description side of tax lot card.

Figure 13-28

[illegible]

Figure 13-29

1980 ANNOTATIONS

Final Determinations on Boundary Suits to be Filed With Assessor

ORS 105.705 provides procedures for settling disputes over property boundary lines; by one of the abutting owners bringing a suit in equity in the circuit court. The statute requires the clerk of the court to file one copy of the decree with the county assessor. This is to be used by the assessor to verify or modify the property line on the map.

Taxes on Real Property Subject to Eminent Domain Proceedings

Question. Where real property is subject to condemnation proceedings, which date shall be used for proration of real property taxes for the current tax year, the date of deposit of just compensation or the date of the order to distribute the deposit?

Answer. Neither date. The controlling date is the date possession is taken by the condemnor or the date of final judgment; whichever is earlier. *Department of Justice opinion* 150-25-303-00849, 79-22 (3-19-79).

Dedicated Public Roads, Alleys, Ways and Highways

A dedication of a public way is not binding on either party unless accepted. *Mathis v. Thunderbird Village, Inc.*, (1964) 236 Or 425, 389 P2d 343.

The subdivision plat and the accompanying writings usually indicate whether or not the owner has the requisite intent to dedicate. *McCoy v. 27tompsoz4* (1917) 84 Or 141, 164 p589.

There is acceptance of the streets and roads shown on a plat when the county court endorses its acceptance of the plat thereon following the approval of the surveyor and assessor. *Whitney v. Crittenden*, (1924) 112 Or 278, 229 p378. In the *Whitney* case the court ruled that the dedicator cannot revoke an actual, valid, accepted and final dedication (a statutory vacation is the only method of extinguishing dedicated roads, streets and alleys). The dedication may be revoked before final acceptance.

In Oregon, there are cases where actual construction of a road, or improvement of a road (along with other factors) constitute acceptance by the public. See *Hendrickson v. City of Astoria*, 127 Ore. 1, 270 Pac. 924.

The fee to dedicated land remains in the dedicator and passes to the purchasers of abutting lots in ac-

cordance with the intent of the transferor. *McQuaid v. Portland & V. Ry.*, (1889) IS Or 237, 22 p899; and *Huddleston v. Eugene*, (1899) 34 Or 343, 55 p868, 43 LRA 444. In *Barton v. Portland*, (1914) 74 Or 75, 144 p1146, the court held that a purchaser of a lot abutting on a public street acquires a possible reversionary interest in half of the street. However, more recent court decisions have eliminated any question about reversionary rights of lot owners, e.g., in the case of *Portland Baseball Club v. Portland*, (1933) 142 Or 13, 18 P2d 811, the court confirmed the title to the street was in the abutting lot owners and upon vacation of the street all interests (free from the public interest) reverted to said lot owners. In *Fowler v. Gehrke*, (1941) 166 Or 239, 111 P2d 831 an abutting owner's title was ruled to extend to the center of the street upon its vacation by ORS 271.060 (which is recognition of the common law rule).

When a conveyance describes property as bordering on a street (absent of an express provision in the conveyance to the contrary) the conveyance includes the fee to the center of the street. *Fossi v. Meyers*, (1975) 271 Or 611, 533 P2d 337.

Adverse possession of land duly dedicated to the public (as a street or alley) is, by itself, insufficient to extinguish the public's easement, or to revest all interest in the dedicator or descendants in title. See *Oliver v. Synhorst*, (1906) 48 Or 292, 86 p376, 7 LRA (NS) 243; *Christian v. Eugene*, (1907) 49 Or 170, 89 p419; *Barton v. Portland*, (1914) 74 Or 75, 144 p1146; *Killiam v. Multnomah Co.*, (1931) 137 Or 562, 4 P2d 323.

Recording Deeds

ORS 93.010 defines how conveyances are made. The provision, in this statute, that a deed may be "acknowledged or proved and recorded" was not intended to make either acknowledgement, proof or recording any part of the execution of an instrument. *Goodenough v. Warren*, (1879) 5 Sawy 494, 498 Fed case No. 5, 534; *Eadie v. Chambers*, (1909) 99 CCA 561, 172 Fed 73, 76, 18 Ann Cas 1096, 24 LRA (NS) 879.

Conveyances, Deeds, Descriptions

A quitclaim is not a mere release but passes all the estate that a grantor has in real property as effectually as would a warranty deed. *Guild v. Wallis*, (1929) 130 Or 148, 279 P546; *Kane v. Kane*, (1930) Or 79, 291 p785.

A grantor is presumed to convey all the interest that he has in real property described unless he clearly indicates an intent to transfer a lessor estate. *Palmateer v. Reid*, (1927) 121 Or 179, 254 p359; *Bigler v. Nunan*, (1912) 186 Fed 665, 118 CCA 23, 199 Fed 549.

The courts are usually liberal in construing descriptions. In *Sequin v. Maloney - Chambers*, (1953) 198 Or 272, 281, 253 P2d 252, the court said a description of land is sufficiently definite and certain if it is possible for a surveyor to ascertain from the description *aided by intrinsic evidence* what property was intended to be conveyed. See also *O'Hara v. Brace*, (1971) 258 Or 416, 482 P2d 726. In *Gubser v. Town*, (1954) 202 Or 55, 273 P2d 430, the court ruled a description to be sufficient when evidence indicated that a surveyor could find the land notwithstanding the errors in the description. An erroneous description is not fatally defective if it identifies the property and is not misleading, *Clatsop Co. v. Taylor*, (1941) 167 Or 563, 119 P2d 285.

In *Raymond v. Coffey*, (1873) 5 Or 132; *Commissioners v. Wiley*, (1881) 10 Or 86; and *Hayden v. Brown*, (1898) 33 Or 221, 53 p490, the courts held "where, by omitting one part of a false or impossible description in a deed a perfect description remains, the false part should be rejected and the instrument be upheld."

References to volume and page numbers, of the deed records, are a poor substitute for courses and dimensions in a deed description; however, the courts have held a description is sufficient when it refers to such volume and page numbers if they adequately delineate the boundaries of the property involved. *Frederick v. Douglas County*, (1945) 176 Or 54, 155 P2d 925. It should be noted, however, references to volume and page numbers, when used instead of courses and dimensions, are not acceptable for taxing district boundary descriptions required by ORS 308.225.

If land is so situated that it cannot be definitely described by legal subdivisions or by lots and blocks, it must be described in some other manner that will make its location certain. *Jory v. Palace Dry Goods Co.*, (1896) 30 Or 196, 46 p786. Regarding ORS 308.240, the court said that "much is left to the good sense of the assessor as to methods of description" and that ORS 308.240 authorized the use of tax lot (or tax tract) numbers and maps; and an erroneous item in the description will not invalidate the assessment if *no one is misled*. *Clatsop Co. v. Taylor*, (1941) 167 Or 563, 119 P2d 285.

Regarding ORS 308.240, a court held "the test of a description is not whether it is fully understood by the man in the street, but whether it would be sufficient in a deed of conveyance from the owner or whether a court of equity would decree specific performance of a contract containing such description." *Frederick v. Douglas County*, (1945) 176 Or 54, 155 P2d 925.

A failure to specify the township, range, county and state in a memorandum does not render the contract inconsequential. *Burns v. Witter*, (1910) 56 Or 368 108 p129; *Wurzweiler v. Cox*, (1931) 138 Or 110, 5 P2d 699.

Construing a Description

"Unless a contrary intent is expressed in the deed, quantity is subordinate to monuments, boundaries, angles, surfaces and distances." *Weniger v. Ripley*, (1930) 134 Or 265, 293 p425.

ORS 93.310 "did not apply to a deed conveying land south to Longcoy Road when a county road, intended to be Longcoy Road and conforming to the measurements, had been vacated, and there was an existing, more southerly road popularly known as Longcoy Road... To mean the existing road the deed must clearly show that the parties intended it as the southern terminus of the property conveyed. *O'Gorman v. Baker*, (1959) 219 Or 170, 347 P2d 85, 338 P2d 638.

When the distances and courses in a deed description are inconsistent with the boundaries or monuments referred to in the deed, the boundaries or monuments, as *they exist on the ground*, are to control. The following cases support this principle (and justify the policy of carefully making the deed subordinate to surveys that have been executed to show where the boundaries are, or where the monuments were set in the ground). *Lewis v. Lewis*, (1871) 5 Or 65; *Goodman v. Myrick*, (1871) 5 Or 65; *Weiss v. Oregon Iron & Steel Co.*, (1886) 13 Or 496, 11 p255; *Anderson v. McCormick*, (1889) 18 Or 301, 22 p1062; *King v. Brigham*, (1890) 19 Or 560, 23 Or 262, 25 p150, 31 p601, 18 LRA 361; *Vandusen v. Shively*, (1892) 22 Or 64, 29 p76; *Kanne v. Otty*, (1894) 25 Or 531, 36 p537; *McDowell v. Carothers*, (1915) 75 Or 126, 146 p800; *Hennigan v. Mathews*, (1916) 79 Or 622, 155 p169; *Hickey v. Daniel*, (1921) 99 Or 525, 195 p812; *Wyckoff v. Mayfield*, (1929) 130 Or 687, 280 p340.

A call to an object which is clearly described and easily identified takes precedence over a call to an uncertain boundary line. *Hanns v. Friedly*, 181 Or 631, P2d 855.

"Although a specific description of a certain line should prevail over a general description of the area in ascertaining the position of a line, the general description should govern if the specific call is uncertain or obscure." *Rayburn v. Winant*, (1888) 16 Or 318, 18 P2d 855.

When specific descriptions contain measurements based on assumed 80 chain, 640 acre sections (e.g., 5280', 2640', 1380', 660', 330'd the general descriptions of sections and subdivisions of sections (e.g., N1/2 NE1/4 NE1/4) will usually prevail and the true distances on the ground will control.

If their position at the time the deed was executed can be clearly proven, monuments prevail over courses and distances even though they are no longer vis-

ible. *Lewis v. Lewis*, (1871) 4 Or 177; *Schmidtke v. Keller*, (1903) 44 Or 23, 73 p332, 74 p222.

A grant describing the land as extending to the banks of a nonnavigable stream or lake, thence “with its meanders,” conveys title to the center of the stream or lake. *Michelli v. Andrus*, (1912) 61 Or 78, 120 p737; *Luscher v. Reynolds*, (1936) 153 Or 625, 56, P2d 1158; *Kingsley v. Jacobs*, (1944) 174 Or 514, 149 P2d 950. The point marking the “center of the stream” is the center of the deepest part of the main channel (the thread of the stream). This gives abutting owners access to water regardless of the level of the water. See Chapter 10 and annotations.

Where a party conveys a parcel of land bounded by water, although it lies in shallow water and is intended to be reclaimed by filling, it will never be presumed (by the courts) that the grantor reserves proprietary rights in front of the land conveyed. *Rasmussen v. Walker Whse. Co.*, (1913) 68 Or 316, 136 p661.

“Where there are irreconcilable descriptions in an instrument of conveyance, the court must choose that description which best comports with the intention of the parties considering all the circumstances attending the conveyance.” *McCashum v. Hoselton*, (1975) 273 Or 778, 543 P2d 657.

Where the original deed in the chain of title contained an impossible particular which described a nonexistent point of intersection between a rimrock and a river, and the intent of parties to original deed could not be ascertained, the disputed property was held to not be conveyed. *Tab Enterprises v. Heare*, 37 Or App 879, 588 P2d 671 (1978).

ORS 93.310 did not effect a transfer of tidelands along the Columbia River which belongs to the State of Oregon rather than the upland owner due to failure of the original grantee to purchase tidelands under the proper statutory procedure. *State Land Board v. Reuker*, (1976) 25 Or App 137, 548 P2d 1323, distinguishing *McAdam v. Smith*, 221 Or 48, 350 P2d 689 (1960).

Name of Owner on Assessment Roll

Where “Louis” L. Smith was listed as the owner of the land, the assessment was not void because the true name of the owner was “Lewis” L. Smith. *Smith v. Dwight*, (1916) 80 Or 1, 148 p477, 156 p573, Ann Cas 1918 D, 563.

Where the property assessed was correctly described, a mistake in the name of the owner did not invalidate the assessment. *Guthrie v. Haun*, (1938) 159 Or 50, 76 P2d 292.

Taxing District Boundary Filing and Approval - ORS 308.225

Ambiguous and erroneous descriptions have been certified by registered land surveyors or registered engineers (as provided for in ORS 308.225), in apparent attempt to circumvent Department of Revenue disapproval or rejection by assessors. The certification *allowed* for in DRS 308.225 was not provided as a loophole to force insufficient descriptions on the Department of Revenue, assessors, or the public. Department of Justice opinion 150-25-303-01151; 81-24 says *if the description is not capable of closure, as required by subsection (2) of ORS 308.225 the Department of Revenue may disapprove the description even though it has been certified*. County assessors are required by ORS 308.225(1) to disregard boundary changes which are not “in accordance with” subsection (2) of the statute, i.e. requiring the description of the boundary change be capable of closure.

The purpose of the certification provision of subsection (5) is to expedite the boundary change process. Certification neither eliminates the requirement for closure nor does it create a conclusive presumption that the description is capable of closure. (1981) Department of Justice.

Does ORS 308.225 as amended by Oregon Laws 1975, ch 595 (enrolled Senate Bill 683) require a legal description of the “boundary change” or a legal description of “annexed area” (or “excluded area” as the case may be) to be reported? Department of Justice opinion 150-32-0727-75. (75-237) answers that it is the legal description of the “annexed area” (or “excluded area”) that is required.

Prior to 1975 much was left to the discretion of the assessor and the taxing district as to the accuracy of boundary descriptions. Many descriptions were so poor as to be impossible to plot on maps; some being off as much as 1,000’ from closing. When taxing districts refused to correct description errors and/or ambiguities, the assessor was forced to use an assumed line as a boundary of the district. This situation was the rule, not the exception.

Taxing district boundaries are too important to be decided by guesswork. Surely, the taxpayer does not want someone to make a guess as to whether or not he or she is in a city, water district, fire protection district, etc. To correct the problem of ambiguous and erroneous taxing district descriptions being forced on assessors, the 1975 Legislature amended ORS 308.225 to require the boundary change description be capable of closure. This author prepared the amendment, and closure meant *a closed traverse as defined in professional surveying*. Department of Rev-

enue opinion 150-32-0727-75 (75-237) says “one of the rules of statutory construction is that every word and phrase used in a statute must be given some meaning if such meaning is consistent with the intent of the Legislature and does not lead to an absurd result. In ORS 308.225 as amended by the 1975 Act, it is clear that the Legislature intended a more precise boundary change be certified to the Department of Revenue and the county assessor. In order to reach this result, the Legislature has decreed that the description of the boundary change shall be capable of closure in that *the series of courses shall start at a point of beginning and the final course shall end at the point of beginning. This means that the annexed territory must be described so that the description is full and complete with a final course to end at the point of beginning of the description of the annexed territory.*”

Anything less than a closed traverse *can be rejected*; however, descriptions using lots or blocks of recorded subdivisions, subdivision by the U.S. Rectangular Survey, or *all* of a county are accepted because the recorded surveys of those areas are assumed to close. However, if use of such descriptions result in ambiguities, they can be rejected.

Lines described by only reference to recorded deeds are not acceptable. Such references, however, are acceptable when accompanied by bearing and dimension.

Remember, ORS 308.225 *was not amended to provide loopholes to submit poor, erroneous and ambiguous descriptions. It was amended to eliminate such descriptions.*

Subdivision Vacations

It is often necessary for the assessor to remind the nonassessment map user community that cadastral

maps are made for the purpose of ad valorem assessment and taxation; *not for the purpose of confirming or establishing the legality of ownerships, property lines, deeds, surveys or governmental acts.* For the assessor to use the maps and maintain the maps it is necessary to be able to identify, on the map, certain information referred to by other records (past as well as present); for example, to be able to identify subdivision information referred to in a deed.

The fact that a subdivision, or any part of a subdivision is vacated is of little significance in deciding whether or not the subdivision information is to be included on the maps.

What is significant is the frequency of reference to the subdivision in deeds, surveys, assessment records, plats, court decrees, mortgages, etc. If a subdivision is developed and occupied (either all, or in part) the frequency of reference will be high. If, on the other hand, the subdivision is undeveloped (as defined in ORS 92.225) it is possible, but not certain, that little reference will be made to its elements. It is up to the assessor to decide whether or not the lines and measurements be retained on the cadastral maps after vacation.

Some counties require the vacation of a lot line before approving a minor land partition that covers all or parts of more than one lot in a subdivision. In all probability the minor land partitions are being made in developed subdivisions; therefore, it is likely that reference is frequently made to the subdivision elements. Subsequently, the lot line must be retained on the map. Another justification for retaining the lot line is the vacation of the lot line does not act to vacate the lots; therefore, the lot line must be retained to define the area (or boundary) of each lot.

*The security and certainty
of title to real estate are among
the most important objects
of the laws of any civilized
community. Around it the law
has thrown certain solemnities
and formalities so that the fact
may be known and read by all
men & women.*

*Hogue v. City of Albina
20 Or. 188*

CHAPTER 14

HIGHWAYS AND THE LAW OF DEDICATION

Oregon Cadastral Map System

Highways and the Law of Dedication



August 2003

Oregon Cadastral Map System

A comprehensive explanation of the system
approved by the 1953 Legislative Assembly
(HB 232) with special attention to the:

- Concepts and Standards (Volume 1)
- Technical and Cartographic Procedures (Volume 2)
- Maintenance Process (Volume 3)
- Highways and the Law of Dedication (Volume 4)
- Mapping Riparian Lands (Volume 5)

Highways and the Law of Dedication

First Edition
June 2003

**Prepared by
Property Tax Division
Oregon Department of Revenue
Salem, Oregon 97310**

Preface

The statewide cadastral map system is explained in five volumes:

Vol. 1 Concepts and Standards.

Vol. 2 Technical and Cartographic Procedures.

Vol. 3 Maintenance Process.

Vol. 4 Highways and the Law of Dedication.

Vol. 5 Mapping Riparian Lands.

Planned future additions are:

- Estates in Land, Title, and Deed Interpretation.
- Mapping by Computer, and Geographic Information Systems.
- Photogrammetry and the Cadastral Map.

The purpose of this series is to supply tax administrators with background on the map system, map standards, technical procedures, and legal principles that must be considered in mapping the rights, title and interests in real property.

The information will be useful for training cartographers and other assessment officials. It also will be a valuable reference source for assessors, appraisers, cartographers and the map user community. Finally, it will supply a balanced picture of the science and art of cadastral cartography.

The Cartographic Unit has high hopes that the five-volume series will furnish a basis for equitable assessment and taxation of locally assessed real property. It is intended that the information presented will contribute to and promote further development of the cadastral map system.

Volume 1 deals primarily with:

- A brief history on cadastral cartography and cadastres.
- Problems leading to the legislative act to create a uniform mapping system in Oregon.
- The philosophy of those who designed and developed the foundation of today's map standards.
- The graphic standards and map specifications.
- An explanation of the standard tax lot number (the parcel identifier of the system).
- The general index for the five-volume series.

Volume 2 contains the technical elements applied in cadastral cartography, such as *direction*, an element that has proven to be confusing to new cartographers and to the map-user community. The six major systems of direction (or angular measure) are outlined in **Chapter 1**. Information is included on meridian, declination, quadrants, azimuth, deflection angles,

and plotting angles and bearings with a drafting machine.

Most of the land in Oregon was granted by sections, or subdivisions of sections, established by the United States Rectangular Survey. Even land granted under the Donation Law was indirectly tied to the survey (as is land conveyed by reference to subdivisions that are tied to the survey). Consequently, the Rectangular Survey is the common denominator in most land records (deeds, surveys, subdivision plats, etc.). For this reason, it is the base of the map number part of the state standard tax lot number, and the base for map areas and scale.

Chapter 2 supplies those elements of the survey system that cartographers must know, and map users should know. In addition, the chapter provides those principles of law that **must** be considered in the mapping and map maintenance process.

"A survey does not create title; it only defines boundaries." (U.S. v. State Investment Co., 264 U.S. 206, 68 L. Ed. 639.; 285 F. 128--Eighth Circuit Court). "No-man's land" has become a mere figure of speech. *All lands have ownership*. With ownership comes rights--boundaries, surveys, and, in some situations, case law. Boundaries, more than ownership, are the objective of the mapping effort because the boundaries are what limits the extent of ownership. **Chapter 3** is presented to not only acquaint you with surveys, but to instill in the cartographer an appreciation of the problems confronting the surveyor.

Chapter 4 contains an explanation of coordinate systems, such as the Oregon State Plane Coordinate Systems. This is a key element of the standard cadastral map system because the plane coordinate system provides our map system with the ability to achieve tight, accurate mathematical control. Map projection (such as the "Lambert Conic Conformal" and the Universal Transverse Mercator Projection), plane coordinates, basic cartesian coordinate principles, and the Oregon State Plane Coordinate System form the outline of this chapter.

The surveys of major transportation routes (oil, power, gas, as well as highway) are useful for mathematically bridging other public and private surveys. Yet the language of the route surveys is somewhat confusing to cartographers, and the spiral and compound spiral curves often seem impossible to plot. **Chapter 5** is designed to take the mystery out of the route map, and to provide solutions to the more difficult curve problems. Hopefully, this chapter will allow county cartographers to make better use of the surveys of county roads, state highways, railroad rights of way, transmission lines, and pipelines.

Today's electronic calculators and computers have eliminated the burden of making manual calculations. No longer does a cartographer need to manually compute the square of any number, or wrestle with a slide rule to close a traverse.

But little things like the concept of *significant figures*, *rounding of numbers*, and *mathematical operations* remain important in cadastral cartography. Moreover, if a cartographer works in an office that does not have sophisticated electronic computation hardware, it will be necessary to know how to close a traverse, compute latitude and departure, compute the length of one or more sides of a triangle, and compute areas and coordinates.

Hopefully, **Chapter 6** will supply enough information for that cartographer to perform, at least, the basic mathematical operations.

Automatic mapping systems have eliminated much of the tedious manual drafting tasks. However, some local map maintenance operations do not have such luxuries. Moreover, even with such equipment at the cartographer's disposal, it remains necessary for him or her to use drafting hardware, instruments and techniques. Consequently, it was necessary to provide some drafting basics in this publication in **Chapter 7**.

Volume 3 contains guidelines for maintaining cadastral map systems to state standards. However, it falls short of providing helpful suggestions for managing a mapping section, as well as the environmental and design criteria for a drafting room operation (which is the same for a cartographic operation). This oversight will be corrected in the future.

The objective of Volume 4 is to improve the way that the dedicated public lands and highways are being mapped and assessed, and to set the record straight on rights, title and interests in the public ways and state highways. This volume was six years in the making (about three years researching legal sources, and three years in the writing). It is a comprehensive explanation of "Highways and the Law of Dedication." The manual will be useful in identifying problems where legal assistance should be obtained, and it will provide an approach to resolving many of the less complex problems.

This volume contains a generous supply of case law of the Oregon Supreme Court, the principles and rules of law announced by that Court, and citations to nearly every Oregon Supreme Court case dealing with dedication, public ways, eminent domain, nuisance, user, misuser, etc., as well as many landmark cases before the high courts of other common law states.

Volume 5 deals with mapping riparian lands. This volume:

- Includes a review of the doctrine of riparian rights.
- Contains a discussion of the important rules and principles of law applicable to riparian lands and rights.
- Provides case law considering the ownership of riparian lands.
- Touches on riparian lands and the public trust doctrine.
- Offers solutions to some of the complex problems in mapping and assessing riparian lands.

The glossaries provided in this series are designed to instruct as well as de/me. The primary objective is to develop consistency in the language of cadastral cartography. It is not only essential to know what a term means, but how it relates to a problem or situation, how the term is applied by the court, and, when necessary, how the term is misused in certain cases. Each definition has been checked with legal authorities, and is usually the prevailing definition.

It is important for you to understand that everything about cadastral cartography is not contained in these five volumes. The omission of certain state of the art processes should be obvious. Aside from that omission, these publications still supply only that information necessary to construct, maintain or understand the standard cadastral maps.

Consequently, extensive study is recommended of the sciences and professions related to this branch of cartography: trigonometry, calculus, computer sciences (specifically automated mapping and computerized geographic land data processes), advanced surveying, boundary control and legal principles, photogrammetry, real estate, real property law, and the like is recommended.

Introduction

If a cartographer is unable to identify legal problems regarding highways and dedication, the chances are excellent that serious errors will be made in mapping the dedicated public highways. When these errors go undetected long enough to give the impression of finality and legitimacy, they will inevitably spawn residual errors in the map user community. At that point, they become difficult and costly to correct.

This volume was to be included in the first edition of the *Manual of Cadastral Map Standards, Concepts and Cartographic Procedures*. However, the research on dedication was far from complete at the time of publication. Yet, cartographers were making mistakes in mapping the public roadways. The mistakes were misleading both the governmental and private sectors of the map user community.

Some guidelines were provided for mapping and assessing public roadways in Chapter 13 of the first edition in hopes of resolving this problem, but it persists. Serious misunderstandings about the public's, counties' and cities' rights in dedicated roadways have resulted in erroneous actions by various levels of local government.

These actions often result from mapping and assessment errors, and sometimes are the cause of such errors. Many of the mistakes made in mapping the public roadways stem from fallacious rule-of-thumb solutions to dedication problems.

Feedback, solicited to measure the effectiveness of the map manual in problem solving, provided clues to why the information on dedicated roadways failed to change the way the roads were being mapped and assessed. Simply stated, the manual didn't have the background information and thorough explanation to verify the few rules and principles supplied in Chapter 13. This publication is intended to fill that void.

Volume 4 contains a generous supply of example cases and many textual notes and case citations. If it leaves the impression that this is to supply an air of "legalism" to the chapter, you can rest assured this is not the purpose.

The example cases are to demonstrate how the court analyzes and solves legal problems. They will also demonstrate that simple principles of law are much less absolute in the context in which a problem is likely to arise. They will most certainly show how certain important principles of dedication were endorsed by the Oregon Supreme Court.

The citations are, in part, for those who feel the printed word carries more weight than comments on cases or digests of cases. But there was really no

intent of encouraging long, arduous research on the law of dedication. The primary purpose of the case citations is to make them readily available to expedite responses to your request for legal assistance.

An intelligent use of any published law material should begin with an awareness of the author's credentials. Only then can an accurate perspective of the contents be had.

Department cartography personnel have long experience working on, or managing, Oregon's statewide cadastral mapping program. This involved continual contact with highway and dedication problems, and exposure to the legal, as well as the technical, solutions to such problems. You must keep this in mind in order to exercise good judgment in using the information you'll derive from this publication.

A layman is less apt to have the knowledge to relate the general body and philosophy of law to a specific legal problem than an authority. With this in mind, this volume has relied more on quoting case material, and less on editorial digest of that material. The goal is to keep each rule and principle in context with the facts, conditions and considerations of each case. Every principle has been checked and rechecked with the authorities cited in the chapter.

It should be evident that it would be dangerous to use any of the information of this chapter for other than mapping and assessment purposes. The chapter is designed to help you recognize and identify highway and dedication problems. But it is not to advise a taxpayer of legal problems requiring an attorney,¹ nor is it to provide the legal advice that can only be effectively provided by an attorney. For a layman to provide such advice misleads taxpayers rather than assists them.

This publication will identify situations where you should request legal assistance. Hopefully, your familiarity with this volume will provide legal counsel with a more informed client. It will also identify solutions to less serious problems such as: apportioning vacated public roads, streets and alleys; interpreting subdivision plats and maps; and determining the taxable status of the beds of public roadways.

The law of dedication, as presented in this chapter, is deeply embedded in American common law and the common and statutory laws of this state. To grasp the significance of the rules and principles of dedication, it is important to know the relationships between common law and statutory law. It is also important to know what effect they have on court decisions. Therefore, we have given this topic brief attention in the preface.

Two excellent publications provide insight into the law of dedication. The first, widely cited by the courts and other authorities, is Elliott's *Roads and Streets, First Edition*² The other is the *Oregon Law Review*, specifically, a treatise by Sheldon W. Parks: "*The Law of Dedication in Oregon*."³

Other sources referred to in this research were Thompson's *Commentaries on the Law of Real Property*⁴, Brown's *Boundary Control and Legal Principles*⁵, Black's *Law Dictionary*⁶, Clark's *A Treatise on the Law of Surveying and Boundaries*⁷, Skelton's *Boundaries and Adjacent Properties*⁸, the *American Law Reports Annotated*⁹, and every Oregon Supreme Court decision regarding highways and dedication contained in *Reports of Cases Decided in the Supreme Court*.¹⁰

Overview

*Webster's New Collegiate Dictionary*¹¹ defines "way" as a thoroughfare for travel from place to place. Elliott¹² says: "way can be either public or private... and a way open to all people is a *highway*," i.e. streets, alleys, bicycle paths, bridges, and public walkways under jurisdiction of the cities, and ferries, roads, alleys, bicycle paths, bridges and walkways under jurisdiction of the counties. State highways are public ways. However, in this chapter the word "highway" always means those public ways under jurisdiction of the cities and counties, unless prefixed by the word "state", e.g. *state highway*.

Dedication is an appropriation of land to a public use by the owner, and accepted for such use by the public¹³ (acceptance can be formal or informal). The body of statutes, rules of law, principles of construction, rules of intent and constitutional provisions governing the highways are referred to as the "*law of dedication*."

The problems encountered in mapping and assessing the highways are similar to the highway and dedication problems that have been before the Oregon Supreme Court. For example:

- The vacation and abandonment of highways.
- Reversionary rights in the highways.
- Prescription.
- Adverse possession of dedicated lands.
- Interpretation of lines, spacing and wording on maps and subdivision plats.
- Effect of paying taxes on dedicated lands.
- Misuser or diversion.
- Acts constituting dedication and acceptance.

The courts have resolved these and other highway and dedication problems, have enunciated rules and legal principles to be used in solving like problems,

and have applied them without deviation. It has accomplished this with an almost religious regard for *precedent*.

Precedent and the Common Law

Precedent is the lifeblood of common law. The security of our rights in real property, and certainty that those rights will continue to be recognized, demands that accepted and established legal principle, under which those rights accrue, be recognized and followed by the courts.¹⁴ The policy of the courts to *stand by precedent and not disturb settled point* is called *stare decisis*.¹⁵

Thompson explains: "Once such a rule is recognized, future situations must be controlled thereby for the doctrine of certainty to be available to traders in land. Such common law must not be subject to ready change by either the courts or the legislatures or the doctrine of certainty will be ruined."¹⁶ This is not to suggest that *stare decisis* is a law or strict policy that binds the courts, or that they have always been faithful to that policy. But, as regards the law of dedication, the Oregon Supreme Court has most certainly stood by precedent.

Webster's defines common law as:

"The body of law developed in England, primarily from judicial decisions based on custom and precedent, unwritten in statute or code, and constituting the basis of the English legal system and of the system in all of the U.S. except Louisiana."

This definition gives the impression that there is one body of real property law in operation throughout the United States. However, it is not that simple. Although alike for the most part, the common law differs enough from state to state to result in 50 versions of the law in operation throughout the country—one in each state.

In *Peery v. Fletcher*,¹⁷ the court concluded the rules and principles of the common law of England (as they existed before the American Revolution) are to be in full force; that is, so far as they are applicable and are of a general nature, and are not in conflict with the Constitution or special enactments of the legislature. This is a strict interpretation of Article XVIII, Section 7 of the Oregon Constitution:

"All laws in force in the Territory of Oregon when this constitution takes effect, and consistent therewith, shall continue in force until altered, or repealed."

The laws “in force” were those prescribed by the 1844 Legislative Committee of the Provisional Government of the Oregon Territory:

“The common law of England and the principles of equity not modified by the statutes of the Iowa Territory, or this government shall be the law of the land.”

The important question is: What is the common law today in Oregon? The answer is:

“The established common law of Oregon is that body of customary law based on judicial decision embodied in the reports of cases decided in the Oregon Supreme Court; made by applying custom, reason and established legal principles to general disputes, and made in consideration of the lex situs.”¹⁸

It is safe to assume the court decisions are in consideration of English common law, the constitutions, and state statutory law.

The next important question is: What is the relationship between Oregon common law and the Oregon Revised Statutes?

The explanation is that often the statutes govern in situations not governed by the common law. In some cases, the statutes clarify a common law or define how a common law will be applied in this state. Some statutes exist where a common law principle already controls; e.g. the rights of reversion in vacated dedicated ways. In such cases, the statute merely acts to codify the common law principle.

Like statutory law, the common law of Oregon can be altered by the legislature. Any alteration is subject to the strictest legal interpretation, because where a common law principle exists, it very likely has the consequence of a property right protected by the Fifth Amendment¹⁹ and 14th Amendment²⁰ to the United States Constitution, and Article I, Section 18²¹ and Article XI, Section 4²² of the Oregon Constitution.

Since those who framed the constitutions intended them as forming the fundamental and paramount law of the nation and of the State of Oregon, it stands to reason that an act of the legislature repugnant to any of these constitutional provisions *is not law*. The legislature, as well as the courts, are bound by the constitutions.²³

Evolution of the Law of Dedication

The roots of dedication are in the Anglo-Saxon *customary law*. Customary rights included the rights of certain people to use land as it had been customarily used for time immemorial. From a practical stand-

point, it was that way as long as anyone could remember or any writing had recorded such use. “Thus it was recognized that the inhabitants of a town could acquire the right to go upon certain land for the purpose of drying their fishing nets, holding fairs, or taking water.”²⁴

Black’s²⁵ defines customary rights as: “A usage or practice of the people, which by common adoption and acquiescence, and by long and varying habit, has become compulsory, and has acquired the force of law with respect to the place or subject matter to which it relates.”²⁶

Although certain people, and sometimes certain classes of people (in England), benefited from customary rights, seldom did those benefits extend to *all* people--*the public*. Moreover, where customary rights were acknowledged, it was usually under the condition there would be no improvements made to the land. Those factors and the requirement that use be for “time immemorial,” made it difficult for the public to acquire ways for travel, trade and commerce. Consequently, customary rights gave way to the doctrine of dedication. Thompson says: “The earliest judicial recognition of dedication was in 1713.”²⁷

Parks cites the 1732 cases of *Rex v. Hudson*²⁸ and *Lade v. Shepherd*.²⁹

Dedication in England was (and remains) confined to highway purposes. But in the United States it was extended to include parks, commons, squares, wharves, plazas and cemeteries.³⁰

In 1841, when the first wagon trains were departing for Oregon, dedication was an accepted doctrine of the *jus commune* (common law) of the Eastern and Mid-western states. The people migrating from those states were a conservative lot, proud of their heritage and in no hurry to change their political, economical and religious way of thinking. Nor were they about to discard the *jus commune* as they knew it. In 1844, the Legislative Committee of the Provisional Government adopted English common law as the law of the Oregon Territory.

The Oregon Supreme Court has held that the constitutions of new states could not take from the people the rights accruing to them as citizens under a former territorial government.³¹ Presumably, those who framed Oregon’s Constitution were aware of this when they included Article XVIII, Section 7 in the constitution. That section adopted all the land laws of the Oregon Territory.

Territorial Land Laws

Subdivision plats and maps issued prior to statehood are the source of litigation and problems regarding

the dedication of highways, parks, commons, etc. They also generate problems regarding the location of the lines of streets and alleys for mapping and assessment purposes. The correct interpretation of these plats and maps requires an understanding of the land laws in force in the Oregon Territory.

At the time of the organization of the Oregon Territory in 1848, an anomalous state of condition existed here. The country was extensively settled, and the people were living under an independent government established by themselves. They were a community in a full sense of the word, engaged in agriculture, trade, commerce and the mechanical arts. They had built towns, opened and improved businesses, developed farms, established highways,³² passed revenue laws and collected taxes.

As a necessity of their condition and the cornerstone of their government and social fabric, they had established a "land law," regulating the possession and occupation of the soil among themselves. It is highly probable that all of this was known by Congress at the passage of the Act of 1848, organizing the Territory of Oregon.³³ In that act, Congress declared that the laws of the United States should be in force in the territory "so far as the same, or any provision thereof, may be applicable."³⁴

The leading feature of the land law of the provisional government provided that every male inhabitant of the country over a certain age should hold and possess 640 acres of land. The uses that the land might be put to were immaterial. In the disposition of the public lands, this state of things called for peculiar legislation, differing *in toto* from that required in an unsettled country.

Prior to the Territorial Act of 1848, a settler held only *the mere possession of land*. The first settler on a tract of land could not charge the land, in the hands of the successors in interest, with any easement or encumbrance.³⁵ Consequently, a settler could not burden the land with a dedication of the land for any public use.

In 1848, when Congress organized the Oregon Territory, there were certain important land laws in the United States. *The Pre-emption Act* of May 26, 1824, was an act "granting to the counties or parishes of each state or territory of the United States, in which the public lands are situated, the right of pre-emption to a quarter-section of land for seats of justice in the same."³⁶

In 1844, Congress enacted the *Townsite Act*. This was a special and temporary act, intended for a town already built up. In this act, an occupant's right of selection as to the particular land he would occupy was subordinate to "the law of the community who constitute the occupants of the town." It also provid-

ed that "such portions of the town as the community may designate as streets or public grounds, *for that reason becomes so*, and are not liable to individual occupation."³⁷

The courts, in *Carter v. City of Portland*,³⁸ *Lownsdale v. Parrish*³⁹ and *Lownsdale v. The City of Portland*,⁴⁰ discussed the question of which laws were extended to the Oregon Territory by the congressional act of 1848. All decisions were in harmony. The courts held that neither the 1824 Pre-emption Act, the 1844 Townsite Act, nor the 1824 County-seat Act⁴¹ were extended to the Oregon Territory in 1848. In fact, "Congress passed no law in anywise affecting title to lands in Oregon Territory till 27th September, 1850,"⁴² i.e. the Donation Law (often referred to as the "Donation Land Claim" law).

The 1850 Donation Law granted a half section, or 320 acres, to every settler over 18 who was a citizen or declared his intention to become a citizen before Dec. 1, 1851, and who occupied and cultivated his land before that date. If married before that date, his wife was also granted 320 acres.

Between Dec. 1, 1851, and Dec. 1, 1853, settlers had to be white males, 21 years of age, to receive 160 acres. The wives also received 160 acres.

A February 1853 amendment extended the expiration date of the act to 1855, and permitted the settlers to patent their land claims after two years of occupancy for \$1.25 per acre. It also allowed widows title even though occupancy requirements had not been met.

An 1854 amendment granted 160 acres to orphans of settlers who took lands under the land claim laws. Under the Donation Law, 2,567,285 acres were granted through 7,329 patents.

The 1844 Townsite Act was extended to the territory by a special act of Congress July 17, 1854.

In conclusion, dedication was a recognized doctrine of common law in the Oregon Territory as early as 1844. That year, Dr. John McLoughlin laid out the town of Oregon City, dedicating streets, alleys, a promenade on the bluff, and other lands to the public. But until land was patented under the 1850 Donation Law, a settler could not legally charge the land with a dedication to the public.⁴³ This was because prior to the Donation Law, a settler had only the right of possession to the land. Therefore, although dedications were made prior to 1850,⁴⁴ they were ineffective.⁴⁵

In the McLoughlin situation, the 1851 Legislature of the Oregon Territory recognized this. It was concerned about the problems that could develop from Dr. McLoughlin's sales of lands that were not really his to sell or dedicate. It resolved the problem by confirming title to the interests he conveyed⁴⁶ and bequeathed.⁴⁷ In

the case of *Oregon City v. Oregon and California Railway Company*⁴⁸ to be discussed in this publication, the court ruled in favor of his dedications.

How Highways are Established

Highways can be established by one of five different methods. These are:

1. Dedication.
2. Grant (purchase or donation).
3. Eminent domain (ORS Chapter 35).
4. Statutory proceedings, e.g. use of road viewer's report as provided by ORS 368.073, eminent domain, dedication as in chapter 92, or acquisition as in ORS 368.073.
5. Prescription (the rarest of the five methods).⁴⁹

*The intent of the dedicator is
the foundation and life of all
dedications, and the intent
must be clearly manifested.*

*McCoy V. Thompson
84 Or. 148*

CHAPTER 15

DEDICATION

Dedication

In *Harris v. St. Helens*,¹ a case often cited for its definition of dedication, the court said:

"Dedication is an appropriation of land to a public use, made by the owner, and accepted for such use by or on behalf of the public. A dedication may be express, as when the intention to dedicate is expressly manifested by a deed or an explicit oral or written declaration of the owner, or some other explicit manifestation of his purpose to devote the land to public use. The dedication may be implied by some act or course of conduct on the part of the owner from which a reasonable inference of his intent may be drawn or which is inconsistent with any other theory than he intended a dedication."

But the definition provided in the case of *Security Investment Co. v. Oregon City*² will suffice for the first principle.

Principle 1

"Dedication is an appropriation of land by the owner for a public use."³

It has been repeatedly held in Oregon: "The dedication of land to the public for use as a street or highway may be either by statutory dedication or by common-law dedication."⁴

Principle 2

"Dedications are of two general kinds: statutory and common law."⁵

A statutory dedication is made when a person complies fully with the provisions of the statutes, showing that certain formalities, when observed, operate as a dedication of lands to the public.⁶ For example, a statutory dedication is made by recording a subdivision plat, approved in accordance with ORS Chapter 92, that contains a dedication of streets and alleys to the public.

Acceptance of the subdivision plat by the proper officials commits the responsible government body to maintain and repair the streets and alleys actually constructed and in use. With statutory dedications, acceptance is usually formal.⁷

Common law dedications, sometimes referred to as *parol dedications*, arise by operation of law from the acts of the owners. A common law dedication may exist by express grant and need not be evidenced by any writing, nor by any form of words, oral or written. If the donor's acts are such as to indicate an intention to appropriate the land to the public use, then upon

acceptance by *the public*, the dedication becomes complete.⁸ Common law dedications are in the nature of *estoppel in pais*.⁹

Common law dedications do not require formal acceptance by cities or counties, or by anyone. However, the courts recognize certain acts that constitute acceptance by the public, or by counties and cities. This will be discussed in greater detail elsewhere in this publication. Although a city or county is committed to maintain and repair a public highway established by a statutory dedication, they are *not responsible* for maintaining and repairing a public highway created by common law dedication. This is the only significant difference between the effects of the two kinds of dedication.

In *Huggett et ux v. Moran et ux*,¹⁰ the Supreme Court, citing *Moore v. Fowler*,¹¹ held to the rule that "... *property owners for their own benefit, cannot impose a street or highway upon a municipality against its will and compel it to improve or repair that street or highway.*"¹²

Principle 3

"The law of dedication does not permit property owners to impose land upon the public, or a municipality against their will."¹³

However, if the highway is duly accepted by the county, the duty to establish and maintain the way then arises.¹⁴ An offer of dedication may be implied as accepted by some act or acts showing that the municipality has assumed control and possession of the common law highways.¹⁵

The Public; Public Use

The definitions of the terms "the public" and "public use," supplied by the courts, are important to the law of dedication.

The public, by *Black's* definition, is: "Everybody and accordingly the body of people at large; the community at large, without reference to the geographical limits of any corporation...; the people."¹⁶ But since we know that *most* people will never use, desire to use, or need to use any specific public highway, we need to qualify the above definition as follows: "*It does not mean all the people, nor most of the people, nor many of the people, but so many of them as contra-distinguishes them from a few.*" However, the term "the public" cannot exclude any member of our society: "*For so long as any citizens are excluded from a common use, it is not a public road.*"¹⁷

The definition supplied in *McQuaid v. Portland & V. Ry Co.*¹⁸ will serve the purpose, *i.e.*:

Principle 4

"The public is the general mass of the people without regard to any legal organization."¹⁹

Therefore, a road dedicated to the public *must* remain open to travel by the general mass of the people. No person may be excluded from common use of the public way. Although cities are guardians of the streets and alleys, cities *are not the public*. Cities have no constitutional authority to restrict the use of streets and alleys to the exclusion of any member of society, to the benefit of a limited segment of the community. *The streets are in the public, not the municipality.*

The term "public use" is used in constitutional provisions restricting the exercise of the right to take private property in virtue of eminent domain. To clarify that the taking could not possibly benefit every member of our society, the courts apply a more practical definition to the term:

Principle 5

"Public use" means a use concerning the whole community as distinguished from particular individuals.²⁰

Elliott's *Roads and Streets*²¹ provides this simple test to determine if a road is public, or whether the public's rights are being recognized.

Principle 6

"If it is free and common to all citizens, then, no matter whether it is or is not a great length, or whether it leads to or from city, village, or hamlet, or whether it is much or little used, it is a public road."

It should be evident at this point of the discussion that private individuals *are not the public*. Consequently, where an unconstructed, dedicated street is fenced by an abutting owner and is used for gardening, a private individual may not remove and destroy the fence and garden on *behalf of or in the name of the public*.²² The Oregon Revised Statutes make provision for taking possession and opening such highways by authorized governmental agencies. *Never tell a taxpayer that since the land is a dedicated street, anyone who so desires may trespass to force access.* This will be easier to understand as you progress deeper into this publication.

It is also noteworthy that the public does not, in the opinion of the courts, possess the capacity to take fee title to the land in a dedicated public way.²³

Common Law Dedications

As recent as 1973, the Oregon Supreme Court has adhered to principle that streets may be established by common law dedication, and may be either express or implied.²⁴ This is reiteration of the principle as laid down in the 1873 case of *Carter v. City of Portland*,²⁵ one of the first Oregon cases evaluating such dedications. This case is typical of the problems with many of the earliest townsite plats. The principles set out in this case have survived the test of time and of a long line of high court decisions.

This was a suit by the City of Portland to quiet title to blocks 280 and 281 of "Coffin's Addition to the City of Portland." The city claimed it was owner in fee simple of the blocks dedicated as parks. T. J. Carter and O. P. Mason claimed an interest in the land adverse to the city, *i.e.* that the dedication was by former proprietors and was, subsequently, void.

Note: Although this case involved a park rather than streets, the court pointed out that: "*The same doctrine applies to public squares and parks, and the dedication may be established in the same manner as in the case of streets and alleys.*"²⁶ This is true as to the act of dedication and as to the requirement that the land not be used for purposes other than for which it was dedicated. But as to the underlying fee, it is different in parks, squares and commons from that of public ways. This will be discussed in the section on "Effect of Common Law and Statutory Dedications."

These facts were established in testimony:

1. During 1850, Daniel H. Lownsdale,²⁷ Stephen Coffin and W. W. Chapman were in possession of and claimed to own the "Portland Land Claim."
2. In that year, but before the passage of the Sept. 27, 1850, Donation Act, they ordered a survey of blocks, lots, streets, parks and other public grounds of the townsite of Portland. Portions of the area were designated on the ground by stakes and monuments.
3. At that time they had a (Mr.) Short make a map of the area. The map designated the area in question as public parks, but the lots were unnumbered.
4. Before the surveying and mapping of the Portland Land Claim, the land of the claim was being settled and used for trade and commerce.
5. In 1850, a John Brady, at the request of the proprietors, made two copies of the map drawn by Short. On both copies blocks 280 and 281 were numbered and designated as public parks.
6. Coffin took possession of one of the copies by Brady and began selling land by reference to the

“Brady map.” Keep in mind that the “selling” of this land before the Donation Law was legal. But as you discovered in the subsection on “Territorial Land Laws,” prior to the Donation Law a settler held only the mere possession of land, and could not charge the land with any easement or encumbrance. So, prior to Sept. 27, 1850, nothing Coffin did amounted to a common law dedication. The testimony to this point merely sets the scene for the common law dedication that will occur with the very first sale that Coffin makes subsequent to passage of the Donation Law.

7. The City of Portland was incorporated by a Jan. 23, 1851, act of the territorial government.
8. In April 1852, the city council adopted the Brady map as the official “plat” of the city.

Comment: The resolution read: “*Resolved*, the city council of Portland adopt the plat of said city drawn by John Brady as the city plat; and that the mayor appoint a select committee, with instructions to call upon the proprietors of the City of Portland, and obtain from them a bond or deed of all the public streets in said city, and a deed to trust for all land donated to benevolent societies, public schools, public squares, etc.” This resolution was not in the court report, but was noted in *Church v. City of Portland*.²⁸ The “select committee” was unsuccessful in its assigned task.

Also unmentioned in the court testimony was the fact that on Dec. 9, 1852, a plat of D. H. Lownsdale’s claim was delivered to the clerk and recorder of Washington County for record. It included a “map or plat” of the original town of Portland, which map or plat was conceded to have been the “Brady map.” It was recorded Dec. 16, 1852 (*Church v. City of Portland*).²⁹

9. Coffin was fully aware of the April 1852 resolution and the “official plat.”
10. Coffin adopted, exhibited and used the Brady map from the time it was made, and after passage of the Donation Law, after adoption of the map as the “official plat” of the city, and up to Dec. 4, 1867, he made sales with reference to the Brady map.

Not mentioned in the testimony was that Coffin, Lownsdale and Chapman obtained a patent to the Portland Land Claim, in severalty from the United States under the Donation Law.³⁰

11. Subsequent to the Donation Law and before Dec. 4, 1867, Coffin sold lots on the blocks lying opposite to and facing the public parks. At the same time, he informed the purchasers that the lots purchased were situated adjacent to public parks.

12. On Dec. 4, 1867, he made and recorded a plat designated as “Coffin’s Addition to the City of Portland.” He attached to it a written explanation donating all streets, as shown by the plat. He stated that “on this plat the parcels lying between East Park Street and West Park Street,” designated on previous maps or plats as public parks, were numbered respectively as blocks 276, 277, 278, 279, 280, 281 and 282.

It was the court’s job to ascertain whether the acts of Coffin were properly regarded as evincing a clear intention to dedicate and whether the dedication, when made, became irrevocable. It made it clear that it was not concerned with who had the fee to the land.

The court recited a principle set down in *United States v. Chicago*,³¹ which will be used for Principle 7:

Principle 7

The mere surveying of lots, streets, parks and squares, and the making of a map or plat of the area will not amount to a common law dedication without a sale.³²

But Coffin sold land by reference to the Brady map that showed lots, blocks, alleys, streets and public parks. Citing a number of legal sources and precedents,³³ the court held:

*“If one owning land, or having equitable interest therein subsequently acquires the title thereto, and lays thereon a town, and makes and exhibits a plan with certain ground marked as streets, alleys, public squares or parks, and sells lots with clear reference to a plan or map, the purchasers of the lots acquire, as appurtenant thereto, every easement, privilege and advantage which the plan or map represents as part of the town.”*³⁴

The court, in *Carter*, recognized the well established rule: “... that a sale of lots or blocks with reference to a given map or plat describing lots and blocks as bounded by streets, will amount to an immediate and irrevocable dedication of the streets.”³⁵ As emphasized earlier in this case, the court recognized that the rules applicable to the dedication of streets and alleys apply equally to parks, public squares and commons.³⁶

The court reasoned that when individuals are induced to purchase lots or lands bordering a public square or common, in expectation that they shall remain as such, the sellers cannot redesignate the lands designated as parks and commons and appropriate them to any other use. Even in 1873, the chief concern of the court is *protection of the consumer’s rights*, i.e. the grantee, rather than the grantor, city or even the public. This proved to be the crux of all opinions regarding common law dedications. It is consistent with the unwritten policy of giving the grantee benefit of the doubt.

In the *Carter* case, the court held that Coffin made an irrevocable dedication by *parol* of the land designated on the maps and plats as public parks. Forty-five years later, in *Menstell et al v. Johnson et al*,³⁷ the court, adhering to precedent established in *Carter*, held:

Principle 8

"Where the owner of land lays out and establishes a town and makes and exhibits a map or plan thereof, and sells and conveys lots by reference to such plan or map, the streets and public places designated on that document are irrevocably dedicated to the public."³⁸

The sale and conveyance of lots and blocks according to such plan or map implies a covenant that the streets and other places designated on the plan or map shall never be appropriated by the owner to a use inconsistent with that represented by the map.³⁹ To reclaim the land would be in violation of good faith to the public and grantees who purchased the lots with the expectation of using the streets and enjoying the public parks, squares and commons. In the case of the sale of a lot with reference to a plat, there is the added feature that an easement indicated by the plat constitutes a part of the consideration passing to the purchaser.⁴⁰

Dedicated "parks" were the subject of litigation in yet another case, *Steel v. City of Portland*.⁴¹ In this situation, Ben Holladay conveyed to G. W. Weidler, as trustee, 241.94 acres of land in Portland. Sometime prior to December 1870, Holladay had the entire tract surveyed, platted, and laid out in lots, blocks and streets under the name of "Holladay Addition." He had Weidler execute the plat which was recorded Dec. 17, 1870.

In February 1871, Holladay had Weidler make and execute a second plat of the same area. This was intended to take the place of the former plat. It was recorded in February. The land in dispute was labeled "park" on both plats. But soon after recording the second map, Holladay had the park enclosed with a substantial fence. He had the park area maintained until 1883, when the city took possession of the property.

After making and recording the plats, Holladay *sold and had Weidler convey lots and blocks with reference to the plat*. Some of the lots fronted and abutted the streets surrounding the park.⁴²

Holladay apparently had second thoughts about the dedication of the land. Before he died, he let it be known that he might be able to retake the park. After all, it was evident the city did not appreciate his gift. Otherwise, they would have improved and beautified the park. Moreover, he sensed there was some irregularity in the dedication that would make

it invalid. Consequently, after his death, James Steel, administrator of the Holladay estate, brought suit to recover the park to make it part of the estate.

Steel contended the making and filing of the plat, with the land in dispute marked as a "park," followed by a conveyance of lots with reference to the plat, did not constitute a legal dedication of the park. He also charged that if, by chance, the dedication was legal, the public lost its rights by the statute of limitations before Ben Holladay died.

The court cited the conditions for a common law dedication laid down in *Carter v. City of Portland*,⁴³ *Meier v. Portland Cable Ry. Co.*,⁴⁴ and *Hogue v. City of Albina*.⁴⁵ Briefly, the conditions were: (1) owning land, (2) having it surveyed, (3) executing a plan, map or plat, (4) showing the area divided into lots, blocks, streets, alleys, parks (or other public areas), and (5) selling the lots and blocks with reference to the plan map or plat. But, as you will soon discover, other cases only require the selling of lots and blocks with reference to a plat containing the dedications to create an irrevocable dedication.

This case involved parks, not highways, but the court reiterated the principle explained in *Carter v. City of Portland*.⁴⁶

Principle 9

"There is no difference in the principles applicable to the dedication of public streets and public squares or parks."⁴⁷

The court continued: "In each case the dedication is to be considered with reference to the use to which the property may be applied or the purpose for which the dedication is made. This may be ascertained by the designation which the owner gives to land upon the map or plat, whether it is designated as a street, square or park."⁴⁸

Justice J. Bean clarified this by adding: "*The word 'park,' written upon a block of land represented upon a map or plan of a city or town, is as significant of a dedication, and the use to which the land is intended to be applied, as the word 'street,' written on such plan.*" The popular and natural meaning of the term (park) when so used (on the plat) is: *a piece of ground set apart for the enjoyment, comfort, and recreation of the inhabitants of the city or town in which it is located*. This is so whether the word is used alone or with some word, as "central park." (Clarification supplied.)⁴⁹

In this case, the court ruled that Holladay made an irrevocable dedication of the park. It did not rule on the matter of whether the statute of limitations would run against the public, but it held that Holladay never held the property by adverse possession.

In cases where an irrevocable dedication was made as the result of selling lots and blocks *“with reference to the plat,”* it is not essential to *show* that the plat was actually recorded. That principle was contained in *Kuck v. Wakefield*,⁵⁰ i.e.

Principle 10

“It is not necessary to show that the map upon which such streets, alleys, public parks, etc., were displayed, was recorded, but simply that it was used and referred to by the proprietor in selling the lots.”⁵¹

The courts claim that common law dedications are not because of the record itself, but for the reason of conveyances being made *with reference to the plat*.⁵²

Number of Sales Required

In *McCoy v. Thompson, the plaintiff*,⁵³ Alice McCoy, filed suit to enjoin E. A. Thompson from enclosing a 40-foot strip of land that Mrs. McCoy claimed was a street. Thompson claimed it was his land and was not a street.

The controversy arose out of the platting of “Hadley’s Addition to Mill City.” The land in question was shown on the subdivision plat as a “street 40 ft. wide.” The writing accompanying the plat did not contain any words of grant, and although another street was mentioned, it did not make reference to other streets shown on the plat. Justice Harris observed: “The writing is not in the form usually adopted, and it may well be the subject of debate as to whether it constitutes a perfect statutory dedication.” He was of the opinion there was not a statutory dedication of the streets, reciting this principle:

Principle 11

“An unsuccessful attempt to dedicate land under a statute, if followed by sales with reference to the plat, may result in a completed common law dedication.”⁵⁴

Did H. J. Hadley, the proprietor of the land, make sales with reference to his plat? Testimony and evidence showed that on April 18, 1889, he conveyed “Lot number 1 (One) in block number 1 (One) in Hadley’s Addition to Mill City” to Angus Scott Shaw. Title to that lot, through mesne conveyances, was in the plaintiff. On April 29, 1904, Hadley conveyed 106 acres of land to James M. Wadsworth. The 106 acres included the 40-foot strip of land in dispute. Subsequently, Wadsworth conveyed a smaller parcel of land, including the land in dispute, to the defendant.

The court ruled: “The offer by Hadley to dedicate the street became a completed and irrevocable dedication when he delivered the deed to Shaw. The conveyance

was made with express reference to the recorded plat for lot number one was described as being lot No. 1 (One) ‘as appears on the recorded plat of said Hadley’s Addition to Mill City in the recorder’s office at Salem in said Marion County.’ ”⁵⁵

Principle 12

“Ordinarily the sale of a single lot completes the dedication and more especially does the sale of a single lot effect a dedication of a street upon which the lot abuts.”⁵⁶

“Consequently, the sale of lot No. I (One) to Shaw operated as an acceptance of the offer of Hadley to dedicate the adjacent land as a street and rendered the dedication irrevocable.”⁵⁷

The deed to Wadsworth from Hadley expressly excepted Hadley’s Addition to Mill City. Therefore, Wadsworth acquired no greater rights than Hadley owned, and Thompson, who purchased from Wadsworth, does not own more than his immediate grantor. The dedication, which was made by the sale of Lot No. 1, to Shaw, not only bound Hadley, it also bound his successors in interest.⁵⁸

Intent

*“The intent of the dedicator is the foundation and life of all dedications and the intent must be clearly manifested.”*⁵⁹

The intention of the owner as evidenced by his acts and the acts which he permits and encourages is controlling on the issue of dedication.⁶⁰

Principle 13

“In order to constitute a dedication by parol there must be some act proved which would clearly indicate an intention of the owner to dedicate the land to public use.”⁶¹ Such an intent, however, is not a secret open, but is that which is expressed in the visible conduct and open acts of the owner.⁶² The owner’s acts and declarations should be deliberate, unequivocal and decisive and manifest a positive and unmistakable intention to permanently abandon his property to the specific public use.⁶³

If the owner’s acts and declarations are equivocal and do not clearly and plainly indicate such intention they are insufficient to establish a dedication.⁶⁴

In *Security Investment Co. v. Oregon City*,⁶⁵ Justice Robert S. Bean explained why a dedication is not to be presumed.

“The burden of proof rests with the defendant (in this case, Oregon City) to show a dedication.... The security and certainty of the title to real estate are among the most important objects of the laws of any civilized community. Around it the law has thrown

certain solemnities and formalities so that the fact may be known and read by all men. *What a man once had he is not presumed to have parted with, but the fact must be shown beyond conjecture.* And, although in the case of streets and public grounds in towns, from the nature of the case, a dedication may be shown by acts resting on parol, *they must be of such a public and deliberate character as makes them generally known and not of doubtful intention.*"⁶⁶

So, it must be proven "beyond conjecture" that a landowner's intent was to dedicate part of his or her land to the public. To the layman this probably gives the impression that such proof demands an explicit oral expression of intent in the company of a witness, or an explicit explanation in writing. But neither level of proof is essential for the landowner's intent to be made known. The intention of the owner to devote the land to public use may be shown by deed, words, acts, conduct or any other class of satisfactory evidence.⁶⁷

Principle 14

"No particular form is necessary to the validity of a common law dedication, and it need not be in writing, as the statute of frauds has no application to the doctrine of dedication. All that is necessary to the validity of a common law dedication is the assent and intent of the owner to appropriate it to public use, and any act or acts clearly manifesting an intent to dedicate is sufficient."⁶⁸

In *Parrott v. Stewart*⁶⁹ the court said: "In determining as to a dedication, the intention of the owner is the controlling factor; *but the law does not seek for his undisclosed intention.* It acts upon his intention as evidenced by his acts and *the circumstances which he permits or encourages.*"⁷⁰

Consequently, the courts are not concerned with what a landowner had *in mind* when that person sold lots with reference to a map or plat showing parks or streets. The buyers could not read the proprietor's mind. They could only base their decision on what the proprietor said, presented in writing, displayed on the map or plat, or implied by certain acts or conduct. In *Carter v. City of Portland*,⁷¹ the proprietor sold lots by reference to a map that showed certain blocks as "public parks." He informed buyers that the lots were fronting on "public parks." He was aware the City of Portland adopted his map and delineated the blocks, in dispute, as "public parks." Yet he never contested the map. He replatted part of the area and confirmed, in writing, the fact that the blocks had been previously labeled as "public parks." His actions, plat, oral remarks and writings showed an intent to represent the land as a place for the use, rec-

reation, comfort, and enjoyment of the grantees of *his townsite, and the inhabitants of the city.*

In *Steel v. City of Portland*,⁷² Ben Holladay labeled the disputed land on his plat as "park." The word "park" was sufficient to show an intent to represent the land, to potential buyers, as "a place for the resort of the public for recreation and enjoyment." His first sale of land by reference to that plat *irrevocably dedicated the "park" to the public.*

In *McCoy v. Thompson*,⁷³ the subdivider did not make a clear written dedication of the disputed land. The court ruled the subdivider had not made a statutory dedication. However, he delineated the land in dispute, on his plat, with two parallel lines that scaled 40 feet apart. He showed the notation "Street 40 ft. wide." That notation showed an intent to dedicate the land, as a public way, because the court held:

Principle 15

The word "street" has only one meaning. When the owner of land makes a plat and refers to a strip of land as "street," he does not mean a "private way," but the term signifies a public way in all that "public way" implies.⁷⁴

To the court, the 40-foot strip of land appeared on the plat in such a manner as to be inconsistent with any other theory than to show an intent to dedicate the land as a public way.

The words "road" and "alley," when shown on a plat, are sufficient to convince a court that the proprietor at least intended to represent the land as a public way.⁷⁵ If prefixed by the word private, or the context requires the meaning to be "private," a court will usually rule that the proprietor intended to confine the land to a private use.

Other terms are held to imply a private use, *e.g. reserved for wharves, garden square, hotel site, strand, and the like.* In *Harris v. St. Helens*,⁷⁶ the court explained:

"The Century Dictionary defines 'reserved' thus: 'kept for another or future use; retained; kept back.' This is the primary and general acceptance of that word. The phrase 'Reserved for wharves,' written in the part of the plat marked 'strand,' signifies that the owner retained or kept back the tract represented by that space for wharves. Wharves may be private property, and hence the words 'Reserved for wharves' do not manifest an intention on the part of the owner to part with the title to the strand or devote it to a public use."

"Reserved" is merely a signal that land, or an interest in land, is being held back or retained for some future use. To interpret its meaning the court must consider it in context with the whole statement, and often in

context with the whole plat. Depending on how it is used, it can mean “reserved for public use” or “reserved for private use.”

The statement “*reserved for streets and alleys or reserved for park,*” without any other explanation, means reserved for the use by the public, because “streets,” “alleys” and “park” connotes a public use. “Reserved for a public landing” implies a landing for use by all the public. However, the statement, “This park reserved from public use, and title kept in proprietors,” clearly shows an intent to retain the land for private use. The court, in this case, said: “Stronger language could not have been used to show that they did not intend to devote the land to public use.”⁷⁷

*Lang v. Portland*⁷⁸ serves as an excellent example of how the courts evaluate the wording of plats and other writings, and the acts and conduct of the proprietor, to determine intent. As you review this case, try to identify the facts that show intent.

In this case, the appellants filed suit to prevent the City of Portland from using block number 132 as a site for a public auditorium.⁷⁹ They claimed the original owners of the town site, Stephen Coffin, Daniel H. Lownsdale and W. W. Chapman, dedicated block 132 for a public market. They also charged that the diversion of the use of this land from that of a public market would cause special injury to them.

The proprietor’s map⁸⁰ did not show any references to block 132 being reserved for any purpose. In March 1852, the three proprietors decided to secure patents under the Donation Act of 1850 in order to secure legal title to their land. They partitioned their claim and entered into an escrow agreement stipulating that each of them should acquire title to the part set off to him. After securing title, they would issue new title to those who had purchased land from them, i.e. to protect their grantees’ rights. The agreement was also to protect each of them from “the complications arising from the claims of their several (sic) wives to portions of such donation claims.”

Coffin and Chapman each took the necessary steps to secure title to the lands set off to him. Lownsdale, however, undertook to acquire title to the entire tract. After taking the required steps in that direction on Dec. 9, 1852, he filed a map and memorandum for recording, which read (in part):

“Plat of D. H. Lownsdale’s Claim, including map or plat of the original town of Portland (on what is known as the Portland Claim of land, which claim is held under record, in the territorial record books in the name of Daniel H. Lownsdale; recorded on the 23rd day of September, A. D. 1848, at Oregon City by Theophilus McGruder, recorder, and proven up before the surveyor general of Oregon at Oregon City on the 28th of Oc-

tober, 1852, by said claimant Daniel H. Lownsdale) together with enlargements. Now, know ye that so much of said claim as is covered with said original town plat or map and the enlargements are included within the marginal lines and the northern claim line and the river Willamette, inclusive, may and by my permission be subject to the bylaws of a corporation for said town or city under charter from the legislature of the Oregon Territory so far as making regulations for the public streets as laid down by their particular width (but not further), also any public square for ornamental purposes (but not otherwise), also any public parks. The several public streets are particularly marked with their names and widths. Those running eastward and westward commence at low tide water mark at the margin of the Willamette River (except south of Market Street), and are all 60 feet in width, and no more. The wharves and wharfing privileges are all specially reserved to the holder of the claims, and never (except by deed) subject to any but the laws of the Territory of Oregon or ordinances of town or city corporation as other town (private) property. The marginal above referred to are marked (A, B, C, D, E, G, H, I, J, K, on or not far from center of each line). N.B. All rights as claim holder and not particularly described above or quitclaimed to others to private individuals are specially reserved to me and my heirs forever. Given under my hand and seal this 3rd day of December, A. D. 1852.

“Daniel H. Lownsdale “[L.S.]

“Blocks 54 and 55 appropriated for public square. C. Church appropriated to the Congregational Church No. 23, North half B. Church appropriated to the Baptist Church No. 62, North half F. Seminary appropriated to Female Seminary No. 205. Blocks having other marks are unappropriated, but left subject to the uses as follows: At any time they will be substantially improved for the following purposes: B. 150 Free Masons, Odd Fellows, Sons of Temperance and Lyceum; block 132 and 172 for markets; North half block 134 district school; block 211 for Male Seminary; South half block 208 for Daughters Temperance. The parks of 80 feet in width are already appropriated for public parks.

“Received for record December 9th. Recorded December 16th, A.D. 1852.TM

“W. S. Caidwell

“‘Clerk and Recorder’ “

Sometime after the making of the Brady map, but before 1854, a map of the City of Portland was made by T. O. Travailliot, the captain of a French ship visiting Portland. In 1866, a map was made by a Mr. Burrage, which, by order of the city council, was filed with the county clerk. The Travailliot map was not in evidence, but testimony was supplied that block 132 was tinted with a “reddish color.”⁸²

A patent, under the Townsite Act of 1844, was issued by the federal government to the City of Portland on Dec. 4, 1860. On March 8, 1861, a patent was issued to W. W. Chapman for a donation land claim. Both patents included block 132.

In 1852, the city council, by resolution, adopted the Brady map as the official plat of the city. It appointed a committee to secure bonds or deeds of the streets and deed of trust for the lands dedicated by the proprietors for public purposes. But the committee failed to secure the bonds, deeds and deed of trust.

Prior to June 16, 1864, an action in ejectment⁸³ was begun by W. W. Chapman against T.J. Carter for the possession of block 132. Chapman's action was successful. In 1865, the City of Portland began an action in ejectment against Chapman, who filed an answer setting up title, possession, and right of possession in himself. While Chapman's action was pending, the city council settled the controversy by paying Chapman \$1,200 for a warranty deed to block 132. In that action, the city based its right of possession upon the patent issued it under the 1844 Townsite Act.

It was conceded that W. W. Chapman, the patentee of the land in controversy, sold lots and blocks as represented upon the Brady map, but there was no evidence that he ever knew of or used the Lownsdale map.

The property had never been used as a *public* market. For several years, it was used by L. G. Pfunder for his business as a gardener and florist. Under his agreement with the city, he improved and cultivated it with a view to its becoming a public park. Thereafter, with the consent and approval of the city authorities, it served as a site for a Mechanics' Fair Pavilion for about 10 years upon the condition that "they erect thereon buildings of a specified value, to be used exclusively as a market place." That corporation assigned its lease and franchise to "the People's Market Association." It defaulted by not complying with the terms of the lease. The city council sought to repeal the ordinance, and the corporation began a suit to enjoin the city from so doing. The city prevailed and the suit was dismissed. "Since that time the land was used for wood storage and for balloon ascensions."

The important question for the court to answer was: Did the city hold title to the property, by a *dedication* which would have precluded its use for any other purpose than that of a public market, or did it hold block 132 by purchase from W. W. Chapman?

The appellants contended that any acts of dedication had their inception in D. H. Lownsdale's December 1852 filing of his map. They also claimed that Chapman's selling of the property, with reference to Lownsdale's map, made the dedication binding. If a dedication to the public was made, the city could use

the property only as a public market place, regardless of its possession of a warranty deed to block 132. If, on the other hand, a dedication was not made, the city would use the land for an auditorium, assuming it had good title to the land.

What evidence showed Chapman's intent to dedicate block 132 to the public: his sales by reference to the Brady map, or Lownsdale's map? The court said the Brady map was "silent" to any public use of block 132. Moreover, W. W. Chapman said he never saw Lownsdale's map, and he sold lots and blocks by reference to the Short-Brady map. Evidence to the contrary was not produced.

Suppose, for the sake of argument, Chapman was not telling the truth; possibly he had made *one* sale by reference to Lownsdale's map. From the discussion to this point, it is known that one sale with reference to a map will result in an irrevocable dedication of all lands dedicated on the map. It is also known that the map doesn't have to be the proprietor's map. Would Chapman be estopped from denying the dedication? His acts would show an intent to accept all things represented on the map: the spaces, lines, words, distances, declarations and dedications. Was Principle 13 overlooked? Did Chapman's acts and declarations show a *deliberate and unequivocal* intent to dedicate block 132 to the public? Were his acts and declarations *decisive and manifest a positive and unmistakable intention to abandon his property to the specific public use?*

The court ruled:

"There is nothing upon or connected with the Lownsdale map in the nature of a dedication. Block No. 132 is platted thereon in like manner as other blocks, and there is no legend or statement except the one unsigned, which reads as follows:

"'Blocks having other marks are unappropriated but left subject to the uses as follows...block 132 and 172 for markets,' etc.

"There is nothing in this statement inconsistent with private ownership."

Justice Benson, citing *City of Pella v. Scholte*,⁸⁴ explained:

"The phrase 'Garden Square' does not express or necessarily imply a dedication to the public. The implication from the expression is rather the other way. There seems, however, to be nothing conclusive either for or against the dedication in the words used. The same has been the holding as to 'hotel site'⁸⁵ and 'wharf.'⁸⁶

"It will be remembered that the Lownsdale map, referring (among others) to block No. 132, says:

“... unappropriated, but left subject to the use as follows: When they will be substantially improved for the following purposes: . . . Blocks 132 and 172 for markets.”

“Every market in Portland today is private property. The above plat statement, as it impresses us, seems to negate any intention to devote the land to a public use.”

Counsel for the appellant presented the argument that the “escrow agreement,” entered into by Lownsdale, Coffin and Chapman, committed Chapman to the “alleged” Lownsdale map. The court knew of no precedent to support that contention. But even if the argument were valid, nothing on the Lownsdale map showed an intent to dedicate block 132 to the public.

It had already been decided in 1861 that Lownsdale never had title to the area of land that included block 132. For that matter, the city did not acquire title to the land by virtue of the townsite patent. Its title came by way of the warranty deed from W. W. Chapman, free from limitations of its use.

In other cases before the Oregon Supreme Court, it is necessary to analyze the lines, omission of lines, spaces, wording and the omission of certain wording to determine intent. Three such cases are provided in detail. These are not to teach you the law, but to help you *think like the court* when you are faced with the problem of analyzing a map or plat to determine intent for mapping and assessment purposes. Hopefully, your decision will be in harmony with the principles of law provided by the courts.

Note: Use of a way by the public may amount to a dedication when the circumstances of the case indicate the intention of the owner to make a dedication. Such use, however, raises only a rebuttable presumption of an intent to dedicate.⁸⁷ This topic will be discussed in the section, of this publication, on “Prescription, Adverse Possession and License.”

Parrish v. Stephens⁸⁸

This 1853 case is presented for its historical significance as well as for its analysis and interpretation of a plat and testimony. It is the first case in the Oregon Territory dealing with dedication. It sets to rest the length of time the doctrine of dedication has been recognized in this state. The analysis by the court was thorough, and its interpretation of the plat and determination of intent was excellent. However, it overlooked one very important fact. See if you can identify that oversight. You have already been given the first clue. The answer is given in Footnote 97.

This was a suit in equity by the owner of property on “Water-Street” in Portland to enjoin the proprietors and their vendees from erecting buildings on the river bank in front of the plaintiffs premises. At issue was a strip of land between the Willamette River and a front row of blocks nearest the river. The plaintiff, Josiah L. Parrish, claimed the strip was dedicated to the public for a street and levee as a result of sales by reference to the original plat, and as a result of the proprietor’s subsequent conduct and declarations. The defendant, Thomas Stephens, claimed the street did not cover the entire strip, but left a narrow margin of land along the river reserved as private land.

Only a copy of the plat was in evidence. The absence of the original, made by “Brown, the surveyor,” was unaccounted for. Both parties testified that, except for certain subsequent additions, the copy was correct. The document relied upon by the defendants as excluding the strip of land in controversy from the street was pasted to the back of the copy of the plat. It was in tabular form, with columns headed: “To whom sold,” “When sold” and “No. of block.” The court referred to this as the “table of sales.” It contained only one entry: William Warren, Jan. 1, 1848, Lot 4 Block 27. A caption at the top of the table of sales read:

“All lots are 50 by 100 feet. Water Street, in front of blocks No.s 4 and 5, is 30 feet wide; in front of blocks No.s 1 and 8, is 60 feet wide. All other streets are 60 feet wide.”

The platted area was typical of most early townsites and additions. The lots and blocks were rectangular. The blocks were separated by spaces that usually represent streets. Like most of the older townsites bordering rivers, this one had a space for a street between the river meanders and the row of blocks nearest the river. The following is the court’s consideration of the plat lines, spaces, lettering, wording or lack of wording:

The plat copy shows “blocks and lots, designated by numbers, with blank spaces between them, which coalesced with each other at their intersections, and with the surrounding blank spaces at the sides of the plat. Near the first row of blocks the Willamette River is drawn at such a distance as to leave a narrow strip between, which owing to the meanders of the river, is of variable width, being in some places narrower, and in others wider, than the blank spaces between the rows of blocks.... The sizes of the lots and blocks, and the width of these several spaces, are not marked; nor is there any evidence on the face of the plat that the spaces were intended for streets,⁸⁹ except that they form a connected network of open space among and in front of the blocks; making all the lots acces-

sible from each other and from the river, which is here an arm of the sea, within the ebb and flow of the tide, and a resort for shipping.

"Upon the face of the plat there is the same evidence that the strip is a street, as that those spaces are streets which separate the rows of blocks. The cross streets terminate at its inner edge, and do not traverse it and terminate at the river: *and if it be not a street, then the continuity of the street is broken, and half the lots fronting on this strip are inaccessible without passing over private property* (emphasis supplied). Indeed, it is admitted to be a street, and its eastern boundary alone is disputed. But the plat carries on its face, no evidence of any other boundary than the river. As stated before, neither the width of the strip, nor the width of a street to be taken out of it, is stated; nor is any line drawn upon it between the front lots and the water line of the river; nor is any other intimation given that the entire strip is not as much a street as the entire strip between any two rows of blocks. It is not unreasonably wide for the quay⁹⁰ of a commercial town, but on the whole, rather narrow for that purpose, being, in much of its extent, narrower, and but for a slight curve in the river would be nowhere wider than the ordinary streets of the town. And yet, from its location, it must necessarily be much more used than any other, for the carting of goods, and for the ordinary uses of city streets; and besides, it must be the receptacle of all goods imported and exported by the vessels resorting there. It is quite as important to the town proprietors as to the individual lot holders and other citizens, that loading and unloading of vessels, which confers upon the town its principal importance, should not be embarrassed by the caprice and avarice of private persons who might own the land adjacent to the water; and they appear by the face of the plat to have adopted, as reasonable men, the usual and proper means of guarding against this evil. *That this street was intended to enjoin the river, to form the connecting link between all highways of the town and the great highway of water, upon which the town is dependent, is therefore, both reasonable in itself, and apparent from the face of the plat.*"

By the year 1853, the U.S. Supreme Court had already ruled on an identical (even regarding the street name) situation, *i.e.* in *Barclay v. Howell*.⁹¹ The court said: "There is nothing on the plat which shows any limit to the width of Waterstreet, short of the river to the south. If a line had been drawn around its southern limit, there would have been great force in the argument that the ground between such line and the water was reserved by the proprietors."

The court, in *Parrish*, cited the case of *McLoughlin v. Stephens*⁹² to show the conditions necessary for a dedication to fail:

"There was a line, as well as a natural boundary, namely, a precipitous bluff, along the brink of which the outer line of the street was drawn upon the face of the plat. The street was bounded on the plat by *two parallel straight lines, and in the open space between them was written: 'width, 66 feet; and the strip between this street, thus marked, and the river, from the top of the bluff to the water, was from 150 to 200 feet . . .* It was, 'therefore, evident, from the plat and topography of the place that the street was confined to level ground and the top of the bluff; and there being no other evidence of dedication, but rather the contrary, the Ohio court held that the strip was private property.

"In Louisiana, where this subject assumed importance, in the 1800's, from the widening of these quays by alluvial deposits; and where it had been thoroughly studied and discussed, such plats are considered sufficient evidence of dedication; and Chancellor Kent cites approvingly the opinion of Chief Justice Martin (of Louisiana), that when the plan of a city, fronting on a navigable river or the sea, has an open space between the front row of houses, or street, and the water, in public use, it becomes part of the port, without any other designation or evidence of dedication.⁹³ This is precisely such a case, such a plat, such a strip, and such a public use of it. And if the case stood upon this alone, there would be very little danger of error in pronouncing in favor of a dedication."⁹⁴

The defendants failed to produce evidence that proved when the plat was prepared, and by whom it and the document were made. The plat copy showed more than double the number of blocks originally laid off. It was written in the same hand, with the same ink, and evidently at the same time. The court concluded the copy must have been prepared after the additions were made to the town. It contained the name of Stark written in vacant blocks, as if to indicate a reservation. The court was convinced the plat was made after Stark became a joint proprietor. The first sales were made in 1846. The first entry in the table of sales was 1848. It was, therefore, likely that the plat was prepared approximately three years after the town was originally platted. The court said: "If it had been made before that time, the first entry would have been made of a sale prior to 1848."

The court was reluctant to base a decision on a copy of the plat, especially one that was not claimed to be a true copy of the original. It asked:

"If this memorandum (table of sales) was not an afterthought, why was it hid away where no one would look for it, or be likely to find it by accident, instead of being written on the plat in the usual way, where an interpolation would be detected? And if it was likewise attached to the original plat, why has not that fact---*the very fact on which the case might turn*--been proved by the production of that plat, or by oral evidence after showing its loss? We get our first knowledge of this memorandum from the witness Hanner, who says that in 1849 or 1850, Coffin showed him a map by which he discovered that the streets were 60 feet wide, leaving a fraction along the river, part of which he proposed to buy, but Coffin declined selling, for the reason that he wished to leave it vacant for public use."

Pettigrove, in his testimony, said the lots and streets were the size represented on the copy, except that: "Front-Street, as he called it, was 30 or 35 feet in front of blocks 4 and 5, as will be seen by the original plat." But failure to produce the original plat left the court with this conclusion: "The absence of that original not being explained, its contents *cannot be insinuated* in this illegitimate, unsatisfactory and suspicious mode." It would base the decision on testimony and the acts, declarations and conduct of the proprietors.

The other numerous witnesses, several of whom mentioned the original plat, appeared to be ignorant of the memorandum. Hannon, Coffin and Pettigrove, on the side of the defendant, were the only witnesses who had knowledge of its existence. The court reasoned:

"If it had been generally known, and lots had been purchased and the town built up with that knowledge, the claims of the defendant could have been easily proved. The failure to prove it is equivalent to disproof, when taken in connection with the recent date at which the memorandum apparently was made, and the strange place it is found concealed,⁹⁵ and the seemingly prevalent ignorance of its existence. We think its binding effect (that this strip was reserved for private use) is not established by the plat and memorandum. And even if it were of binding obligation, the width of the strip has not been proved; and the inference of Hanner from a map shown by Coffin, that a strip would remain after taking out the street, is not sufficient without actual measurement. And furthermore, if such excess were found, it does not necessarily follow that it would be private property. The table of sales appears to be the statement of a descriptive fact--that the street, or strip, is of certain widths at certain detached places--rather than a term of limitation appropriating so much for a street. *The language is that Water-Street is so wide at those places.* This is a

statement of an existing fact, and may be true or false without changing the fact itself. Indeed, it is but a partial description, for it states the width in front of only one-half the original blocks. If it be construed as a dedication of so much ground, then it dedicates no ground in front of original blocks 2, 3, 6 and 7, and the five new blocks below, in front of which the strip is continuously marked. The ground dedicated would then be in three, small, detached parcels, and not a long, continuous Water-Street. The descriptive memorandum is to be understood in the same respect to all blocks, lots and streets. If any other street were wider or narrower than described, surely the excess could not be added to, or the deficiency taken from the adjacent lots; and if lots were found greater than described, surely the proprietors could not reclaim the excess.

"The streets and lots are marked, as well as their dimensions given. The boundaries of Water-Street, as marked, are the river on one side and the front lots on the other. If the quantity exceeds the description, the excess may as well be taken from one side as from the other--as well as next to the river. But the rule in all such cases is, that the land within the actual boundaries, and no more, passes by the deed or plat, or other conveyance, be it more or less than the quantity assumed. The grantor is neither allowed to reclaim an excess, nor required to make up a deficiency. This being a conveyance of not so wide a strip, but of a *particular strip*, between marked boundaries, described as of certain widths at certain places, the memorandum (table of sales) containing that description must give way to, and cannot override, those boundaries if the two are in conflict. In no view that we can take of this document, therefore, can it affect the *prima facie* dedication appearing on the face of the plat." (Note: A "prima facie" dedication would suffice until contradicted and overcome by other evidence; *prima facie* meaning: at first sight; on the first appearance; a fact presumed to be true unless disproved by some valid evidence to the contrary.)

Pettigrove, in his testimony, did not say the water-front strip *was not set apart for public use*, but merely that *he did not remember having said so*. Six witnesses testified that on numerous occasions he stated the strip of land was reserved for public use. The court thought little of Pettigrove's testimony. Justice Olney's opinion was:

"His (Pettigrove's) memory, saying nothing of his veracity cannot, therefore, be trusted." In his opinion, it was enough that Lovejoy sweated positively to "the act of setting the land off for public use, in which act and intent both proprietor's concurred;

none of which was denied by Pettigrove, and that this original act of dedication, thus satisfactorily established, was, for a series of years, repeatedly confirmed by the declarations and conduct of Pettigrove; contemporaneously with corresponding use of the ground by the public, in full confidence of their right, with his knowledge and without objections, as a mass of testimony shows. This provides the unhesitating belief in the mind of the court that the strip (of land) was thrown out to the public, precisely as Lovejoy states."

The court, at this point, was of the opinion that even if there was no original dedication, the land was public by adverse use from 1845 to 1850. It also said that abandonment by the proprietors estopped them from reasserting their ownership. It rendered the plat and table of sales of little consequence:

*"For he who induces the public to believe his land a gift, or knowingly permits them to use and treat it as their own, until they have so accustomed themselves, and adjusted their property and accommodated their business to it, they cannot, without detriment, be dispossessed, confers a right which he can no more resume without wrong, than he can rightfully seize what was acquired otherwise than by his gift. 'Turpe est fidem fallere,' 'it is base to disappoint the expectations we have authorized,' is the keynote of the common and civil law of which equity is compounded. It is a fundamental principle of natural justice, pervading all systems of jurisprudence and common to all countries where man is civilized (sic)."*⁹⁶

This court held that: "Water-Street was bounded on the east by the Willamette River, from block 8 on the south, including the street on the south side of block 8, to the claim of John H. Couch on the north."⁹⁷

Oregon City v. Oregon & California Railroad Co.⁹⁸

This was a suit by Oregon City against the Oregon and California Railroad Company to determine ownership of the land now used for the Southern Pacific Railroad right of way, and the promenade at the top of the bluff, both parcels of land being in Oregon City.

In 1849, Dr. John McLoughlin laid out an addition to the town of Oregon City. In December 1850, he made and acknowledged a map of the entire town, which was recorded in January 1851. McLoughlin had only the right of possession to the Oregon City claim, yet he sold and conveyed numerous lots and blocks by reference to the map of Oregon City. By the Sept. 27, 1850, Donation Act, the title to all the property sold or granted by McLoughlin before March 4, 1849, was confirmed to the purchasers or donors and their as-

signs. The Surveyor General was required to issue proper certificates to each purchaser or donee, upon which patents were to issue as in other cases. The remainder of the Oregon City claim was taken from McLoughlin and given to the Territory of Oregon for university purposes.⁹⁹ As directed by the Donation Act, the Surveyor General issued certificates to the holders of title from McLoughlin. In due time, patents were issued to them in which the land was described according to the map previously made and filed by McLoughlin.

After March 4, 1849, and prior to receiving notice of the passage of the Donation Act, McLoughlin sold a number of additional lots. In 1851, the title to those properties was confirmed by the Legislature of the Territory of Oregon.¹⁰⁰ McLoughlin died in 1857, leaving as his legatees his son, David, his daughter, Eloise Harvey, and her husband, Daniel Harvey. In 1859, David conveyed his interest in his father's estate to Daniel Harvey.

In October 1862, the state legislature formally accepted the government's grant of the Oregon City claim for university purposes. At the same time, it conveyed title to Daniel and Eloise Harvey for \$1,000.¹⁰¹ After becoming the owners of the property, the Harveys did not make a new map or plat of Oregon City, but sold and conveyed by deed lots and blocks by reference to the map made and filed by McLoughlin in 1851. From the date of the filing of that map to the date of this case (January 1904), the map was used and considered as the *only* plat of the city.¹⁰²

About 600 feet east of and substantially parallel with the river is a perpendicular bluff about 100 feet high. It divides the town as platted by McLoughlin into two portions--the lower town, or that part lying between the foot of the bluff and the river, and the upper town lying on the top of and back from the bluff. The map shows a strip of land of varying width between the most westerly tier of blocks in the upper town and the edge of the bluff. In this space on the map appear the words, "All the open or vacant spaces in front of these blocks are donated for a public promenade." In the dedication by McLoughlin, which accompanied and was made a part of the map, it is stated that "the space between the edge of the bluff" and the tier of blocks referred to "is donated for a promenade for the inhabitants of Oregon City."

Between the foot of the bluff and the east line of the first tier of blocks west is a space varying in width from a few inches to perhaps 100 feet or more. This strip of land is about 2,500 to 3,000 feet long and is "not marked on the map in any way." The space is substantially parallel with and one block distant from Main Street. It was generally referred to by the public and designated on the city records as "Bluff Street."

All the lots on the east side of the tier of blocks west of it front or abut upon it, and all the cross streets and alleys open into it. It is not enclosed at either end. On the north it opens into Center Street, and on the south into the space marked "The Mill Reserve." It had never been enclosed, nor had it been improved, but it had been used for crossing at numerous places on the line of cross streets. The upper town extends along the bluff five blocks farther south than the lower town. In the dedication by McLoughlin all the space below the edge of the bluff, in front of these five blocks, "is reserved as private property." A similar reservation is made of "all the spaces in front of the blocks on Water Street not covered by the width of the street (60 feet)."

The Oregon Central Railway was organized in 1867 to build a railroad from Portland to the southern boundary of the state. In March 1868, upon the company's request, the council of Oregon City granted to it a right of way from its tract on any of the streets of the city except Main Street. In 1870, it transferred and conveyed all rights of way, franchises and property belonging to it to the defendant Oregon and California Railway Co. (O. & C. R.R. Co.). In the same year the O. & C. R.R. Co. applied to the city council for leave to use a portion of "Bluff Street" for depot purposes. Permission was granted on condition it pave and keep open as a public thoroughfare 25 feet of block 25, belonging to it, in lieu of that portion of "Bluff Street" occupied by the depot. The railroad track was built along the space called "Bluff Street," and its depot was located thereon. It has been occupied and used as a railroad and depot to this date (March 4, 1985).

In 1876, Leahy and his wife, the heirs in law of the Harveys, asserted some claim to the land occupied by the railroad company, and asked damages for material taken by the company from the adjacent ground. The defendant, as a compromise and relinquishment of such claim, paid them \$500 for a conveyance of all their right, title, and interest in such land and a release for damages. The description in the deed was so indefinite, however, as to render uncertain the property intended to be conveyed. In 1891, the railroad company procured another deed from the Leahys conveying to it by definite description all their title to the entire space of ground between the west line of the most westerly tier of lots on the bluff and the east line of the most easterly tier of lots below the bluff. This included the space donated for a public promenade and the space referred to as "Bluff Street."

A question subsequently arose among the plaintiff, Oregon City, and the defendant as to the rights of the respective parties to use the property included in the Leahy deed to the defendant. The suit commenced in

January 1899. Oregon City contended the property was dedicated to the public by McLoughlin, and that the dedication was ratified, approved and confirmed by the United States, the State of Oregon and the Harveys. The position of the railroad company was: (1) McLoughlin never made or intended to make a dedication of the property, (2) he did not have title; therefore, if he did intend to make a dedication, the attempt was without effect, (3) the Harveys got title to the property from the State, not from McLoughlin, and (4) the state never recognized or intended to recognize any dedication to the public of the land in controversy.

The Clackamas County Court ruled in favor of Oregon City. The railroad company appealed to the Supreme Court. Mr. Justice Bean delivered the following opinion of the court:

"1. Although McLoughlin never acquired title to the land in question, his map was recognized by the U.S. government and the State of Oregon when confirming title to his grantees. It was also recognized by the Harveys after they acquired title and conveyed lots and blocks with reference to McLoughlin's map. The court held: *'It is well settled that, where the owner of land exhibits a map or plat of a town thereon, showing lots, blocks, streets and other public ways, and sells and makes deeds of conveyance by reference thereto, he thereby dedicates to the public the streets and public places thereon.'*"¹⁰³ This is Principle 8 of this publication.

"The answer, then, required interpretation of the plat to discover McLoughlin's intent.

"2. As to the land on top of the bluff, "The case is clear. In the donation as acknowledged by McLoughlin and recorded, it is stated that it 'is donated for a promenade for the inhabitants of Oregon City,' and on the map as made and filed by him and subsequently adopted by the Harveys that is 'donated for a public promenade.' " But as to the land below the bluff, "the case is not clear. In our opinion, however, it is very apparent that it was designed and intended to be dedicated to the public as a street or public way." *At this point the court proceeds to analyze the cartographic elements of McLoughlin's map.* "It extends almost through the town north and south, dividing it (the land in controversy) into two parts, and is parallel with, and one tier of blocks distant from, Main Street. It is not enclosed by lines at either end, nor where it is intersected by cross-streets or alleys. In short, it appears upon the map in such a manner *as to be entirely inconsistent with any other theory than it was intended as a street or public way*, notwithstanding its easterly line follows the irregular course of the bluff, making a street of varying width, and that

there appears on the map no word or mark that can be construed as naming the tract a street. The cross streets and alleys all open into it, and four lots on each block, from 20 to 29, inclusive, front up on it in the same manner as lots in other portions of the town front upon their streets. Two of the inside lots of each of these blocks are otherwise inaccessible from the public street. *Unless it was intended as a street or way, there would be no connection between the upper and lower town, except over private property or by a roundabout course.* The fact it is not named as a street is by no means conclusive evidence of a lack of intention to donate it as such.¹⁰⁴ Indeed, the presumption is that, as it was not expressly reserved for private purposes, it was intended for public use."

The court then cited the following rule that we will identify as Principle 16.

Principle 16

"If the owner of the soil throws open a passage, and neither marks, by any visible distinction, that he means to preserve all his rights over it, by positive prohibition, he shall be presumed to have dedicated it to the public. It is a safe rule to resolve doubts in such cases against the donor, and, within reasonable limits, to construe the dedication so as to benefit the public, rather than the donor. Naturally, the presumption is that one who records a plat, and marks upon it spaces that appear to form no part of any platted lots, dedicates the land represented by the spaces thus excluded to public use."¹⁰⁵

The court continued:

"It must be presumed, therefore, that it was the intention of McLoughlin and the Harveys to donate the strip of land, in controversy, to the public. The presumption is confirmed by the fact that the space below the bluff immediately south of and adjoining that land in controversy and the space between Water Street and the river are expressly reserved as private property, thus indicating an intention to *donate all other vacant spaces shown on the map to the public.*"

The court also ruled: "The defendant did not acquire title by adverse possession. Its entry was by permission and acquiescence of the city. Having so entered and occupied the land, it cannot claim that its occupancy has been adverse to the city, or that it is now entitled to exclude the public from the use of the property."¹⁰⁶

The court ruled in favor of the city, *i.e.* that the lands in dispute were *parol* dedications, confining the defendants' use of the street to that portion occupied by

its "main tract, depot building, roadbed, water tank, switches, and side tracts."

Security Investment Co. v. Oregon City¹⁰⁷

This example of plat interpretation by the Supreme Court is a suit by the Security Investment Company of Oregon City against Oregon City to quiet title to certain so-called street ends, or extensions, of Fourth, Fifth, Sixth, Eighth, Ninth and Tenth Streets in Oregon City. The land in dispute is between Water Street and the Willamette River as shown on the map acknowledged by Dr. John McLoughlin on December 2, 1850. The plaintiff claimed that, by virtue of mesne conveyances¹⁰⁸ from the heirs, legatees, and devisees of Dr. John McLoughlin and by certain sheriffs' tax deeds, it was the owner in fee simple of the above strips of land.

The city did not deny that title was vested in the plaintiff *if its predecessors had any interest in such land to convey*. The city claimed the land in controversy was dedicated as streets for use of the public.

The investment company contended that, even if it was assumed there had been a dedication of the land in controversy, the city was estopped to assert that the land was public streets. The company claimed this was so by reason of permanent and valuable improvements made on the land, by the company and its predecessors in title, with acquiescence of the city.

The plaintiff also asserted that it was not the intention of the dedicator that these strips of land should extend beyond the west line of Water Street.

Aside from the question of estoppel, the *intent of the dedicator* was the vital issue in this case. The genesis of McLoughlin's map was the same, basically, as outlined in *Oregon City v. Ore. & Cal. R. Co.*¹⁰⁹ The court added this background information:

"In 1846, a few years prior to the time Dr. McLoughlin laid out and established the townsite, Oregon City had a population of 500 and there were about seventy houses. The doctor had completed his sawmill near the falls. Roads and highways were unknown and the river, a navigable stream, was the sole avenue for transportation.

"Dr. McLoughlin was a shrewd business man with a prophetic vision and it is not surprising that, in dedicating property for public use, certain reservations hereinafter discussed, relative to the land along the river front, should have been made."¹¹⁰

"On the lower plane (of the town) next to the river is the business district. This plane is so narrow that

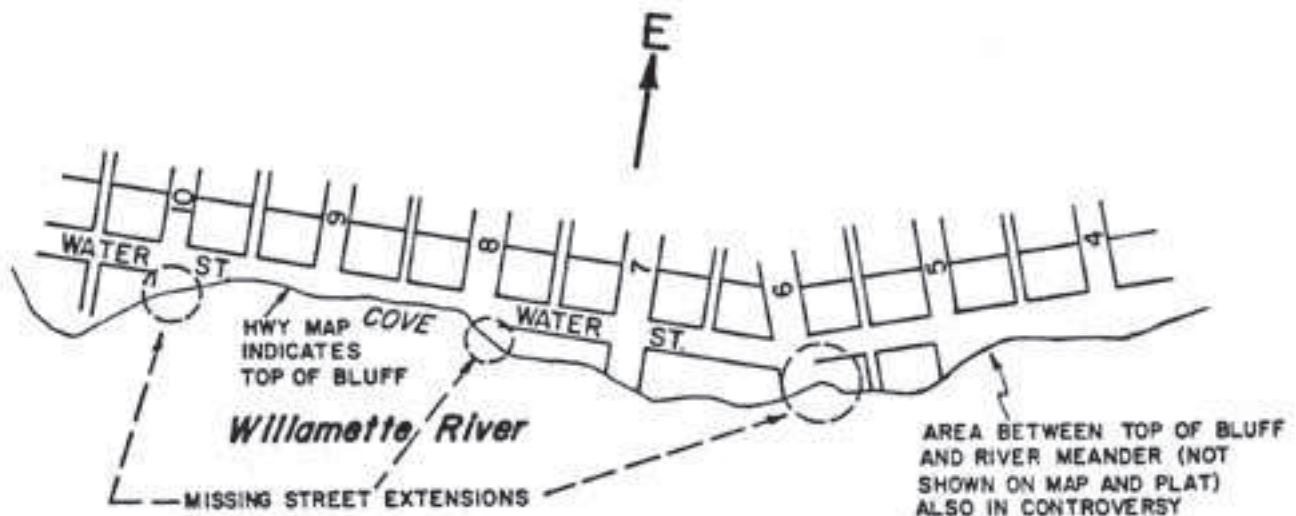
it affords space for only two streets, Water Street and Main Street. (**Note:** The court forgot about Bluff Street.) Intersecting these two streets at right angles, about 200 feet apart, are numerically designated streets, 1 to 15 inclusive. The top of the east bank of the river is about forty feet above ordinary low water mark, and is approximately the same level as the above named two streets in 'lower town.' The bank of the river extending to the water line is of solid rock formation, precipitous and of uneven contour.

"Water Street, which runs along the top of this high bank parallel with the river, is designated on the plat as being 60 feet in width. At some points on Water Street the irregular line of the bank encroaches upon it so as to necessitate the construction of fills in order to maintain vehicular traffic. The river itself encroaches upon Water Street at only one point—between 8th and 9th streets. Here the river forms a cove extending into Water Street.¹¹¹ A dock was maintained there for many years. In more recent times the dock was abandoned and a bridge was built across this cove on Water Street. For the entire length of Water Street, excepting the cove between 8th and 9th streets, there is land between the west line of Water Street and the river. A part of the irregular strip of land was platted by Dr. John McLoughlin as fractional lots (see figure 4-1)... the remainder thereof reserved as private property. On some of these fractional lots, buildings have been erected and maintained for many years.

"At this juncture, reference to the following rough sketch of the McLoughlin plat may be helpful. (See figure 4-1.)

"Having in mind the above plat, it is well to consider the map prepared by the State Highway Department in February, 1936, and corrected as of February, 1937, concerning the *locus in quo*. This map prepared by skilled engineers with instruments of precision, shows that the distance between the west line of Water Street and the river opposite 10th Street is from 89 to 100 feet; opposite 8th Street, 42 to 60.8 feet; and opposite 6th Street, from 31.4 to 65 feet. It is evident from these measurements that the west line of the Applegate survey made in 1844 marks the edge of the high bank and not the river or property line of the 'Oregon City Claim.' It is quite reasonable to assume that Applegate, in making his survey, ran his lines for Water Street by omitting the rough land between the bank and the water's edge as being utterly unfit for a street. Dr. McLoughlin acknowledged his dedication six years after this survey was made. The map before showed the encroachment on Water Street which he desired to be 60 feet in width. It is probable that he contemplated that sufficient land on the lower level would be taken to give the street full width. If this west line of the Applegate survey represents the property claim at the edge of the river, then the intention to have Water Street 60 feet in width, as declared in the legend, would be rendered futile as the dedicator did not own the bed of the river.

"Referring to the McLoughlin plat, it is observed that there are no parallel lines opposite 4th, 8th



FACSIMILE OF MCLOUGHLIN MAP (except for notations)

Figure 4-1

and 9th streets, indicating any intention to dedicate the areas in question as streets, although there was sufficient land west of Water Street upon which such lines could have been extended had the dedicator desired."¹¹²

"It is observed from the plat that on 7th Street, where the bridge across the river is located and has been for many years, two parallel lines are extended beyond Water Street indicating a clear intention to dedicate such area as a street. This street is not in controversy, but reference thereto is *pertinent relative to the question of intent of the dedicator*. It may also be noted that further provision for access to the river at almost water grade was made at 15th Street--the plat showing two parallel lines extending beyond Water Street (not shown in figure 4-1). The map shows that fractional lots have been platted opposite 5th, 6th, and 10th streets. It is observed that only single lines have been extended beyond Water Street, although there was land west of such street upon which two parallel lines could have been extended--thus clearly indicating streets--had the dedicator so desired."

The court had to determine if the single lines indicated boundaries of fractional lots or the extension of streets. Engineers, called as expert witnesses, differed in their opinions about the meaning of the single lines opposite those indicating the so-called street ends.

Henry J. Richardson, chief surveyor for the City of Portland for more than 30 years, testified that it took "two sides to make a street," and that "the single lines did not indicate an intent to extend the streets involved herein to the river." This witness answered "yes" in response to the following question: "So the only one here that shows a street across Water Street is Seventh, in ordinary practice?" D. Y. Meldrum, an experienced engineer, said the single lines "didn't indicate anything in regard to a street." Other engineers called to testify said the streets extended to the river. The court said:

"Of course, all this testimony of the engineers was at best merely advisory. *The opinions expressed did not take into consideration the reservations of the dedicator nor the general contour of the land west of Water Street*. After all, it remained for the court to ascertain the intention of Dr. McLoughlin, after consideration of *all the facts and circumstances* of the case. As was well stated by the trial judge in his able memorandum opinion: 'The record shows that the pivotal question to be determined is the intention of the dedicator with respect to the street ends at Water Street. *This common law dedication to the use of the public rests upon the intention and clear assent of the owner of the soil.*' Therefore, Dr. John McLoughlin's conduct in the creation of this plat

must be surveyed in the light of the then existing conditions, and not only must the acts and documents created by the dedicator be considered, but likewise *the general character of the land and the condition of the country at the time of dedication.*"

At this point, the court stated a policy that we will include as Principle 17:

Principle 17

"Plats by which dedications are made are to be interpreted by the court as any other writing would be, and are to be construed as a whole in order that the intention of the dedicator may be ascertained, and every part of the instrument given effect."¹¹³

The court held it was not the intention of Dr. McLoughlin to extend the streets in question to the river:

"It would have been unreasonable to do so in view of the precipitous bank and the general contour of the land. The narrow strip of rough and rocky land along the river had no value for street purposes. It had a definite value for moorage, wharfage, and manufacturing purposes which would have been greatly lessened if its continuity had been broken by theoretical streets never to be constructed. Dr. McLoughlin made ample provision for access to the river over 7th and 15th streets.

"On August 7, 1865, Daniel Harvey and his wife, by warranty deed, conveyed to the People's Transportation Company, a corporation, all land west of Water Street from the 'Mill Reserve'--located at the south end of Main Street--to Sixth Street. This conveyance included property in controversy opposite 4th and 5th streets. In view of the fact that the validity of the McLoughlin plat was established by their adoption and ratification, this conveyance is strong proof of their interpretation of the plat. The Harveys, in all probability, knew what Dr. McLoughlin intended by his dedication."

Note: This last statement of the court is, at best, an assumption. The Harveys could have made the conveyance on the advice of another, or they could have based the conveyance on their own interpretation, with no real knowledge of McLoughlin's intent.

The record showed that in 1895 T. L. Charman, a predecessor in title of the plaintiff, fenced all the property west of the west line of Water Street from the south line of 4th Street to the north line of 10th Street. The fence was maintained for many years. This, of course, proved nothing. Remember that in the discussion of *Steel v. City of Portland*,¹¹⁴ Ben Holladay enclosed a dedicated park with a fence and had the land main-

tained for 13 years, but the court did not consider such an act as adverse possession of the land.

The sixth point in the court decision was:

“Any doubt about the intention of Dr. McLoughlin we think is removed by the express reservation as shown on the plat of ‘all the space in front of the blocks on Water Street not covered by the width of the street (60 feet) is reserved as private property.’ . . . It is our opinion that Dr. McLoughlin intended to reserve as private property all unplatted land between Water Street and the river, except 7th and 15th streets which were plainly designated as streets.

“In *Portland Ry., L. & P. Co. v. Oregon City*,¹¹⁵ the court had under consideration the following reservation: ‘All the space below the edge of the bluff *along the front* of blocks 73, 74, 75, 76 and 77 is reserved as private property.’ (Italics are the court’s.) It was contended that the dedicator intended streets to run through the ‘Mill Reserve’ but the court held to the contrary. In *Oregon City v. Oregon & Cal. R. Co.*,¹¹⁶ the court again had under consideration the McLoughlin plat. The case involved a certain strip of land at the foot of the bluff, about 300 feet east of Water Street, which the city asserted was a street, and also land on top of the bluff which had been reserved as a ‘promenade for the inhabitants of Oregon City.’ In determining the intention of the dedicator, it was, of course, necessary to consider the plat in its entirety and its various reservations. The court, speaking through Mr. Justice Robert S. Bean, in reference to the questions under consideration, said:

“‘It must be presumed, therefore, that it was the intention of McLoughlin and the Harveys to donate the strip of land in controversy to the public. This presumption is confirmed by the fact that the space below the bluff immediately south of and adjoining that in controversy (Mill Reserve) and the *space between Water Street and the river are expressly reserved as private property*, thus indicating an intention to donate all other vacant spaces shown on the map to the public.’ (Italics are the court’s.)

“It is true that the reservation herein involved was not in controversy, but the construction which the court gave it is, nevertheless, highly persuasive.

“*Dedication is an appropriation of land by the owner for a public use. Dedication is not presumed.*¹¹⁷ As stated in the early case of *Lownsdale v. City of Portland*,¹¹⁸ and quoted in the *Hogue*¹¹⁹ case: ‘The burden of proof rests on the defendant to show a dedication. It must be clear and satisfactory.... The security and certainty of the title to real estate are among the most important objects of the laws of any civilized community. Around it the law has thrown certain

solemnities and formalities so that the fact may be known and read by all men. What a man once had he is not presumed to have parted with, but the fact must be shown beyond conjecture. And although in the case of streets and public grounds in towns, from the nature of the case a dedication may be shown by acts resting on parol, they must be of such a public and *deliberate* character as makes them generally known and not of doubtful intention.’ (Emphasis supplied.)

“To constitute a valid common law dedication, there must be an intention on the part of the owner to devote his property to the public, and his intention must be clearly and unequivocally manifested”¹²⁰ (holding to Principle 13 of this publication).

The court concluded: “Applying the well established legal principle to the facts of this case, we cannot say that the intention of Dr. John McLoughlin and the Harveys to dedicate the land in controversy as streets has been clearly manifested, nor that it has been established by the greater weight of evidence.” The court was also of the opinion that it was unnecessary to consider the question of equitable estoppel.

Burden of Proof to Establish Intent to Dedicate

This principle of the law of dedication was announced in *Miller v. Roy W. Heinrich & Co.*¹²¹ and was reaffirmed in the 1974 case of *Mid-County Cemetery District v. Thomason*.¹²²

Principle 18

To constitute a valid dedication, burden of proof is upon party asserting dedication to establish an intent, clearly and unequivocally manifested, on part of owner to devote property to a public use.

In the *Miller* case, the plaintiff filed suit for a declaratory judgment seeking to establish that a strip of land had become a public street by implied dedication.

The property involved in this case was owned by Florence T. Munger and other members of her family. In 1909, they had the property surveyed and platted for selling lots. The proposed plat was *not approved* by the city or the county because of conflicts with another subdivision.

The plat included a street called Broadway which was 60 feet wide and about 400 feet long. In September 1915, Florence conveyed a portion of the real property included in the plat to Fred Warner. The property was described by metes and bounds and included the west one-half of what would have been Broadway

Street. In April 1945, a portion of the above property, including the west 30 feet of the street, was conveyed to William Heinrich, using a metes and bounds description. In July 1964, Heinrich conveyed to the defendant, Roy W. Heinrich & Co., Inc., by a metes and bounds description, what would have been lots 17 and 45 on the unrecorded plat and including also the west one-half of Broadway Street. (However, the deed did not specifically mention the plat or street.)

In June 1946, the plaintiff (Miller), by a metes and bounds description, acquired title to lot 16 according to the “unrecorded” plat. Lot 16 adjoined Broadway Street on the east. The court records did not disclose the grantor of this parcel, but made it clear that it was not Florence T. Munger.

Miller claimed that the conveyance on Aug. 31, 1967, of the east 30 feet of the strip to the defendant (Heinrich) was a nullity. He claimed the legal effect of the prior conveyance of lot 16 was to convey to the plaintiff not only the property but also title to the 30-foot strip, which would be to the middle of the street. In support of this position, Miller cited the general rule that, where land has been dedicated to use as a public street, the fee in the street remains in the dedicator subject to the easement (see Principle 24). When the dedicator sells the land abutting the street, the abutting owners own to the center of the street subject to the public easement. “Upon a vacation of the street, the title reverts to the abutting owners free of the easement.”¹²³ (This is not technically a correct statement. The fact is, fee title never leaves the grantor or his grantees when a way is dedicated; therefore, how can it “revert” upon vacation? It is the easement to the public that reverts.)

Mr. Justice Howell delivered the opinion of the court:

“1. In order to invoke the above rule the plaintiff is obliged to prove an implied or common law dedication of the street because the plat was not recorded nor was it approved by the city or the county.

“2. To constitute a valid dedication the burden of proof is upon the party asserting the dedication to establish an intent, clearly and unequivocally manifested, on the part of the owner to devote the property to public use.”¹²⁴

“3. In cases where the party asserting the dedication relies upon an implied dedication, the sale and conveyance of lots with reference to the plat represent a dedicatory intention as to the streets indicated in the plat.”¹²⁵

“The record shows only three sales by Florence Tongue Munger. The first sale in 1915 to Fred Warner used only a metes and bounds description of the property (see figure 4-2, page 2-19). A second sale

occurred in 1945 when Mrs. Munger sold a portion of the property to General Foods Corporation. The deed for that sale described the property by metes and bounds and also referred to the property as being known as various lots in ‘Tongue’s Unrecorded Addition to the City of Hillsboro.’ The third sale in 1967 conveyed the 30-foot strip to defendant Heinrich by metes and bounds.”

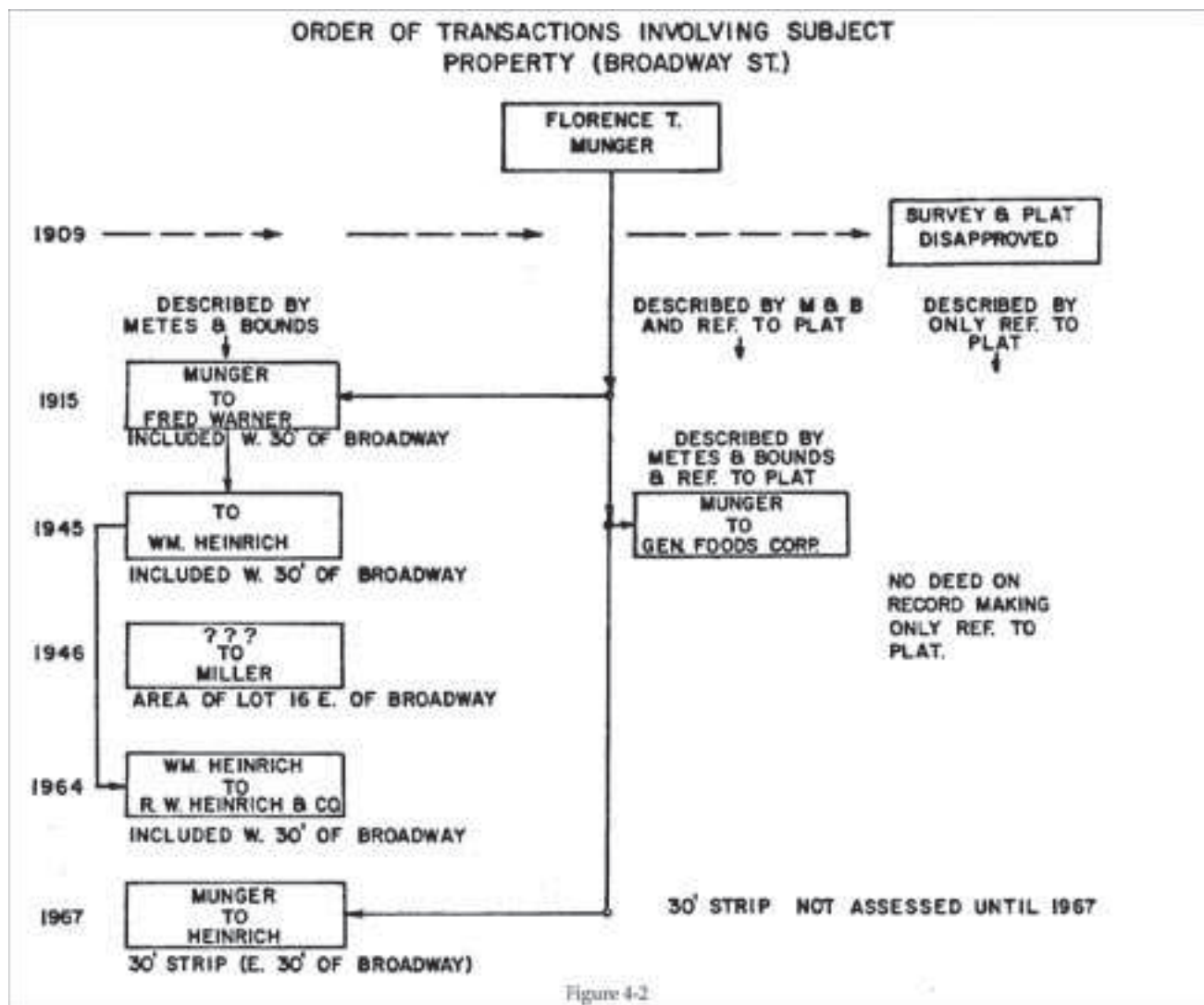
(This was the east 30 feet of the area platted as Broadway.)

“There is no evidence that Fred Warner, who purchased a portion of the property in 1915, or General Foods, who purchased another portion in 1945, saw or relied upon the map.

“The evidence also disclosed that a map in the possession of the title company referred to the property as ‘Tongue’s Unrecorded Addition’; that copies of the plat or maps found their way into the county tax department and the county surveyor’s office and that on at least one of the maps Broadway Street was designated as 312th Street. The plaintiff saw some of these maps when she purchased the property in 1946. The strip was not assessed by the tax department, for some unknown reason, until 1967, following a reappraisal program by the county.

“4. The record does not show the necessary clear and unequivocal intent to devote the property to public use. The plat was not approved by public authorities. The three sales from Florence Tongue Munger described the property by metes and bounds and there was no evidence that the purchasers saw or relied on the plat. The record *does not show the conveyance from Florence Tongue Munger to plaintiff’s predecessor* so it is impossible to determine whether such conveyance used a metes and bounds description or described the property by reference to the lots. After the city rejected the plat, Mrs. Munger made no further effort to record or file the plat and ‘just sold (the land) off piecemeal.’ (Note: This is a statement of fact, not a condition necessary to effect a common law dedication.)

“Moreover, there was no evidence that the strip of land was ever improved as a street. On the contrary, the evidence disclosed that the strip was in grass and weeds and that later a garden was planted. (Note: Keep in mind, however, that it is not necessary to either a common law or statutory dedication that a street be opened or improved at any particular time.) The fact that the strip was not assessed by the county is not persuasive. The failure to assess was not explained, and it could have been that the tax department overlooked placing the strip on the assessment rolls.”



The court held the strip of land did not become a public street by implied dedication.

The reference to “Tongue’s Unrecorded Addition” following the metes and bounds description in the deeds is an *informative term* that supplies addition information about the location of the land described by the metes and bounds description. (Note: The reference is used like adjectives that help distinguish similar objects from one another, i.e. a “red” shirt and a “white” shirt is more explicit than “two shirts.”) Curtis Brown, in his *Boundary Control & Legal Principles*, cites the rule: “If the informative term is in conflict with the term that it modifies, it yields.”¹²⁶ Consequently, if the total width of lot 16, including the

east one-half of Broadway, is 30 feet wider than the parcel described by metes and bounds, then the presumption that it was the grantor’s intent to include Broadway must yield to the metes and bounds description. The intent would be to inform the grantee that the parcel was the size of the lot excluding

Broadway. But regarding the *location* of the lot-size parcel, the plat will control.

In this case, the metes and bounds descriptions sufficed to locate the land without reference to the plat. It was, therefore, essential to prove beyond a doubt that the grantees “saw or relied upon the map.” The fact the plat was referred to in the deed as an informative term was not in itself proof of an intent to dedicate.

Acceptance

Principle 19

The well recognized rule is that neither a formal acceptance by a county nor a formal acceptance by a city are essential to complete an irrevocable dedication to the public.¹²⁷ The purchase of a lot, or lots, constitutes an acceptance of the grant made by the owner to the public. Moreover, certain acts by a city or a county constitute an implied acceptance.¹²⁸

The frequently used argument against the concept of common law dedication is: "To be valid, every dedication must be formally accepted by a city or county." It is true that "acceptance" is required. However, as Principle 18 says, it does not have to be formal, nor does it have to be by a city or county.

Sheldon Parks says, in his treatise on "The Law of Dedication in Oregon":¹²⁹ "There is considerable conflict among authorities¹³⁰ regarding whether a sale of a lot, or of lots, with reference to a map or plat will, without more (sales), establish a complete and irrevocable dedication in favor of the public;.. that the purchaser accepts on behalf of the public." Regardless, with only one exception,¹³¹ the Oregon Supreme Court has laid down the rule by dictum: "*The purchase of lots with reference to the plat constitutes an acceptance of the grant made by the owner to the public.*"¹³²

Justice C. J. Thayer provided this explanation in *Meier v. Portland C. Ry. Co.*:¹³³

"It would be unreasonable and unjust to allow a town proprietor to revoke the dedication of any street indicated on the plat of a town because the corporate authorities of the town had not specially accepted it as a street.

"The purchasers of lots, in such cases, do not understand, when they make the purchase, that the only benefit they receive from the streets will be a mere right of way to their lots. They are assured that the streets will remain open for public use, and, as the town builds up, will be improved; which will add to its importance, and to the value of their property. Many of the courts, in discussing this subject, have made too great an effort to discriminate between such purchasers and the general public. *The former are not a distinct class from the latter. They belong to it--are as much a part of the public as those who use the streets for the purpose of travel.* If a dozen different persons were to buy lots under the circumstances before alluded to, and impliedly stipulate with the town proprietor that the streets shown on the plats of the town site should perpetually remain open to public use, they would, so far as I can see, represent the public in the affair as much as a like number of wayfarers would--who travel upon such streets and have equal authority to accept a dedication of them for the public. The acceptance is not supposed to be made by the entire public. It is done by comparatively few persons, who represent it; and direct agreement, made by those who are personally interested in the matter, that the streets shall remain open to public use, ought to constitute as much an acceptance of them by the public as the using of them by other members of the community would."

In *Oregon City v. Or. & Cal. R. Co.*,¹³⁴ the court supplied this viewpoint:

"It may be argued that neither the dedication of the promenade on the bluff, nor the strip of land below it had been accepted by the city prior to the execution of the deeds to the defendant from the Leahys, because the former has never been improved nor the latter opened to wagon and carriage travel lengthwise. But *no formal acceptance of the dedication was necessary.* 'It would be unreasonable and unjust' says Mr. Chief Justice Thayer, 'to allow a town proprietor to revoke the dedication of any street indicated upon the plat of the town for the reason that the corporate authorities of the town had not specially accepted it as a street nor the public actually entered upon and used it as such.' "¹³⁵

In *McCoy v. Thompson*¹³⁶ the court said:

"Ordinarily the sale of a single lot completes the dedication, and more especially does the sale of a single lot effect a dedication of a street upon which a lot abuts; and consequently the sale of lot number 1 (One) to Shaw operates as an acceptance of the offer of Hadly to dedicate the adjacent land as a street and rendered the dedication irrevocable."¹³⁷

*Carter v. Portland*¹³⁸ resulted in this ruling:

"A formal acceptance is *not necessary*. The acts of inhabitants in the purchase of lots, the improvement of streets, etc., and their use, conclude the owner and the corporation may insist upon every right which any of its inhabitants may have acquired by virtue of the original dedication."¹³⁹ The purchase of lots and improvement of streets, with reference to the Brady map or plat, were acts of acceptance of the streets and other public places."¹⁴⁰

In the 1980 case of *Douglas Co. v. Umpqua Valley Grange, Inc.*,¹⁴¹ the Oregon Court of Appeals said:

"Dedication to the public is impliedly accepted when lots are sold with reference to a plat which shows the dedication" (or shows an intent to dedicate).

Acts of Acceptance by Cities or Counties

It is probable that most cities and counties have formally or impliedly accepted certain public highways created by common law dedication.

First, many roads, streets and alleys *presumed* to be created in accordance with the statutes would, on close examination of recorded subdivision plats, be created by parol or common law dedication. They would fail as statutory dedications because many approved and recorded plats do not actually meet the strict requirements of Chapter 92 of the Oregon Revised Statutes.

Part of the problem is that Chapter 92 is amended so often it is an almost impossible task to stay abreast of the law. Consequently, a plat that might conform to the 1983 laws, for example, would be approved and recorded after the 1985 amendments became law. In other cases, certain statutory formalities are overlooked that would cause a court of law to rule out a statutory dedication, but hold the roads, streets and alleys were public by common law dedication. However, the city or county would be estopped from denying their formal approval contained on the plat.

Second, the health, welfare and safety of its citizens may demand that a city or county formally accept a public highway created by a common law dedication.

Third, an *implied*, informal acceptance *could* be manifested when a city or county assumes dominion, or exercises authority over a highway created by a common law dedication. Examples of such *acts in pais* are as follows:

- a. An ordinance adopting an official map of a city showing a particular street.¹⁴²
- b. Land was ruled as an accepted dedicated street where a portion of it was used as a playground, for turning vehicles, for locating water mains and for placement of sewer lines.¹⁴³
- c. "Acceptance of the dedication of a street or road may be manifested by recognition thereof, on an official map of the county, prepared under the authority or direction of its proper officials."¹⁴⁴
- d. "The acts of a city in grading streets, maintaining crosswalks, installing culverts, placing water mains in streets and alleys constitute an 'acceptance' thereof."¹⁴⁵
- e. "Where a city, in addition to its approval of a long and continuous use of dedicated streets by the public as highways, extended its sewer and lighting systems over such streets, its acts constituted an 'acceptance' of the dedication."¹⁴⁶
- f. "The acts of appropriating money and labor upon the making and repair of streets is an act of acceptance and dedication."¹⁴⁷
- g. "...a resolution of a municipal board changing the grade of such streets and a map relating thereto were competent evidence to show acceptance by the city."¹⁴⁸
- h. "The acceptance of a dedication may be evidenced by acts of municipal officers, such as exercising authority over property to improve or regulate the property."¹⁴⁹

Note: Keep in mind that neither cities nor counties are authorized to spend the public's money on pri-

vate ways. Consequently, the acts we are describing constitute recognition of the ways as being public.

- i. An acceptance could be made "by proceeding to assess for improvements and issuance of bonds."¹⁵⁰
- j. Formal actions by city or county authorities,¹⁵¹ such as passage of ordinances and resolutions¹⁵² constitute acceptance.
- k. Where a county has used a road (dedicated by common law) mileage to qualify for benefits provided by the legislature.¹⁵³
1. "Open and notorious acts based on a claim of right."¹⁵⁴
- m. "By taking possession."¹⁵⁵
- n. "Making repairs and improvements."¹⁵⁶
- o. "Maintenance by the county would constitute an acceptance of the highway as a county road."¹⁵⁷ (But see ORS 368.031.)
- p. "Implied acceptance arises where public authorities have done acts recognizing the existence of the highway and treating it as one of the public ways of the locality. Where: (1) control of the way is assumed by authorities representing the public corporation, (2) contract by proper officers for improvement of a street,¹⁵⁸ (3) improving or repairing a street, (4) digging a public well,¹⁵⁹ (5) erecting lights or guideposts, (6) assigning a road to the surveyor for supervision, or the like."¹⁶⁰

Other acts, such as installing speed limit signs, stop signs or caution signs; removing snow, cutting roadside brush, painting pedestrian lines, etc., could be considered as acts of acceptance estopping a city or county from denying responsibility over a way. But use of a way for police, fire and similar response would doubtfully be considered acts of acceptance.

Principle 20

An implied acceptance can be manifested when a city or county assumes dominion or exercises authority over a highway created by a common law dedication.

Common Law Dedication Not a Grant

ORS 98.140 provides: "No covenant shall be implied in any conveyance of real estate, whether it contains special covenants or not, except as provided by ORS 93.850 to 93.870." This law was cited by a proprietor of a town plat to defeat a claim of common law dedication. But it is well established in Oregon cases that this law does not apply to public ways, *i.e.* "A dedication is not a grant; it is a right created in favor of the public, and is in the nature of an estoppel in pais."

This was the decision in *Carter v. Portland*¹⁶¹ and in all other Oregon cases considering this issue.¹⁶² The courts are of the opinion, “There need be no grantee *in esse* to take the fee; nor is it essential that the legal title should pass from the owner.”¹⁶³ This will be discussed in greater detail on the section of this publication on “Effect of Dedication” and “Extinguishment of Public Ways.”

Recording Not a Requirement of a Common Law Dedication

Principle 21

“The dedication by *parol*, or common law, is well recognized in this state. For such a dedication to be effected, it is not necessary to show that the map upon which such streets, alleys, public parks, etc. were displayed, was recorded, but simply that it was used and referred to by the proprietor in selling lots.”

This was the principle given in *Kuck v. Wakefield*.¹⁶⁴ Chief Justice Eakin explained:

“The dedication was not by mason of the record, but by reason of the conveyance made by reference to the map. ... The failure of Bigelow to comply with the law in recording his map was not the fault of the plaintiff, and cannot now operate to work such a hardship upon him as to depreciate the value of his property in the face of the circumstances here disclosed.”

Reservations in Deeds for Public Roads

Principle 22

“A reservation in a deed of a strip for a street or highway amounts only to an offer on the part of the grantor to dedicate the roadway to public use; and there can be no dedication until the offer is accepted.”¹⁶⁵

Many deeds contain reservations for public roads, or supposed dedications of narrow strips of land for public roads, where the roads are neither part of the streets and alleys of a subdivision, part of a city street system, nor part of the county road network. The language used in the deed is similar to the following.

- a. “... containing 10 acres; reserving a strip of land off and from the west side, 30 feet in width, which is dedicated for a public roadway.”¹⁶⁶
- b. “Excepting and reserving a 40-foot strip of land along the south side for public road purposes.”
- c. “Except the east 25 feet for public roadway.”

- d. “Except, therefrom, a strip 30 feet wide along the easterly line for public road purposes.”
- e. “Except south 20 feet to the public.” (This is very common language.)

This discussion on common law dedications could leave the impression that the above language would create a common law dedication. After all, the intent of the grantor is clear, and a sale has been made.

Such language *could* create a common law dedication if the road were formally or impliedly accepted by a city or county. But without some form of acceptance, the language does not create a dedication. In *Moore v. Fowler*,¹⁶⁷ the court responded to the language of example (a) with this decision: “The reservation in the deed, as above quoted, amounts only to an offer on the part of the grantor to dedicate the roadway to public use, and there can be no dedication under such circumstances until the same is accepted by the county.”¹⁶⁸

Counsel for the defendant cited *Carter v. Portland*¹⁶⁹ and similar precedent down to *Christian v. Eugene*¹⁷⁰ to support the contention that the language of the deed expressed an intent to dedicate the way to the public. But the court disagreed.

“The cases cited by the defendants... turn upon the principle that when a landowner plats his land into streets or roads, and lots or blocks, and sells a lot or block with reference to a map . . . it amounts to a dedication, at once, of the streets; and it is not necessary, under such circumstances, to show an acceptance by the public. The acceptance is, at once, presumed when the owner makes sales with reference to such map. In this instance, however, no map was ever made of the 10-acres involved, so far as the record discloses. It appears in the evidence, and it is admitted, this 10-acre parcel abuts on lands which were platted under the designation of ‘Little Homes’ in which the defendant’s holdings are situated. But the plat of the latter tract, introduced in evidence, does not, in any way, delineate the 10-acres of the plaintiff. We conclude that neither the pleadings, nor by evidence is there sufficient (cause) to how a dedication (to the public) of the 30-foot strip reserved in the Murtha deed.”¹⁷¹

Common Law Dedication vs. Subdivision Laws

Does the common law dedication provide a means to circumvent the subdivision laws?

Opinions suggest that the cases decided in favor of common law dedications were never meant to waive the provision of law governing subdivisions. Consider first: a close examination of the cases will

reveal that they involve what Oregon law now defines as a “developed subdivision,” i.e. the lands of any subdivision being reviewed, as provided for in ORS 92.215¹⁷² shall be considered “developed” if any of the following conditions exist:

- “a. Roadways providing access into and travel within the subdivision have been or are being constructed to meet the specifications prescribed therefore by the agency or body that approved the plat of the subdivision;
- “b. Facilities for the supply of domestic or industrial water to lots created by the subdivision have been or are being constructed;
- “c. Sanitary sewerage disposal facilities have been or are being constructed for lots created by the subdivision, or septic tanks have been or are being installed on the land or permits have been issued for their installation on the land;
- “d. Buildings have been or are being constructed upon the land or permits have been issued for construction of buildings upon the land;
- “e. One or more lots described in the plat of the subdivision have been sold or otherwise transferred prior to the date of the initiation of such review.”¹⁷³

The cases such as: *Security Investment Co. v. Oregon City*,¹⁷⁴ *Oregon City v. Ore. & Cal. R. Co.*,¹⁷⁵ *Parrish v. Stephens*,¹⁷⁶ *Lang v. Portland*,¹⁷⁷ *Carter v. Portland*,¹⁷⁸ *Harris v. St. Helens*,¹⁷⁹ *Steel v. City of Portland*,¹⁸⁰ *McCoy v. Thompson*,¹⁸¹ *Lownsdale v. City of Portland*,¹⁸² etc., involved subdivisions in every stage of development defined in ORS 92.225.¹⁸³ The issues to be settled were the rights of the public in either a road, street, alley, park, or square. In many of the cases cited in this chapter, the subdivisions or town plats complied with the law; the litigations resulted from ambiguities in the plat, e.g. *Oregon City v. Ore. & Cal. R. Co.*¹⁸⁴ In most of the other cases, the dedications were held to be common law because of technicalities, rather than attempts to circumvent the law, e.g. *McCoy v. Thompson*.¹⁸⁵ But in every case, the common law dedication was effected by the “developed” subdivision, rather than the dedication “legalizing” the subdivision.

Future common law dedications will probably be the result of a subdivision being filed, approved and recorded in the spirit of the subdivision laws, but failing to be technically in compliance with the laws. “Blue Heron Addition” typifies such a subdivision.

An application for the approval of Blue Heron Addition was filed, as required by ORS 92.040, in 1979. The proposed subdivision generated a dispute over an encroachment on a wildlife habitat.¹⁸⁶ An agreement was reached as to the site of the subdivision. Subsequently, a revised application and tentative plan were

filed in 1980. The final plat was filed, approved and recorded later that year. In 1985, it was discovered that neither the tentative plan nor final plat included a dedication or donation of the ways to the public. ORS 92.090 (3) required:

*“No plat of a proposed subdivision and no map of a proposed major partition shall be approved unless: (A) Streets and roads for public use are dedicated without any reservation or restriction other than reversionary rights upon vacation of any such street or road and easement for public utilities.”*¹⁸⁷

Subsection 3a of that statute required:

*“No plat of a proposed subdivision and no map of a proposed major partition shall be approved unless: (e) the plat or map contains a donation to the public of all common improvements, including but not limited to streets, roads, parks, sewage disposal and water supply systems, the donation of which was made a condition of the approval of the tentative plat for the subdivision or the major partition.”*¹⁸⁸

The possibility that the ways of this subdivision were reserved as private roads was considered. When this was the intent of the subdivider, ORS 92.090(2) required:

*“No tentative plan for a proposed subdivision and no tentative plan for a proposed major partition shall be approved unless: (b) Streets and roads held for private use are clearly indicated on the tentative plan and all reservations or restrictions relating to such private roads and streets are set forth thereon.”*¹⁸⁹

There was no wording or cartographic treatment on the plat that reserved the streets for private use.

Here are additional facts regarding Blue Heron Addition:

- a. The plat was approved by the city. However, the city had no record of approving the ways, other than through the approval of the tentative plan.
- b. Taxes were paid as required by ORS 92.095.¹⁹⁰
- c. Twenty-four deeds had been recorded (involving 22 lots). The language of the deeds showed that all sales were made in reference to the plat.¹⁹¹
- d. Appraisal records showed 11 homes either constructed or in the process of being constructed.
- e. Facilities for domestic water supply had been constructed.
- f. Sanitary sewerage disposal facilities had been constructed.
- g. The streets on the plat were represented in the manner used to designate public highways on subdivision maps. The lots on the plat were

separated by spaces, labeled "Street" and "Avenue," that coalesced with each other at their intersections. They "conformed to the plats of subdivisions... already approved for adjoining property as to width, general direction and in all other respects...."¹⁹²

- h. The streets were paved.
- i. The city had installed stop signs, speed-limit signs, and caution signs on certain streets in the development.
- j. The streets were represented on the official city map as city streets.

It has been held in this state that a statutory dedication is not effected unless *every* provision of the subdivision laws (in force at the time of recording) has been complied with.¹⁹³ For example, in *Nodine v. Union*¹⁹⁴ the statute in force required that the plat be acknowledged. But the plat in that case had not been acknowledged. The court held it was not entitled to be recorded, and the streets were not public by a statutory dedication.

In yet another case, *McCoy v. Thompson*,¹⁹⁵ the donation of the streets to the public was omitted from the plat. It was the opinion of the court that the streets were public by a common law dedication.

In the *Bernard v. Willamette Box & Lbr. Co.*¹⁹⁶ case, the donation of the streets to the public was missing from the plat, and the court held:

"Since the law requires the plat of a town to be duly acknowledged and recorded and prescribes a penalty for a failure to comply therewith (Section 3264, L.O.L.), it will be presumed, in absence of any objection to the admission of the evidence on that account, that the law has been obeyed (Section 799, subd. 34, L.O.L.) and that the *original* recorded plat was properly executed, and, this being so, F Street is a public highway; Section 3260, L.O.L."

But in this case the plat in evidence was only a copy, not the original or recorded plat. This, and the absence of any objection to a copy being presented as evidence, provided the court with the latitude to presume the donation was on the recorded plat. It must have been or it would not have been acknowledged and allowed to be recorded. One other point: the court held F Street to be a public highway. However, it never qualified that statement by saying it was public by a statutory dedication.

Blue Heron Addition did not comply with ORS 92.090. In recognition of precedent established in the Oregon Supreme Court, and the principles of common law governing dedication, it was concluded (for mapping purposes): (1) Blue Heron Addition failed to create a

statutory dedication of the streets to the public; and (2) a common law dedication resulted from the first sale of a lot with reference to the recorded plat of Blue Heron Addition.

Suppose, for the sake of discussion, a convincing argument could be provided that the definitions of "statutory," "conform" and "conforming" were liberal enough to recognize Blue Heron Addition as a statutory subdivision. *Black's Law Dictionary* defines *statutory* as: "relating to a statute; created or defined by statute; conforming to a statute." *Conform*, as defined by *Webster's New Collegiate Dictionary*, is defined as: "to bring into harmony or accord; to be similar or identical; to be obedient or compliant." *Black's* defines *conformity* as: "corresponding in form, manner, or use; agreement; harmony; congruity." Would the court be so technical as to rule the addition "illegal"? Probably not. There is sufficient evidence of an intent to create a subdivision "conforming" to statute, *i.e.* "corresponding in form, manner and use."

If the addition was statutory, would this mean the streets were public by a statutory dedication? If the answer is "yes," some provision of statutory law must indicate how to arrive at this conclusion. But the statutes do not provide such guidance. To make a determination, it is necessary to look to the common law. If the principles of common law show that the proprietor's acts show a deliberate, unequivocal, decisive, positive and unmistakable intent to permanently abandon the streets to a public use,¹⁹⁷ then it seems reasonable to classify the dedication as a common law dedication.

The city asked if it could resolve the problem by having the plat corrected as provided for in ORS 92.170(1).

"Any plat of a subdivision filed and recorded under the provisions of ORS 92.018 to 92.170 may be amended by an affidavit or correction:... (d) to correct any other errors or omissions where the error or omission is ascertainable from the data shown on the final plat as recorded."¹⁹⁸

City legal counsel was provided with these thoughts:

1. Had the correction to the plat been made before the first sale, it would have effected a statutory dedication. However, an amendment subsequent to the first sale would be too late to change the legal status of the common law dedication.
2. Upon the first sale of land in Blue Heron Addition (made in reference to the plat of that addition) certain rights were vested in the first purchaser. The rights to public streets, vested in the first purchaser (and the public), were vested

in all subsequent purchasers. Those rights cannot be changed by amending the plat.

The concern over Blue Heron Addition was *not* over the *legality* of the plat. It was merely to determine whether the streets were public or taxable private ways. If they were private they would be mapped and “taxlotted” accordingly. If public, they would remain as originally mapped (public highways created by common law dedication are delineated on the maps the same as highways created by a statutory dedication.)

Elliott’s *Roads and Streets*¹⁹⁹ provides this advice regarding ambiguous subdivision maps and plats: “Dedication by maps and plats are sometimes so made as to render it difficult to determine their nature and extent. We think it a safe general rule to resolve doubts in such cases against the donors, and within reasonable limits, to construe the dedication so as to benefit the public rather than the donor.”

Statutory Dedications

“A dedication may be either by statute or according to common law. The former arises where a person complies fully with the provisions of statutes enacting that certain formalities, when observed, operate as a dedication of lands to the public. Such dedication is usually made by recording a map or plat of land in a public office, acknowledged and executed in the manner prescribed.”²⁰⁰ (by statute).

Principle 23

A statutory dedication is made when a person complies fully with the provisions of the Oregon Revised Statutes enacting that certain formalities, when observed, operate as a dedication of lands to the public. “A valid statutory deed cannot be created unless every provision of the laws are adhered to.”²⁰¹

“A distinguishing difference between a statutory and a common law dedication is said to be that the former operates by way of grant (of an *easement* to the public), and the latter by way of an *estoppel in pais* rather than by a grant.” (Clarification and emphasis supplied.)²⁰² In other words, “a statutory dedication is a conveyance of an *easement*, while a common law dedication operates by way of *estoppel*.... The one concludes the owner upon compliance with the provisions of the statutes under which it was made, while the other concludes him upon the grounds that he has suffered the public and individuals to acquire rights upon the faith that he has devoted the land to the use of the public as a road

or street.” The Oregon courts have held to the same effect.²⁰³

A subdivision created under the plat and subdivision” statutes²⁰⁴ would contain a donation of the streets to the public, required by ORS 92.090,²⁰⁵ with language similar to the following:

“DEDICATION

“STATE OF OREGON

“COUNTY OF KLAMATH

“This is to certify that _____ Development Company of Oregon is a corporation duly organized and existing under the laws of the State of Oregon, and are the owners of the land described in the annexed ‘Surveyor’s Certificate,’ said land to be hereafter known as _____, that said corporation did cause the same to be surveyed and platted as shown on the annexed plat and do for themselves, their successors and assigns, hereby dedicate, donate and convey to the public, for public use forever, all streets as shown on the annexed plat.”

This rule is important: *For any part of a subdivision to be statutory, the entire plat must conform to statute, and the plat will be statutory only when it complies with every provision, condition and requirement of the subdivision laws.*²⁰⁶

Statutes, Notes and Annotations²⁰⁷

It is unnecessary to list all of the subdivision statutes here. However, it is essential to this discussion to emphasize some of the more important provisions and requirements of Oregon’s subdivision law.

ORS 92.010 (9): “Plat” includes a final map, diagram, drawing, replat or other writing containing all the descriptions, locations, specifications, dedications, provisions and information concerning a subdivision.

ORS 92.010 (10): “Replat” includes a final map, diagram, drawing of the reconfiguration of lots and easements of a recorded plat and other writings containing all the descriptions, location, specifications, dedications and provisions and information concerning a recorded subdivision.²⁰⁸

ORS 92.010 (11): “Road” or “street” means a public or private way that is created to provide ingress or egress for persons to one or more lots, parcels, areas or tracts of land. It excludes a private way that is created to provide ingress or egress to such land in conjunction with the use of such land for forestry, mining or agricultural purposes.²⁰⁹

Regardless of this statute, “road” and “street” in legal acceptance is the same as “public highway.”²¹⁰ If an interpre-

tation is required, and “roads” or “streets” are not clearly identified or reserved as private on the plat, they must be considered as public ways. Consequently, subdividers should be advised to avoid both terms when their intent is to reserve the ways as private.

ORS 92.012: “No land may be subdivided or partitioned except in accordance with ORS 92.010 to 92.170.”²¹¹

ORS 92.014(1): “No person shall create a street or road for the purpose of partitioning an area or tract of land without the approval of the city or county having jurisdiction over the area.”²¹²

This requirement (ORS 92.014 subsec 1) relates to partitions rather than subdivisions as defined in ORS 92.010.

ORS 92.014(2): “No instrument dedicating land to public use shall be accepted for recording in this state unless such instrument bears the approval of the city or county authorized by law to accept such dedication.”²¹³

A dedication is not binding on either party unless accepted, for property owners cannot be allowed to impose a street upon a municipality against its will and thus compel it to make improvements.²¹⁴ So under the provisions of ORS 92.016, 92.025, 92.040, 92.042, 92.044, 92.046 and 92.048, definite approval by the city or county was required before any public way could have been accepted.”²¹⁵ But this does not eliminate the possibility of a common law dedication where formal acceptance is not required to effect a donation of the use of the land to the public. Moreover, it does not eliminate the possibility of an implied acceptance by a city or county.

ORS 92.050(4): “The plat of a subdivision shall be of such scale that all survey and mathematical information, and all other details may be clearly and legibly shown thereon. Each lot shall be numbered consecutively. If used, blocks shall be lettered or numbered. The lengths of all boundaries of each lot shall be shown. *Each street shall be named.*” (Emphasis supplied.)²¹⁶

ORS 92.060(2): “The intersections of all streets and roads and all points on the exterior boundary where the boundary line changes direction, shall be marked with monuments either of stone, concrete, galvanized iron pipe, or iron or steel rods. If stone or concrete is used it shall not be less than 6 inches by 24 inches. If galvanized iron pipe is used it shall not be less than three-quarter inch inside diameter and 30 inches long, and if iron or steel rods are used they shall not be less than five-eighths of an inch in least dimension and 30 inches long.”²¹⁷ Amended by 1955 c. 756 subsec 11; 1973 c. 696 subsec 12; 1983 c. 309 subsec 4.

ORS 92.090(2): “No tentative plan for a proposed subdivision and no tentative plan for a proposed major partition shall be approved unless:

“(a) The streets and roads are laid out so as to conform to the plats of subdivisions and maps of major partitions already approved for adjoining property as to width, general direction and in all other respects unless the city or county determines it is in the public interest to modify the street or road pattern.

“(b) Streets and roads held for private use are clearly indicated on the tentative plan and all reservations or restrictions relating to such private roads and streets are set forth therein.

“(3) No plat of a proposed subdivision and no map of a proposed major partition shall be approved unless:

“(a) Streets and roads for public use are dedicated without any reservation or restriction other than reversionary rights upon vacation of any such street or road and easements for public utilities.

“(b) Streets and roads held for private use and indicated on the tentative plan of such subdivision or major partition have been approved by city or county...

“(e) The plat or map contains a donation to the public of all common improvements, including but not limited to streets, roads, parks, sewage disposal and water supply systems, the donation of which was made a condition of the approval of the tentative plan for the subdivision or the major partition.

“(f) Explanations of all common improvements required as conditions of approval of the tentative plan of the subdivision or the major partition have been recorded and referenced on the plat or map.”²¹⁸

It may be assumed that a plat was properly executed even though a purported copy thereof does not contain any dedication.²¹⁹ But where the recorded plat does not contain a dedication, such an assumption is invalid.²²⁰

ORS 92.150: “Every donation or grant to the public, including streets and alleys, or to any individual, religious society, corporation or body politic, marked or noted as such on the plat of the subdivision wherein the donation or grant was made, shall be considered a general warrantee to the donee or grantee for his (or her) use for the purposes intended by the donor or grantor.”

1. Dedication generally²²¹

“The fee to dedicated land remains in the dedicator and passes to the purchasers of adjoining lots in accordance with the intent of the transferor.”²²²

“The sale and conveyance of lots according to a recorded plat implies a covenant that the public places

designated thereon shall never be appropriated to a use inconsistent with that shown on the map.”²²³

“Statutory dedication operates by way of grant while common law dedication depends upon the principles of estoppel for its efficacy.”²²⁴

“The warranty referred to in this section does not become operative or binding until there has been an acceptance of the use.”²²⁵

2. Statutory dedication

“The sale of lots with reference to a properly executed and recorded plat constitutes an irrevocable dedication of the areas on the plat designated for public use.”²²⁶

“In determining what area the owner intended to dedicate to the public and the purpose of the dedication, the court should give great weight to the markings on the plat.”²²⁷

“The recording of a plat is not equivalent to a conveyance of land to the public unless the plat is properly executed and acknowledged.”²²⁸

“An attempt by a subdivider to alter or amend his plat is void as to persons who have purchased lots in the area.”²²⁹

“Statutory dedication can be employed to establish building restrictions on private property if the dedicator marks the recorded plat in such a manner that an intent to benefit the general public is manifested” (but this must be accomplished before sales have been made with reference to the plat).²³⁰

“When the owner of the locus in quo (the place in which the cause of action arose) and a third person properly executed and recorded separate plats under the same name, the owner did not dedicate land reserved for public use on the third person’s plat by selling lots with reference to the plat by name.”²³¹

3. Common law dedication

“When there is no effective statutory dedication due to a defect in the execution of the plat, a dedication may be consummated by the sale of lots with reference to the plat.”²³²

“An offer to dedicate can be made by parol if there are acts clearly evincing an intent to dedicate the land to public use.”²³²

“There can be a dedication to public use of an area plainly indicated on the plat as a lot, if the subdivider sells an adjoining lot on the representation that the former was being reserved for use as a street.”²³⁴

Permitting the public to occasionally use unenclosed property is not sufficient to raise an estoppel in pais necessary to constitute a common law dedication.”²³⁵

“A common law dedication was not effected when the owner sold lots with reference to a map slightly variant from the recorded plat.”²³⁶

4. Acceptance

“Formal acceptance by the corporate authorities of a dedication by parol is not necessary.”²³⁷

“Purchase of lots shown on the plat amounts to acceptance of the areas thereon dedicated to the public.”²³⁸

“Neither confirmatory dedication nor immediate improvement is necessary to secure to a municipal corporation the benefits of dedication.”²³⁹

5. Loss of rights in dedicated property

“A municipal corporation does not lose its rights to land set aside for public use on a recorded plat, unless it is guilty of laches which raises an estoppel in pais.”²⁴⁰

“Adverse possession of land duly dedicated to public use as a street is by itself insufficient to revest title thereto in the dedicator.”²⁴¹

“An estoppel was raised when the city permitted an encroachment to remain on public land for the period of the statute of limitations.”

“Laches²⁴² was not found when a city failed to create a street on land set aside for that purpose on the plat, before its construction was necessary.”²⁴³

ORS 92.205 (undeveloped subdivisions): “(1) The Legislative Assembly finds that many subdivisions for which plats have been approved and recorded have not been developed and that many such subdivisions were approved prior to the adoption of a comprehensive plan, zoning regulations and ordinances and modern subdivision control standards by the jurisdiction within which the lands described in the subdivision plats are situated.

“(2) The Legislative Assembly finds, therefore, that it is necessary for the protection of the public health, safety and welfare to provide for the review of undeveloped subdivisions for the purpose of modifying such subdivisions, if necessary, to comply with the current comprehensive plan, zoning ordinances and regulations and modern subdivision control standards, or, if such modification is not feasible, of vacating the nonconforming undeveloped subdivisions and to vacate any lands dedicated for public use that are described in the plat of such vacated subdivision.”

Note: Remember that once a sale or conveyance of lots has been made with reference to a properly executed and recorded plat, an irrevocable dedication of areas dedicated to the public is effected. Any attempt

by a subdivider, city or county to alter a “developed” subdivision is void as to persons who have purchased lots in the area.²⁴⁴ Therefore, it is important that the definition of “developed” subdivision²⁴⁵ be strictly adhered to when taking action provided for in ORS 92.234.

ORS 92.225: “(1) The agency or body required to conduct the review under ORS 92.215 shall investigate the status of the lands included within a subdivision to determine whether the subdivision is undeveloped.

“(2) For the purposes of this section, the lands described in the plat of any subdivision under review shall be considered to be developed if any of the following conditions are found by the agency or body conducting the review to exist on such lands:

“(a) Roadways providing access into and travel within the subdivision have been or are being constructed to meet the specifications prescribed therefore by the agency or body that approved the plat of the subdivision;

“(b) Facilities for the supply of domestic or industrial water to lots created by the subdivision have been or are being constructed;

“(c) Sanitary or sewerage disposal facilities have been or are being constructed for lots created by the subdivision, or septic tanks have been or are being installed on the land or permits have been issued for their installation on the land;

“(d) Buildings have been or are being constructed upon the land or permits have been issued for the construction of buildings upon the land; and

“(e) *One or more lots described in the plat of the subdivision have been sold or otherwise transferred prior to the date of the initiation of such review.*” (Emphasis supplied.)

“(3) If the agency or body determines that a subdivision is undeveloped after its investigation of the subdivision under subsection (1) of this section, it shall also determine:

“(a) If the undeveloped subdivision complies with the comprehensive plan, zoning regulations and ordinances and subdivision ordinances and regulations then in effect with respect to lands in the subdivision; and

“(b) If the undeveloped subdivision does not comply with such plan and ordinances and regulations, whether the subdivision may be revised to comply with such plan and ordinances and regulations.

“(4) If the agency or body determines that a subdivision is undeveloped after its investigation of the

subdivision under subsection (1) of this section, it shall hold a hearing to determine whether the undeveloped subdivision should be revised and the subdivision replatted or vacated and all lands within the subdivision *that have been dedicated for public use* vacated. Not later than 30 days before the date of a hearing held by an agency or body under this section, the agency or body shall notify, in writing, each owner of record of land described in the plat of the subdivision under review of the date, place, time and purpose of such hearing.”²⁴⁶(Emphasis supplied.)

ORS 92.234: “(1) Following a hearing conducted as required under ORS 92.225 (4), the agency or body conducting the hearing may:

“(a) Require the revision of a subdivision and a replat of the subdivision as it considers necessary, if it finds that the subdivision may be revised to comply with the comprehensive plan, zoning ordinances and regulations and other modern subdivision control standards not in existence when the subdivision was initially approved; or

“(b) Initiate proceedings, as provided in subsection (3) of this section, for vacation of the subdivision, if it finds that the subdivision cannot be revised in accordance with the comprehensive plan, zoning ordinances and regulations and other modern subdivision control standards not in existence when the subdivision was initially approved.

“(2) If an agency or body requires the revision and replat of a subdivision under paragraph (a) of subsection (1) of this section, it shall approve the subdivision only upon the completion of the revisions as required by it and the replat of the subdivision as *provided in sections 2 to 4 of this 1985 Act.*²⁴⁷

“(3) If the agency or body determines that it is necessary to vacate a subdivision, the agency or body shall adopt an ordinance vacating the subdivision and providing for the vacation of lands within the subdivision that have been *dedicated for public use. Title to lands within a vacated subdivision shall vest as provided in ORS 271.140 and 368.366.*”

Note: But to prevent an unconstitutional taking of private property, the fee title ownership of the grantor, which passes to the grantees of the dedicator, must be recognized by the Legislature, the state, counties and cities. See the section of this publication on “Right, Title and Interest in Dedicated Public Ways.”

“Any owner of lands described in the plat of the vacated subdivision who is aggrieved by the action of the agency or body in vacating the subdivision may appeal such action in the manner provided in ORS 34.010 to 34.100. The ordinance adopted by the agency or body for the vacation of the subdivision

and the *lands therein dedicated to the public* use shall be filed with the county recording officer as provided in ORS 271.150.

“(4) Nothing in ORS 92.205 to 92.245 shall prevent the owner of any lands within an undeveloped subdivision from seeking vacation of such subdivision under city or county vacation procedures and, if such vacation proceedings are commenced after the date of review of the subdivision by the agency or body, the review proceeding shall be suspended during such vacation proceedings. If the subdivision is vacated at the initiation of an owner, the review proceedings under ORS 92.205 to 92.245 shall be discontinued; but, if the subdivision is not vacated at the request of the owner, the review proceedings under ORS 92.205 to 92.245 shall be resumed at the termination of the proceedings brought by an owner of lands in the subdivision.”²⁴⁸

Effect of Common Law and Statutory Dedications

With this understanding of *how* dedications are made, it is essential to understand *what a dedication legally does*. The effect of a dedication dictates: who has the right, title and interest in the land, how it can be legally used, what constitutes *misuser or diversion*, and the reversionary right to the land of vacated public ways.

It is important to understand that the dedication of a public park or square is *a grant of the fee*. This rule, recognized in Oregon, is the only major difference between the dedication of public ways and that of other dedicated public lands.

Right, Title and Interest in Public Ways Dedicated by Common Law and Statute

Principle 24

A dedication of a street, alley, road, etc. is not a grant, it is a right created in favor of the public, and is in the nature of an *estoppel in pais*.²⁴⁹

In *John P. Sharkey Co. v. City of Portland*²⁵⁰ the Sharkey Company filed suit to restrain the City of Portland from wrongfully removing earth from an excavation being made in the improvement of Franklin Street. The suit also asked the court to compel the defendants to account for and pay the value of earth which the plaintiff claimed had already been unlawfully converted. The complaint alleged the John P. Sharkey

Company was the owner in equity of all the dirt in Franklin Street, and the owner of fee title in the street, subject to the easement for street purposes for the benefit of the public. The Multnomah County court rendered a decree against the City of Portland. Subsequently, the city appealed the decision to the Oregon Supreme Court.

Mr. Justice McBride delivered this opinion of the court:

“It appeared from the testimony that the plaintiff was the abutting owner on both sides of the street where this improvement was being made, and it is settled past controversy in this state that the abutting owner *is also the owner of the soil of the street in front of his lot to the center of the street, subject to the right of the city to improve the same for the purpose of travel*.²⁵¹ Being the owner of this soil, plaintiff did not become divested of his ownership by the mere act of the defendants in excavating it, in order to improve the street.”²⁵²

The court said the city had the right to use the excavated soil to make fills required upon the same street or upon other streets embraced in the same general plan. However, the evidence showed that over 10,000 cubic yards of dirt was disposed of for use on other streets and for the contractor’s benefit.

The court held:

“(1) That the abutting owner on a street in Portland owns the soil to the center of the street; (2) that he still owns it when it is excavated unless needed for the improvement of the same street; (3) that he has the right to take it away, provided he does so promptly and without delaying work on the improvement; (4) that if there is a place where it is as convenient for the contractor to dump the surplus dirt as to place it elsewhere, it is the right of the owner to have it dumped at such place, if he so indicates at the commencement of the work; (5) that in view of the fact that dirt taken from such excavation is usually valueless to the abutting owner, he should be deemed to have abandoned his claim thereto, unless reasonably made as indicated above; (6) that the owner cannot require the contractor, at the latter’s expense, to place dirt at a distant or inconvenient place, in which in event he must remove the dirt promptly himself.”

The plaintiff needed the soil adjoining the very place where it was excavated. He had even notified the defendant City of Portland that he needed the soil for fill. The place indicated by the plaintiff was the easiest and most accessible place the soil could be disposed of. The evidence presented the court showed it would have cost him \$2,500 to procure other soil to replace

that “wrongfully taken by the defendants, and that such dirt could not then or since be obtained for less.”

The soil would not have been considered the property of the abutting owner if the fee to the bed of the street passed to the city, county or public upon dedication of the public way. It was the property of John P. Sharkey because a dedication is not a grant; it is a right created in favor of the public. The court, in *Portland Baseball Club v. Portland*,²⁵³ clarified this with the following principle:

Principle 25

“In this state the rule is that where land has been dedicated or appropriated for a public street, the fee in that street remains in the original owner subject only to the public easement.”²⁵⁴ The fee passes to the purchasers of abutting lots in accordance with the intent of the grantors.²⁵⁵

When applying this principle, the Oregon court does not distinguish between common law dedication and statutory dedications. Consequently, either type of dedication results in the public acquiring only the right to use the land for the purpose for which it was dedicated.²⁵⁶ The fee remains in the dedicator exactly as it existed before the dedication, but subject to the public’s easement. The fee transfers to subsequent purchasers of land abutting the way, unless expressly reserved by the dedicator or subsequent grantor of land abutting the way (in such cases there must remain no question or reasonable doubt about the grantor’s intent).

In *Huddleston v. Eugene*,²⁵⁷ counsel for the plaintiff argued that the public had fee title in all of the streets. Mr. Justice Moore, delivering the opinion of the court, cited Chief Justice Thayer’s discussion of the effect of dedication or condemnation of a street in *McQuaid v. Portland Ry. Co.*²⁵⁸

“The public may have an irrevocable right to the use of a street, but how can it acquire the fee to the land? The fee must vest in someone having a legal capacity to take it. It must be a natural or artificial person; must be someone having a legal entity. The declaration that the fee in such cases is in the public, meaning the general mass of the people, without regard to any legal organization, although often made use of, is to my mind, absolutely absurd. The public, as a mass does not, in my opinion, possess any such capacity.” Justice Moore added, “While the question considered in that case was not deemed important, the reasoning convinces us that *the public acquires only an easement in a street which has been dedicated or condemned for its use.*”²⁵⁹

Abutting Owner’s Title in Dedicated Ways Clarified

The general rule expressed by the courts, and reflected in Oregon Revised Statutes,²⁶⁰ that “adjoining owners *each* hold title to the center of dedicated public ways” is misleading. It creates an assumption that *every* abutting owner on every dedicated public way has the underlying fee title to the center of the way. But this is not a correct interpretation of the law.

*Neil v. Independent Realty Co.*²⁶¹ is often cited for its clarification of the general rule, that is:

“A statutory provision that upon vacation of a dedicated street the land therein should be attached to the land bordering on the street, and all title thereto should vest in the persons owning the property on each side thereof, in equal proportions, was construed to apply *only in cases where the proprietors or their predecessors in title, on each side of the street, had contributed to the dedication, and not where the street was wholly dedicated by the owner of property abutting on one side of it*, in view of the constitutional prohibition against taking property for private use; and it was entitled to such property as against those abutting owners who had not contributed any of it.”²⁶²

Here is the rule announced in *Stiles et al v. Curtis*:²⁶³

“It is a general rule of the common law that the fee of the land over which a highway passes is owned equally by the owners of the adjoining ground. This rule, however, is not artificial, and of positive institution, but is founded on the presumption, *in absence of proof*, that the highway was originally granted by the adjoining proprietors over their land in equal proportions. This is not a presumption *juris et de jure*,²⁶⁴ but a reasonable presumption based on probability. *Where it appears, however, that the highway was laid wholly over the land of one person, the presumption is annulled.*”

The American Law Reports Annotated²⁶⁵ cites “Tyler’s Law of Boundaries” for support of the principle that the grantee takes the fee of the soil to the center of the highway *only where the chain of title extends from the grantee, back to the dedicator of the highway.*

So it appears that the common law rule to the effect that the adjoining owners had title to the middle of a public way rests upon the presumption they had contributed *equally* to the road. But if the facts show to the contrary, this rule will not apply. In other words, the facts will govern rather than the mere presumption. Out of this grew the principle that:

Principle 26

"If the highway is taken wholly from one person's property, and such highway is vacated, the land in fee reverts to the original owner or the owner's grantees freed from the public use or public easement."²⁶⁶ This rule only applies to the land of the original owner (the dedicator) abutting the vacated public way.

The general rule must give way to the wording of the deeds in the chain of title, and may have to give way to the peculiar circumstances of the case. The abutting owners may not be entitled to any part of the vacated public way.²⁶⁷ Elliott provides this advice:

"In arriving at a proper construction of the effect of a deed granting lots bounded on a street, and the intention of the parties to the extent of the grant in a street, regard must be had to the situation of the lots and streets and the state of the title as well as the language of the deed. This is the recognized rule of interpretation and intent."²⁶⁸

Clarification of the Words 'Revert' and 'Reversion'

Black's defines "revert" as: "To turn back, to return to. With respect to property, to go back to and lodge in the former owner, who parted with it by creating estate in another which has expired, or to his heirs."²⁶⁹

Consider first: At the time of dedication "...there is nothing more than a mere suspension of the dedicatory's right";²⁷⁰ that is, "The public only acquires an easement in the land."²⁷¹ In other words, a dedication "does not pass the legal title (fee) to the property dedicated";²⁷² "the fee and all rights of property incompatible with the public enjoyment as a way remain in the owners."²⁷³

Consequently, the dedication creates a *dominant estate* (being the easement) in the public. The dedicator retains the *servient estate* (the land subject to the servitude or dominant estate).²⁷⁴ A vacation of the dedicated way cancels the dominant estate. What actually reverts to the rightful owner, upon vacation, is the dominant estate, not the fee.

Some court decisions have suggested "reverts" is an improper word to describe the act of returning the dominant estate to the rightful owner.²⁷⁵ But *reverts* is not the problem. It is when the word is preceded by *fee* or *fee title* that it is improper, because the *fee* "and all fights of property incompatible with the public enjoyment as a way remain in the (abutting) owners." The proper explanation of what happens when a dedicated way is vacated is: "Upon vacation, the *dominant estate* reverts to the rightful owner of abutting lands." It would also be accurate to phrase it as:

"Upon vacation, the *public's easement* reverts to the rightful owner of abutting lands."

The word "reversion" presents a different problem. *Black's* defines *reversion* as: "(1) designating the estate left in the grantor during the continuance of a particular estate and also the residue left in the grantor or his (or her) particular estate."²⁷⁶ *Webster's New Collegiate Dictionary* includes this definition: "An act or the process of returning to a former condition."

Black's definitions seem to be applicable to the *servient estate* left in the grantor during the continuance of the *dominant estate* in the public. But the term usually applies to the following examples. If *B* sells to *A* for life and upon the death of *A* the land reverts to *B* and her heirs, then *B* has a *reversionary interest* in the land in which *A* has a life estate.

Another type of reversion is the *right* to regain an estate if a specified condition or covenant, expressed in a deed, is not adhered to. For example, a deed may contain a covenant whereby the grantee promises the grantor that the land being purchased will never be used for raising livestock. Under this doctrine of law, the grantee's estate will terminate if the promise is broken.

In *Gray v. Blanchard*,²⁷⁷ Gray conveyed a tract of land with a house with no windows facing his sister's land. The deed contained a condition that "no windows shall be placed in the north wall of the house." When Blanchard breached this condition, the court held the estate of the grantee terminated. The "residue" left in Gray, when he sold the land to Blanchard, was a *reversion*.

The reversionary right to regain land because of a condition or covenant broken differs from the reversionary right to the land of a vacated way. The former is a *future* estate not vested in anyone, and is contingent on an event that may or may not happen. The latter, however, is a fee simple estate subject only to the public's easement, and it is an estate regardless of whether the way is vacated. It is property within the meaning of the constitutional prohibition against taking property without just compensation, and for other than public use. The *reversion*, or right of entry for a condition or covenant broken is a legal right, but one that is not as sacred as an existing fee simple estate; that is, many states, such as Oregon, have passed statutes limiting the time a condition subsequent, or limitation may restrict a fee simple estate. In Oregon, if the covenant or condition subsequent does not occur within 30 years from the time it was created, it is extinguished.²⁷⁸

But the reversionary right to the bed of a road is not in the nature of a reversionary interest subject to extinguishment by statute. As private property protected by the U.S. and

Oregon constitutions, a reversionary right of an owner of abutting land, to the bed of a vacated way, is not under jurisdiction of the legislature, and cannot be taken for private use, nor without just compensation.

At common law, the dedicator has a reverter to the whole street. If this valuable right in the land is taken for public use without just compensation, it is a violation of the constitutions. "This is the public policy of this state as expressed in its organic law. *No other public or legislative policy can change this constitutional declaration of a state public policy.*" (Quoted from 70 A.L.R.)

When Estate in Nonvacated and Vacated Ways Pass if Not Mentioned in Deed

The estates in public ways are discussed in greater detail in the section of this publication on "Apportioning, Mapping and Assessing the Estates in Public Ways and Vacated Public Ways." However, Principles 27 and 28 are pertinent to this discussion on the "Effect of Common Law and Statutory Dedications."

Elliott explains: "It is stated that it is very unusual and almost unprecedented for a land owner to sell abutting property and at the same time retain the fee of the highway... but there is no legal objection to his doing so."²⁷⁹ If a grantor intends to reserve the fee in a public way, it is essential that the grantor's intent be clearly expressed, or that words to the effect that this is the intent be, in substance, contained in the deed. The mere omission of wording that shows intent to convey is, in itself, insufficient to reserve the way.

Principle 27

A conveyance of lots abutting a street before, or after a vacation, carries the fee in the street, regardless of whether or not the street is mentioned in the deed, except where the grantor did not own the street or expressly reserved the street.²⁸⁰

Principle 28

Principle 27 is a rebuttable presumption that can be overcome by acceptable evidence. Great care must be exercised in applying that principle where the grantor of land abutting a vacated public way has retained other abutting property that could benefit by reserving the vacated way. However, the evidence must be more substantial than the mere omission of words mentioning the streets. Moreover, the fact that the land in the bed of the way could benefit the other land is, in itself, insufficient evidence to support a grantor's claim to the vacated way.

The Oregon cases supporting Principle 27 acknowledged that in *other jurisdictions* the land of a vacated way was "then a separate estate in no wise appurtenant to the adjoining tract." But the court said "that is a statement of conclusion rather than a reason." As clearly stated in *Fahey v. City of Bend*,²⁸¹ "No distinction should be made between conveyances made before and conveyances made after the vacation of the adjoining street; *in both cases the adjoining street should be held to pass by the deed in the absence of the manifestation of a contrary intent.*" (But note: Such a conclusion cannot be applied to deeds for abutting property purchased merely for the purpose of widening a public way.)

Lawful and Unlawful Uses of Public Ways; Use and Nonuse

Neither the Department of Revenue nor the county assessors regulate the use of dedicated lands. Were it not for ORS 307.200, *user* and *misuser* may have been disregarded in this chapter. However, ORS 307.200 exempts public ways from assessment and taxation *only when they are being used for the purpose for which they were dedicated.*²⁸² Consequently, an assessor or appraiser must be capable of distinguishing legitimate (lawful) uses (termed *user*) from illegal (unlawful) uses (termed *misuser*) of the public streets, roads, alleys, and the like. For example: Is a *pedestrian mall* a lawful use of a public street, and therefore exempt from property taxation?

A 1975 Department of Justice opinion stated:

Principle 29

"As long as the public is not using the streets for their dedicated use, the area (must) be assessed to the owner of the fee."²⁸³ Oregon law provides that public ways are exempt from assessment and taxation only when used for the purposes for which they were dedicated.²⁸⁴

User is the lawful use of dedicated land. *Misuser* is the illegal use (unconstitutional use) of dedicated land. *Diversion* is the act of diverting dedicated land from a lawful use to a use inconsistent with the purpose of dedication. A grasp of the legal significance of "user," "misuser" and "diversion" is essential to acquiring a full appreciation of the principles discussed. After all, the designated use is the supreme purpose of all dedications.

In his treatise on "the Law of Dedication in Oregon," Sheldon W. Parks cited this principle of law applied in *City of Portland v. Whittle*.²⁸⁵

Principle 30

"Property dedicated to the public cannot be used for purposes other than those for which the land was dedicated.

"When a man, or company of men own land, and lay it off into blocks and streets, and sell lots abutting on a street so laid off, so that the street is a convenience to the purchasers of lots, those acts amount to a dedication of the land so laid off into streets. The persons so laying it off cannot recall it *or in any manner prevent its being used as streets*. Such persons are barred or estopped by their acts, and all persons or corporations²⁸⁶ claiming under them are equally bound.

"If the place in question was (dedicated as) a public square, and not a street, the acts of a city council (attempting to divert the subject property from a street to a public square) in regard to it are valid. But if it was (dedicated as) a street, the council had no authority to order it fenced up; and in that case, any order of the city directing it to be fenced up is void."

Diversion: Public Square to a City Hall

The case of *Church v. the City of Portland*²⁸⁷ was a dispute involving city plans to divert land dedicated as a public square to the use of a city hall. The court held:

"The building of a city hall...upon said block, as the common council propose to do, would, in our judgement, be a use foreign to the purpose for which it was dedicated, and should not be permitted. Property dedicated to the public use may be said to be restricted to the use for which it was... dedicated; although this rule is to include such uses as are consistent with, or necessary to the principal use. If dedicated property be put to a use foreign to that contemplated by the intention and purpose of the dedication, then not only the dedicating, but the property owner will have a remedy in equity to enforce the proper use, and inhibit the improper one."²⁸⁸

Principle 31

"A misuser or diversion may be restrained by owners of land injured by the change in use or by the dedicating if the ownership is still in that person."²⁸⁹

Private Structure Benefiting Public Can be Misuser

Even a use considered beneficial to public travel can be misuser if it excludes the public and the abutting

owners from part of a dedicated public way. *Wilamette Iron Works v. Oregon Railway and Navigation Co.*, *supra*, involved a bridge abutment of the railway company that would block the Iron Works company's access to Third Street in Portland. The court acknowledged that an individual's interests are subservient to those of the public for proper road purposes. However, any structure on a dedicated street which is repugnant to its use as a public thoroughfare *is not a proper use of the land*.

"There is a limitation to legislative or municipal power over a street which cannot be exceeded without invading the constitutional rights of abutting owners."

Principle 32

"An abutting proprietor is entitled to the use of the street in front of his or her premises as a means of ingress and egress, and for light and air, and this is as much property as the soil within the boundary of the grantor's lot; and, therefore, any impairment thereof, or interference therewith, caused by the use of the street for other than legitimate street purposes is a taking within the meaning of the constitution."²⁹⁰

Note: The court held that Principle 32 had the effect that the abutting owner had right of access to the full width of the land abutting the street. This is true for any private or unlawful purpose, but it has been held in recent cases that this right is subservient to the public's right to free use of the streets. That right is protected by the state's exercise of its police power. In the case of *City of Salem v. Merritt Truax*²⁹¹ and other cases, the closure of an abutting owner's driveway to provide for public safety and convenience was a legitimate exercise of a city's police power. It is not a compensable taking if *other access to the property is available*.

The court, in *Iron Works*, said an abutting owner "holds the property (of a street) subject to the proper legislative authority to control and regulate the use of the street as an *open* public highway, and hence any authorized use gives him no cause for (legal) action. *But such a holding is not subject to legislative power to divert the street from legitimate street purposes* by authorizing a structure thereon which is inconsistent with its continuous use as an open street."

Principle 33

"Any structure on a street which is subversive of and repugnant to its use as a public thoroughfare is not a legitimate use, and imposes a new servitude on the rights of abutting owners, for which compensation must be made."²⁹²

“We think, therefore, that while it is competent for the legislature or municipality to authorize the use of a street for *legitimate* street purposes, without making compensation to abutting owners for consequential injuries to their property, they cannot legally authorize structures of the character complained of (a bridge abutment) to be erected thereon for the use and convenience of a private corporation (the O.R.&N. Co.), and which absolutely and permanently exclude the public and the abutting owner from the portion of the street so occupied, without compensating the adjoining proprietor for the injury sustained.”

The cases cited clearly describe the extent of authority in the legislature, the cities and the counties, for administering the public highways. However, in *Brand v. Multnomah County*,²⁹³ the court did a superb job of putting all of this in proper perspective:

“Primarily, the state has paramount control over all the highways within its borders, including public streets and highways within the confines of municipalities. *Whatever authority a municipality may enjoy or possess, pertaining to its streets and highways, must be derived from the legislative assembly through its franchises or charter; and such a corporation acts, if at all, through a delegated power emanating from the initial source.*²⁹⁴ Nor does the mere fact that the state has delegated certain powers to the municipality inhibit it from again resuming or exercising such powers. Hence it is said: The legislature of the state represents the public at large, and has, in the absence of special constitutional restraint, *and subject to the property rights and easements of the abutting owner*, full and paramount authority over all public ways and public places.²⁹⁵

“Whatever right the municipality may acquire in and about its public streets, whether through dedication or by condemnatory proceedings, or whatever may be the property interests which may remain or are left vested in the owner of property abutting thereon, it has come to be settled, if ever it was seriously controverted, that they (the abutting owners) cannot be burdened with any additional servitude, other than that which properly and legitimately attaches to them as public streets and highways, without just compensation being made to the abutting owner.”²⁹⁶ (See ORS 221.916)

Brand involved a dispute over a bridge abutment and a change in a street grade. Unlike the bridge abutment in *Willamette Iron Works v. Oregon Railway and Navigation Company*,²⁹⁷ this abutment was for public street purposes. But the Columbia Street Bridge Company, a private corporation, was, by a legislative act, granted authority to construct and maintain the

bridge between the cities of Portland and East Portland. The corporation was empowered to take tolls, but Multnomah County was authorized to fix and regulate the rates.

When the bridge was built, an open 14.5-foot roadway was left in the center of its western approach. It led from the eastern line of Front Street down the incline on Madison Street, giving ingress and egress to Bill and David Brand’s (the plaintiffs) lots.

Eventually the bridge committee, authorized by the legislature, purchased the bridge and planked over and closed the 14.5-foot access road. Provision was made for the “commission (to) restore the driveway if not satisfactory to property owners.” The plaintiff was then deprived of the means of ingress and egress to their buildings by way of Madison Street. The East Side Railway Company had a franchise for operating its street railway directly over the space formerly left open for the plaintiffs’ access to their property. Consequently, they brought suit to require the road to be reopened.

The Brands argued that the closing of the access road was a taking without just compensation. They maintained the easement of access, of light and of air, constituted their property, and it was dependent upon the streets contiguous with their land. And: “In addition to the right of safe and unobstructed travel, the abutting owner has a special and private right to use the street as a means of access to his property. This easement he may protect, and, in the protection of it, he may insist that no structure shall be placed or maintained in the street which, although it may be beneficial in a sense to the public at large, is detrimental to him as owner of property affected.”

On rehearing the court stated:

Principle 34

“A municipal corporation is not liable for consequential damages necessarily caused in grading a street unless made liable by statute, constitution or charter.”²⁹⁸

“The argument of counsel, or much of it, seems to proceed upon the theory that the building of this bridge in the street is not a street use, but very much the same as though the street had been walled up or vacated so that it could no longer be used as a street. Our contention is that *the approach to this bridge is as much a part of Madison Street as any other part of the street*, and that the plaintiff can no more complain of the approach being constructed on its present level than he could of any other part of the street being brought up to the duly established grade.”²⁹⁹

"The *authorized* establishment of a street grade, although the change may result in consequential damages to the abutting property, is *not* a *taking* within the meaning of the clause of our constitution (Const. Or. Art. 1 & 18), providing that 'private property shall not be taken for public use.'... A bridge connecting public highways, and erected for the general use and accommodation of the public, whether built and maintained at public expense, or by private corporation authorized to charge and collect tolls from persons using the same, is *itself a public highway, and constitutes part of the highways with which it is connected*."³⁰⁰

The court held that when Columbia Street Bridge Company left the 14.5-foot access approach (to the plaintiffs' property), it was not required to do so. It was merely a matter of accommodation to meet the convenience of the property owners' interests in the river bank "subject to the closure at the behest of the bridge company." The bridge committee succeeded to all the powers and authority granted the bridge company under the franchise, and it acquired the right to close the access roadway. The bridge company "surrendered its franchise and right to take tolls, so that, in practical operation, its free use has become vested in the public; thus disendowing it of its only remaining characteristic of a private concern, and putting it upon the broad basis of a public highway."

A question remained as to whether the bridge, with its approach upon Madison Street, constituted an additional servitude. Even though a use may be public and therefore lawful, if it is a use inconsistent with the purpose of dedication, or a use of which the abutting owner was not compensated, it would be a new servitude. On rehearing, the court held that neither the change in the street grade nor the bridge approach or abutment imposed a new servitude on the land of the street.³⁰¹

*P. & W. V. R.R. Co. v. City of Portland*³⁰² supports the principle that dedicated lands cannot be diverted to a use inconsistent with the purpose of dedication:

"To this property thus dedicated to public use, the dominion of the legislature attached, but its power over it is not supreme (not unlimited). It might regulate its use or promote its improvement, but it (can) not divert it or subject it to any use clearly inconsistent with the purpose of its dedication. To do that would violate the contract of dedication, any person interested (that is, any person sustaining damages differing in kind from that suffered by the general public) would be authorized to institute proper proceedings to enjoin it." (Clarification supplied.)

Principle 35

A city or county holds public ways in trust for the public for the use of the general public as thoroughfares for travel from place to place. Neither the city nor county owns the ways, nor can either corporation sell or divert them to any private use.³⁰³

In Dent v. Oregon City,³⁰⁴ the court held to the proposition that:

"The right to use public highways by the ordinary and usual means of travel is common to *all members of the public without distinction*, and extends to those engaged in the business of carrying passengers or freight for hire by such means, as well as to individuals pursuing strictly private business, subject to the state's power to impose reasonable and impartial regulations by statute, which power may be delegated by the legislature."³⁰⁵

Quoting *Macomber v. Nichols*,³⁰⁶ the court explained:

"A highway is a public way for the use of the public in general, for passage and traffic, without distinction (as to who uses the way)... The restrictions on its use are only such as are calculated to secure to the general public the largest practical benefit from the enjoyment of the easement, and the inconveniences must be submitted to when they are only such as are incident to a reasonable use under partial regulations." (Clarification supplied.)

Dent was a case involving the operation of a bus as a common carrier of passengers between Portland and Salem, and over a route along public highways. An Oregon City ordinance required persons operating interurban public utility vehicles to purchase a franchise from the city before operating the vehicles on that city's streets. The plaintiff had met all the city's license requirements imposed by statute, but had not purchased the franchise. Consequently, he was convicted of violating a city ordinance by the "Recorder's Court" of Oregon City.

The city charter provided the power and authority "to regulate the use of streets, roads and highways, and public places, for foot passengers, animals, cars; street railways, and locomotives; to prescribe the width of tires of all wheeled vehicles, and the weight to be carried thereby for the protection of the streets and highways;...to control and limit traffic on the streets, avenues, and public places."³⁰⁷

The city charter empowered the city to impose reasonable regulations upon those using its streets. The regulations were adopted in view of local conditions and requirements respecting the streets, travel and public safety.

“Those regulations cannot be carried to the extent of prohibition where the use made of the streets is strictly for travel and passage by the usual and ordinary means. But where the use made of the streets results in an occupancy or appropriation of the streets, or any portion thereof, for private purposes *beyond that involved in traveling upon such streets by the usual and ordinary means*, the municipality may not only regulate, but it may prohibit that special or peculiar use of its highways.”³⁰⁸

Some of the cases cited by counsel for the city:

“...contain statements to the effect that a municipality having power to regulate the use of its streets may entirely prohibit those engaged in the carriage of passengers or property for hire from *using the streets within its boundaries for carrying on their business*. That is true when the streets are used by such carriers as a stand for transacting business or soliciting patronage, stopping to let off passengers, or any other use by which the streets, or a portion thereof, are occupied or appropriated to the exclusion of the public, or are used in a manner that produces excessive wear upon the highways or endangers the public safety or which *interferes with, or obstructs, the use of the streets as highways for the purpose of business or travel*; but the statements are inaccurate as applied to the use of such streets by common carriers, strictly as thoroughfares.”

The outcome of *Dent* was: “The ordinance in question prohibits the exercise of the specific rights granted by the statutes (of Oregon) to interurban carriers. Being in conflict with the statutes, the ordinance is invalid.”³⁰⁹

Conversion of a County Road to a City Street by Annexation is Not a Diversion

In *Huddleston v. Eugene*,³¹⁰ the appellants argued that to change a county road into a city street would subject the land to *other and greater servitudes*; that the additional servitude is “property” within the meaning of the constitutional prohibition against taking property without just compensation. They claimed that the uses to which streets are ordinarily put are greater and more numerous than those to which a county road is subjected.

The court said:

“The public easement in a county road is limited to the uses to which such a highway is commonly subjected, and it must be presumed that the condemnation of the land for such road by a county court was made with reference to such uses.

“The imposition of a new servitude upon the land, in addition to and distinct from that to which it

was originally subjected when taken for a highway, the obstruction of the abutting proprietor’s access to the street (*Brand v. Multnomah Co. ?*),³¹¹ or the impairment of his right to light and air, *constitutes a taking of private property for a public use*, within the meaning of the fundamental law of the state, for which just compensation must be made for the damages which necessarily ensue.”³¹²

“The ordinary mode of travel in cities at present is the same as that in vogue in the rural districts when the road was established. The use of the highway as a street will not be in addition to or distinct from that originally appropriated,” hence:

Principle 36

The conversion of a county road into a street does not constitute diversion, misuser, or a taking which demands additional compensation thereof on account of such use.”³¹³

Pedestrian Malls are Lawful Use of Public Ways

The Oregon Legislature and its trustees (the state, cities and counties) may restrict the methods or modes of public travel on highways. The essential requirements of a public way is that it is free, unobstructed, open and common to all citizens for travel from place to place, and the rights of the abutting owner are not impaired. Public highways, or portions of the highways, may be restricted to bicycles, city buses, carpool vehicles, pedestrians, horses, etc. But any citizen must have free, open and unobstructed use of the way for travel by the designated means of travel. And the abutting owners must be compensated for any damages effected by the restriction.

An example of a lawful restriction on a dedicated way is a pedestrian mall, free, open and common to all citizens for pedestrian travel from place to place.

In 1961, the Oregon Legislature found that in certain areas in cities, and particularly in retail shopping areas, there was a need to separate pedestrian travel from vehicular travel. “Such separation”, said the legislature, “is necessary to protect the public safety or otherwise serve the public interest and convenience.” It also declared “that such objective can, in part, be accomplished by the establishment of pedestrian malls pursuant to ORS 376.705 to 376.825.”

ORS 376.720 permits the closure of such ways to vehicular traffic. If any abutting owner suffers special damages effected by a pedestrian mall, Oregon law requires the city to pay just compensation for such damages. Provisions of law, such as this, are evidence that the legislative assembly is fully aware of the limitations on the

use of dedicated public ways, and of the constitutional limitations on the taking of private property.

Private Irrigation Ditch in Public Way, Blocking Owner's Access, Held to be Misuser

In *Sweet et al v. Irrigation Canal Co.*,³¹³ the plaintiffs brought suit before the Union County Circuit Court as an abutting owner to obtain a decree enjoining the maintenance of an irrigation ditch by the irrigation canal company. The plaintiffs claimed the ditch interfered with their right of ingress and egress to and from their property.

The irrigation canal company won the circuit court case because the plaintiff failed to prove that a common boundary existed between the county road and the plaintiff's property. This brings up an interesting point: Even if the circuit court had recognized that the irrigation ditch was misuser of a public way, the plaintiffs had no *standing* to maintain the suit as *abutting owners* because they failed to convince the circuit court that their premises abutted the road. *A party only has "standing" if that party has a personal stake in the outcome of the controversy.*

In this case, the gist of the question of standing was whether the plaintiffs were the proper party to request an adjudication of the issue, not whether the issue was justiciable. Did the ditch deprive the plaintiffs of their rights as abutting owners, of ingress and egress to their property? Had the circuit court found in favor of the plaintiffs, it could then attend to the problem of misuser because the misuse would deprive them of their right, as abutting owners, of ingress and egress.

The plaintiffs appealed the circuit court decision to the Oregon Supreme Court. That court reversed the circuit court decree, finding the plaintiffs' land was contiguous with the county road. Consequently, it could attend to the matter of "use" of the road. The court explained:

"Our conclusion from the evidence is that (the) defendant's ditch is in the county road and the plaintiffs' land adjoins the county road. They are, therefore, abutting owners with the right of access to the highway, which is cut off as long as the defendant maintains its irrigation ditch as an open ditch. The plaintiff...operates on the land a slaughterhouse and meat packing and processing plant, and he, his employees and customers are denied the use of the highway as a means of access to and from his place of business.

"Under our decisions and the law, generally an open ditch along a public highway is a purpresture or

public nuisance.³¹⁵ Even though it were to be conceded that the defendant thus occupied the road by lawful constituted authority, yet it *invades the right of the abutting owner, and is an appropriation of the property of such owner without just compensation*, which is beyond the power of the legislature or municipality, or both, to authorize or sanction.³¹⁶

"Maintenance of the ditch cannot be justified, as counsel for the defendant would have us do, as a public use. The same plea was advanced by the railroad company in the *Willamette Iron and Steel Works* case; but the court said that, while it might be conceded that the interests of Portland and the public at large were promoted by the appropriation of the street to the purposes of an approach to the defendant's bridge, it did not follow that the burden of such a public (benefit) could rightfully be cast upon the plaintiff by appropriating its property for the public benefit without compensation.³¹⁷

"Certain language in *Savage v. City of Salem*,³¹⁸ relied on by the defendant as supporting its position, cannot be used for that purpose when properly understood and considered in the context of the case. The language is as follows:

"... it now seems settled that municipal authorities which possess (under their charters) general control over the streets, have the power to authorize and render lawful obstructions and erections therein for a public purpose, which otherwise would be deemed nuisances, on the ground that such erections or structures are merely putting the street to a new and improved use, as demanded and required by the necessities of the times and the modern conveniences and appliances."³¹⁹

"The case holds that water tanks erected and maintained on certain of the city streets were not a nuisance per se and that, under evidence, it was a question for the jury whether they were a nuisance in fact. The plaintiff had a contract with the city to sprinkle the streets and the tanks were erected by him by authority of the common council for the purpose of supplying his street-sprinkling wagons. They were removed by the city over the plaintiff's objection, and he brought an action to recover damages for such removal. This court, in affirming a judgement for the plaintiff, took a note of the fact that the case *did not involve any question as to the right or remedy of an abutting owner*. That is one point of distinction from the present case, and another and very significant difference is that the water tanks were authorized by a municipal authority having under its charter general control over the streets for the purpose of subserving a public purpose . . . The sort of obstruction to which

the court referred in the sentence relied on by counsel is explained in the next sentence:

“... It is upon this principle that the right to grant franchises authorizing the use of the streets for water and gas pipes for the construction and operation of street railways, the erection of water hydrants and lamp posts, or telegraph, telephone, electric light, and railway poles, and similar structures, is maintained and now generally recognized and upheld by the courts.”³²⁰

The court continued:

“Since a municipal corporation holds its control and power over the streets *in trust for the public*, it has *no* authority to authorize or permit private person’s or corporations to erect or maintain permanent obstructions therein for purely private purposes.’

“It is, of course, manifest that this is exactly what the county has permitted to be done in this case, and there is nothing in either the decision of the *Savage* case, or in any statement of the law in the opinion therein, which gives any support to the defendant’s contention.

“*Baines v. Marshfield & Sub. R. Co.*³²¹ is like *Savage*... in that it involves the maintenance of a railroad in a public street pursuant to what was claimed to be a franchise granted by the city pursuant to legislative authority. Under the evidence, it was held that the railroad was a mere private enterprise and not designed to subserve a public purpose. There was only an occasional interference with the plaintiffs’ right of access to their property; nevertheless, the railroad was held to be a public nuisance and its maintenance in the street enjoined. The case is *not* authority for the proposition that a corporation, even though acting under lawful authority and serving a public purpose, may completely cut off an abutting owner’s right of ingress and egress without paying just compensation. That a railroad may not do so is clear.³²² We see no reason for a different rule in the case of an irrigation company, especially as the Legislature has granted such companies no right to occupy a county road or highway longitudinally, otherwise than by exercise of the power of eminent domain. We say this with full realization of the importance of irrigation to the eastern part of Oregon.

“The plaintiff calls our attention to certain statutes which apparently are claimed to be authority for the county court’s action and for its own right to maintain its open ditch in the road. One of these is subsection 100-2703, OCLA, which provides in part that any person constructing a ditch *across* a public highway shall put over such ditch where it crosses the highway, a bridge or culvert of such width and

material as the county court shall order. *This statute does not aid the defendant.* We may infer from it the authority for passing laterally over a highway, but not for going along it longitudinally.³²³ The other statutes relied on are subsection 12-101, 102, 104 and 105 OCLA. The section last mentioned authorizes a corporation to make a public highway part of its corporate road.³²⁴ *It has no bearing on any question in this case.* The other sections authorize corporations of various types, including those organized for irrigation purposes, to acquire rights of way for canals and ditches by eminent domain proceedings. It is provided, among other things, that the corporation may, by agreement with the county court, appropriate a county road or highway and in lieu thereof condemn contiguous or adjacent property and construct a similar road or highway. As the defendant did not resort to condemnation proceedings, we are unable to perceive any basis for this contention.

“In our opinion, an attempted authorization by the county court to a private corporation to maintain an open irrigation ditch in a public highway is a *usurpation of power. The very statutes upon which counsel rely, and to which we have just referred, by clear implication negate the existence of any such power.*

“The right of an abutting owner to the remedy of injunction in circumstances such as here present is clearly established.³²⁵ The remedy can be granted in this case without undue hardship to the defendant. Plaintiffs do not ask that the defendant be compelled to abandon use of the ditch for conveying water for irrigation purposes, but only, in the language of the prayer, ‘that the defendant enjoined from maintaining said ditch in the public highway adjacent to the land of the plaintiff as an open ditch and an impassable barrier, and that the defendant be required to install a culvert to convey the water in said ditch and to cover and fill the same, level with the surface of the ground, so that the plaintiff may have ingress and egress to and from his premises along the full length of that portion of the said public road to which the plaintiffs’ land is adjacent.’

“Notwithstanding any opinion expressed by us as to the want of legal authority to maintain the ditch at all, it is unnecessary, in making provision for an injunction, to go beyond what the plaintiffs seek.

Principle 37

“An abutting owner, however, is not necessarily entitled as against the public to access to his land at ALL points, and it is held that it is sufficient if he has free and convenient access to his land and improvements thereon even though not at all points where it abuts upon the highway.”³²⁶

Access driveways are depicted by heavy-shaded lines

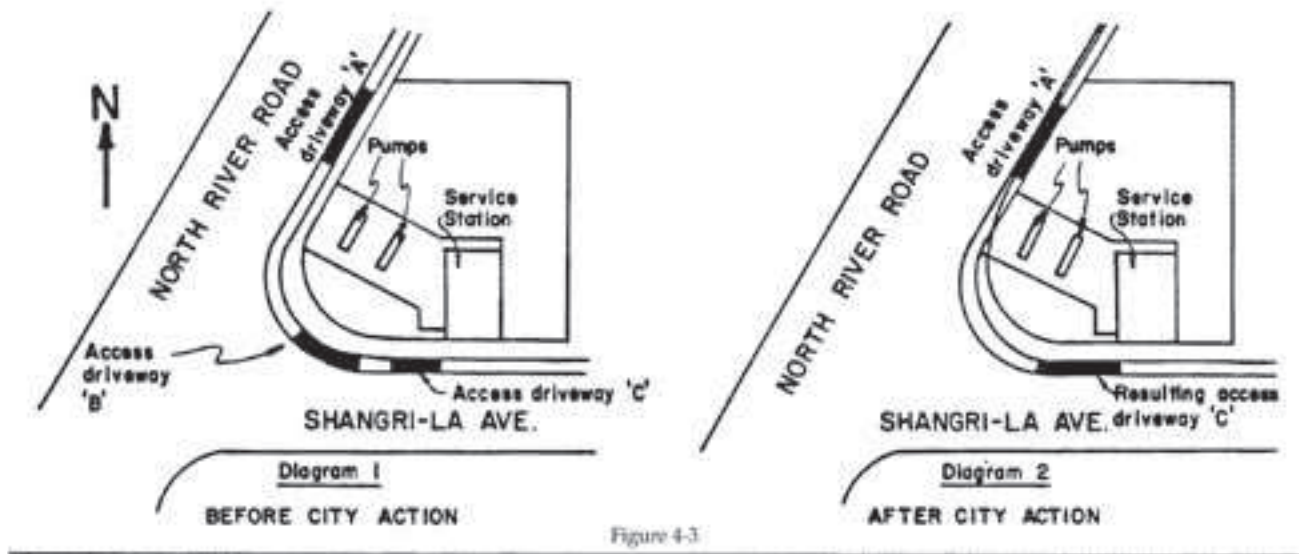


Figure 4-3

"Consequently, the decree in this case will go no farther than to require the defendant to install in its ditch such culverts, bridges, or other structures as will afford to the plaintiffs free and convenient access to their property, and in particular to that portion of it on which their business is conducted to the end that their means of ingress and egress shall not be substantially interfered with."³²⁷

Closure of Driveway by City Legitimate When for Public Safety and Convenience, and When Other Access can be Had; Police Power of City

The case of *City of Salem v. Merritt Truax*, *supra*, demonstrates that Principle 37 is recognized in this state. In this situation, the defendant owned a corner lot in Salem, on which they operated a service station. The situation prior to the city's action can be seen in Diagram 1 of Figure 4-3:

"As part of a street-widening project, plaintiff condemned a narrow strip along one edge of defendants' property and closed one of their three driveways (driveway 'B' of diagram 1). Defendants brought a claim of damages caused by the driveway closure, alleging that their access had inversely been condemned. The trial court, however, determined that the closure was carried out pursuant to a valid exercise of the city's police power (see note at the end of this discussion).

"Although the defendants advanced a number of theories, the real thrust of their appeal is that the trial court erred by directing a verdict against them

on the inverse condemnation claim. We disagree. An owner of land abutting a street has a common law right to access to his property from the road. *Oregon Investment Co. v. Schrunk*, *supra*; *Boese v. City of Salem*, *supra*; rev den 287 Or. 507 (1980). However, the rights of abutting proprietors to access to their premises are subservient to the public's right to free use of the streets. That right is protected by the state's exercise of its police power. *Oregon Investment Co. v. Schrunk*, *supra*; *Boese v. City of Salem*, *supra*. An interference with access rights that is an exercise of the city's police power is not a compensable taking.

"It is well settled that changing a public road to provide for public safety and convenience is a legitimate exercise of a city's police power. Thus we conclude that the closure of defendant's driveway was not a compensable taking. *Oregon Investment Co. v. Schrunk*, *supra*; *Argo Investment v. Dept. of Transportation*, *supra*; *Boese v. City of Salem*, *supra*. Defendants point out that the change in driveways has made it less convenient to enter the station and has resulted in a decline in business. The closure has also made it harder for defendants to get fuel, because it must now be specially delivered because tanker trucks can no longer pull into the station. Those matters are *damnum absque injuria* (loss, hurt or harm without injury in the legal sense) and not compensable. *Oregon Investment Co. v. Schrunk*, *supra*; *Boese v. City of Salem*, *supra*."

The Court of Appeals held that the verdict of the trial court was "proper."

Note: *Oregon Investment Co.* provided this observation of Mr. Justice Holmes in his dissenting opinion in *Tyson & Bro. v. Banton*, 273 U.S. 418:

“... [W]hen legislatures are held to be authorized to do anything considerably affecting public welfare it is covered by apologetic phrases like *the police power*, or statement that the business concerned has been dedicated to a public use. The former expression is convenient, to be sure, to conciliate the mind to something that needs explanation; the fact that the constitutional requirement of compensation when property is taken cannot be pressed to its grammatical extreme; *that property rights may be taken for public purposes without pay if you do not take too much*; that some play must be allowed to the joints if a machine is to work. But police power often is used in a wide sense to cover and, as I said, to apologize for the general power of the legislature to make a part of the community uncomfortable by a change.” (Emphasis supplied.)

The situation of *Oregon Investment Co. et al v. Schrunck et al, supra*, was similar to that of *Merritt Truax*. Here, the City of Portland prohibited vehicular access from Fourth Avenue to a parking lot because the street was designated as a 24-hour bus loading zone. The parking lot was, however, accessible from SW Morrison Street and SW Third Avenue. The plaintiffs admitted that their right of access to and from their property was subject to the paramount right of the public to use SW Fourth Avenue, and of the defendants to impose reasonable regulations and limitations consistent with public use. But they denied that the city had a right to totally prohibit vehicular access to their property from Fourth Avenue, the pivotal question of the case.

The plaintiffs claimed the prohibition was “arbitrary” and constituted “a taking of their property for public use without just compensation in violation of Oregon Constitution, Article I, Section 18.” The court responded:

1. The owners of the parking lot had the burden of establishing the unconstitutionality of the city’s action in prohibiting vehicular access to their property from Fourth Street. The court cited *Pacific States Box & Basket Co. v. White*, 296 U.S. 176, 185, 56 S. Ct. 159, 80 L. Ed. 138, 101 A.L.R. 853, 860:

The burden of showing arbitrary action is not sustained by making allegations which are merely the general conclusions of law or fact. Facts relied upon to rebut the presumption of constitutionality must be specifically set forth.

The plaintiffs failed to set forth a single fact, either generally or specifically, that the city’s act was unconstitutional.

2. *The city’s action in prohibiting vehicular access to the parking lot from the street designated as a 24-hour bus loading zone, which lot was accessible from two other streets, was within the scope of the city’s police power:*

- to regulate the use of streets and public thoroughfares,
- to keep streets in open and safe condition (**Note:** One difference between this and *Cabell v. Cottage Grove, supra*, is that the action in the latter case would have not kept the streets open) for public use, and
- to control and limit traffic and classes thereof and vehicles and classes thereof on the streets, avenues, and elsewhere (Portland City Charter, subsecs 2-105).

3....

4. While an abutting proprietor’s right to use of the street in front of his premises as a means of ingress and egress is a property right, the rights of abutting proprietors to access to their premises are subservient to primary rights of the public to free use of the streets for purposes of travel and incidental purposes.

5. A city has authority to regulate bus stops.

6. *The city’s action in prohibiting vehicular access to a parking lot from a street designated as a 24-hour bus loading zone was not unreasonable or arbitrary, where lot was accessible from two other streets, and if some depreciation in value of the parking lot or some lessening of profits from the parking business resulted, it was not a loss with injury in a legal sense, and hence there was no “taking” of property within constitutional provision.*

7. *Where property fronts on more than one street, access may be denied, under particular circumstances, at one of the streets, if adequate means of access remain to the owner at the other street or streets.*

One important fact in this case that made the court’s job a little easier in issuing its ruling was that the plaintiff had applied for permission to use their property as a parking facility. The plaintiff filed “an acceptance of the terms and provisions of the conditional use as granted by the City Council and thereafter installed an off-street parking facility upon the said real property.” The city granted the application to use the property as a parking facility and “to impose ‘such conditions and restrictions as it deems necessary to protect the best interests of the surrounding property or neighborhood or the City as a whole’: Ordinance number 110103, Planning and Zoning Code, subsecs 6-2204, 6-2217.”

As quoted from *Brand v. Multnomah County*, *supra* (38 Or. at 92, quoting *Northern Transportation Company v. Chicago*, 99 U.S. 635, 25 L. Ed. 336):

*“Acts done in the proper exercise of governmental powers, and not **directly encroaching upon private property**, though their consequences may impair its use, are universally held not to be a taking within the meaning of the constitutional provision.”* But see ORS 105.850 to 105.870 (enacted by 1973 Legislature).

In the situation of *Boese v. City of Salem*, the city closed a driveway because it posed a traffic hazard on Broadway Street. The private driveway served five garages that served a triplex and duplex. The trial court held that the closure was a taking as a matter of law. Surprisingly enough, the Court of Appeals reversed the trial court’s decision, even though the result of the city’s action was the loss of utilization of the garages at the rear of the rental unit. (The plaintiffs arranged for access from the garages through an adjacent property at a fee of \$100 per month. However, the court said the existence of this access was not material.)

The court said that, although closure of a private driveway serving garages in rear of rental units resulted in access that may have been less satisfactory or even nonexistent for auxiliary purposes of utilizing garages at the rear of units, such inconvenience “*way damnurn absque injuria* and not a compensable taking, where landowners retained adequate access to their property from another street for principal purpose for which the property was utilized, *i.e. maintaining rental units.*” But note: ORS 105.855 to 105.870, enacted in 1973, provides a procedure for compensation when access to commercial abutting property is restricted.

Can the Public’s Easement be Defeated by Nonuse, Adverse Possession, Equitable Estoppel or Property Taxation?

It is settled past controversy in this state that the right of the public to use land dedicated for a street, alley or other highway may not be extinguished by a claim of adverse possession.³²⁸ In other words, the ordinary statute of limitations cannot be set up to defeat the right of the public to the use of a public way. It is of interest that this became Oregon Law by a statute of Feb. 23, 1895, and remains the law as provided in ORS 221.750 and ORS 275.027.

In the “Laws of Oregon,” 1895, on page 57:

“The right of cities and towns (whether incorporated or not) within the State of Oregon, to land

dedicated to or otherwise acquired for the public use for streets, highways, parks or public places, shall not be extinguished by any adverse possession however long continued...”

Oregon Law now provides:

Principle 38

ORS 221.750: “The right of cities and towns, whether incorporated or not, to land dedicated to or otherwise acquired for the public use for streets, highways, parks or public places, shall not be extinguished by any adverse possession, however long continued. No title to such lands as against any such city or town shall be hereafter acquired in this state through operation of the statute of limitations.”

Principle 39

ORS 275.027: “The rights of any county to public lands are not extinguished by adverse possession. No title or property rights to public lands shall be acquired against the county through operation of a statute of limitations.”

So it is settled. Even though an abutting owner uses the land of the street for gardening, lawn, or to store lumber for the statutory period of 10 years, the public retains the right to open the road for travel. But what if the abutting owner inadvertently constructed valuable improvements on the land of the street, with a city’s knowledge and tacit acquiescence (inferred approval by the city’s silence and failure to halt the construction)? In *Schooling v. Harrisburg*,³²⁹ the first case of *Oliver v. Synhorst*,³³⁰ *Portland v. Inman-Poulsen Lumber Co.*,³³¹ *Nicholas v. Title & Trust Co.*,³³² *Barton v. Portland*³³³ and *Dabney v. City of Portland*³³⁴ the Oregon Supreme Court held that the right of the public in and to a street, by an unlawful encroachment thereon, may be extinguished by *equitable estoppel*,³³⁵ consent by the officers of a municipality, or tacit acquiescence.

Before presenting Principle 42 regarding equitable estoppel and tacit acquiescence, it is important to discuss the doctrine of law as it prevailed in the pioneer era.

In 1903, the Oregon Supreme Court decided *Schooling v. Harrisburg*.³³⁶ The plaintiff, Schooling, brought suit to enjoin the city of Harrisburg from opening a certain public way which had been dedicated by filing a plat in 1871 and by the sale of lots with reference to the plat. At the time of dedication, the tract was enclosed by a substantial fence which was maintained at all times thereafter. None of the streets or alleys in controversy were ever opened.

The dedicator, after filing the plat, planted fruit trees and grapevines in the street. In 1876, he conveyed to the plaintiff, by warranty deed, portions of two blocks, and by quitclaim deed, all of his interest in the portions of the street in controversy. In addition to planting more fruit trees and grapevines in the streets, the plaintiff fenced the area and erected a shed across the alley.

In 1901, the city directed removal of all obstructions (nuisances). The plaintiff alleged that the defendant ought to be estopped from asserting any rights in the streets and alley, "for it had, for more than twenty-five years, with knowledge of his claim of ownership in said streets and alley, permitted him to improve the same." The court ruled in favor of the plaintiff, citing Dillon on *Municipal Corporations*. Although acknowledging that as respects public rights, cities were not affected by the ordinary statutes of limitations (10 years), the court said:

"... but there is no danger in recognizing the principle of an *estoppel in pais* (estoppels by conduct) as applicable to such cases, as this leaves the courts to decide the question, *not by mere lapse of time*, but by all the circumstances of the case, to hold the public estopped or not, as rights and justice may require.

"...In the case at bar the officers of the (city) knew that the streets and alley in question were enclosed, and must also have known that plaintiffs, for more than twenty-five years had been making *valuable* improvements thereon, and, these officers having permitted him to use the property without objection in a manner inconsistent with the assertion of any right thereto on the part of the city, such tacit permission and use evidence and abandonment of the highway by the municipality, which operates to estop it from asserting the right now insisted upon, and this being so, no error was committed in restraining the opening of such streets and alley, and hence the decree is affirmed."

Comments. Today, the Supreme Court would probably rule in favor of the city for these reasons:

1. The improvements would not be considered *valuable* today, nor would they make it difficult for the public to open the highways.
2. Based on the decision in *City of Molalla v. Coover et ux*,³³⁷ the fact that the dedicator and plaintiff knew the streets and alley were dedicated would, today, cause the court to reject Schooling's plea.
3. Schooling had the fee to the bed of the streets, not primarily as a result of the quitclaim from the dedicator, but as an abutting owner. Therefore, his use was not really *adverse*.

4. Where use is merely permissive, and not adverse, there is no basis on which a right by adverse possession may rest.³³⁸ If Schooling's use was not adverse, and was permitted by the city (as claimed by him) there *should* not be a basis for his claim.

5. In *Lowell et al v. Pendleton Auto Co.*,³³⁹ the court said:

"It is well established that the doctrine of *laches* is inapplicable to public rights. As was said by Lord Ellensborough, in *Rex v. Cross*, *supra*: 'It is immaterial how long the practice may have prevailed, for no length of time will legitimate a nuisance.' "³⁴⁰

6. A municipal corporation is not estopped by the acts of its officers when they exceed their powers.³⁴¹ The rule is that persons dealing with such officers must, at their peril, ascertain the scope of their authority.³⁴²

The first case of *Oliver v. Synhorst*³⁴³ involved an assertion by the plaintiff that her improvements were made with the knowledge and "consent" of the city. The trial court struck the allegations on which estoppel was predicated and the plaintiff appealed in the Supreme Court. In that court the plea of estoppel was held good. The court said:

"...But, while the rule may be that the ordinary statute of limitations as such cannot be set up to defeat right of the public to the use of a street or highway, there may grow up, in consequence of the *laches of the public authorities*, private rights of more persuasive force in the particular case than that of the public. And if 'acts are done by an adjoining proprietor which indicate that he is in good faith claiming as his own that which is, in fact, a part of the highway, and is expending money on the faith of his claim, by adjusting his property to the highway as he supposes or claims it to be, the public will be estopped'..."

"The approval in this case, and references to 'laches of the public authorities' support the view that estoppel may result from tacit acquiescence . . ."³⁴⁴ *Oliver v. Synhorst*³⁴⁵ was again before the Supreme Court. The court said the evidence failed to show that the plaintiff had taken any measures to ascertain the location of the street lines or that the plaintiff believed her improvements to have been on the lots which she purchased.

"...In other words, being uncertain as to the exact line, she was willing to take the chance of an improvement being made in the future. This comes far from the good faith required in these cases to constitute ground upon which to predicate an estoppel."

The court also said:

“... To require a city to open and improve all its streets at once, without reference to the need of such improvement, at the peril of forfeiting them, would be absurd, as a matter of public policy...”

But the question is not whether a city may forfeit a street by failure to improve it. The question is whether forfeiture may result from failure to perform its duty to prevent or remove permanent obstructions.³⁴⁶

The court held further that there was nothing in the fact that the city council visited the property and made no objection to the location of the plaintiff's improvements. It was considered immaterial that the mayor had stated that there would be no objection to the fencing of the street. The court said:

Principle 40

“(A) mayor cannot vacate a street by the most solemn act of authority, much less by a mere casual expression of opinion.”³⁴⁷

On rehearing, the court pointed out that a sale by reference to a plat is bound thereby, and:

Principle 41

“In good reason a person acquiring property with reference to such a plat is equally bound by the plat with reference to the streets and alleys marked out.”³⁴⁸

“The court held that there was no evidence of any affirmative action by the city. It pointed out that the commonest kind of observation would have shown the plaintiff that her enclosure was encroaching on the street and added:

“‘... The plaintiff is presumed to know what, with ordinary care, she might have discovered by searching the records or causing a survey to be made...’

“The court attempted to distinguish *Schooling v. Harrisburg*³⁴⁹ by pointing out that in the latter case, plaintiff had color of title. Plaintiffs claim of estoppel was again rejected.”³⁵⁰

Although the final *Synhorst* case overruled previous precedent of the Supreme Court, subsequent decisions in *Portland v. Inman-Poulsen Lumber Co.*,³⁵¹ *Nicholas v. Title & Trust Co.*,³⁵² *Barton v. Portland*³⁵³ and *Dabney v. City of Portland*³⁵⁴ came within the rule laid down in *Schooling*, i.e. that the public's right to the use of a dedicated way is defeated under the doctrine of estoppel by acquiescence. The *Schooling* case has also been cited in *Silverton v. Brown*³⁵⁵ and *Booth v. Prineville*.³⁵⁶

The court, in *Coover*, puts those decisions in proper perspective:

“... The actual decisions, however, are by no means as persuasive as the words employed. The first opinion in *Synhorst* was based on *alleged consent of the city*. In *Inman-Poulsen*, the city established street grades on the streets around the area in controversy, *but none on the alleged streets on which the defendant erected improvements of very great value. The defendants were encouraged by the mayor and city council to locate their mill on the premises; they notified the city of intention so to build:*

“‘... and requested that if said city claimed any interest or right in said premises or any portion thereof, or for the use of the public as a street or otherwise, that the same should be vacated, and he was informed by the said mayor that the City of East Portland *did not and would not claim any of said premises as a public street or highway*, except that the city claimed Fifth Street, now Grand Avenue, as a public street...’

“After acquiring legal advice, the defendants constructed their mill. This court held the city was estopped. It was a clear case of affirmative action relied upon in good faith. In *Silverton* there was evidence of adverse possession for the statutory period *prior to the enactment in 1895* which exempted the city from the operation of the statute of limitations. In *Booth v. Prineville*, *Barton v. Portland*, and *Nicholas v. Title & Trust Co.*, all *supra*, the approval of the ruling in *Schooling* was mere dictum. In *Dabney v. Portland*,³⁵⁷ although this court said that estoppel might arise from acquiescence, it was at pains to point out that there were affirmative acts by the city ‘whereby a person might reasonably reach the conclusion that the property had been abandoned for public use.’ In *Hart v. City of Independence*,³⁵⁸ the statement that the city was estopped was unnecessary to the decision of the case. The Court also pointed out that it was not, as in earlier cases, a simple matter for the plaintiff to have ascertained the true boundary lines of the street. It indicated that the exercise of reasonable diligence might not have discovered the true boundaries.

“It would seem that a governmental body should be, in general, as immune from estoppel as a private litigant.

“As against the holdings that the city may be estopped by passive acquiescence, we find persuasive authority and sound reasons for the severe restrictions of the doctrine. In *Portland v. Miller*,³⁵⁹ the city sued to enjoin the maintenance of a dwelling house in the street. The Court cited the second opinion in *Oliver v. Synhorst*³⁶⁰ and said:

“‘The city is not estopped by reason of its failure to eject the defendants at an earlier date.’

“‘While this addition continued to be thinly populated, there was probably no occasion to use the street in question; and now that occasion has arisen for its use, citizens who bought and built upon the faith of the plat should not lose their right to use the street because the city authorities did not open it before such occasion arose...’

“In a suit to restrain the defendant from obstructing a street, the court rejected the defendant’s plea of estoppel, and said:

“‘... Defendant knew that there was a question as to the location of the street line; talked about it with the chairman of the street commission before he had done more than lay the foundation of the building. He had sufficient knowledge to put him on inquiry, and what he did thereafter he did at his peril...’ *City of Newberg v. Kienle*.³⁶¹

“The Court also observed that the defendant had not been induced to make an expenditure ‘by any acts of the city.’ In *Cruson v. City of Lebanon*,³⁶² the plaintiff, relying on the *Schooling* case and upon the doctrine of estoppel, sought to enjoin the city from opening an alley. Here again, the Court recognized the possibility of estoppel by acquiescence, but it emphasized that there must also be ‘belief in good faith on the part of the claimant that the street had been abandoned by the public,’ and reliance ‘on the faith of that belief’ “*Lowell et al v. Pendleton Auto Co.*³⁶³ was a suit to restrain a defendant from carrying on the business of storing and repairing automobiles in a public street. The defendant pleaded long-continued use and laches on the part of the plaintiffs. The Court said:

“It is well established that the doctrine of laches is inapplicable to public rights. As was said by Lord Ellensborough, in *Rex v. Cross*, *supra*: ‘It is immaterial how long the practice may have prevailed, for no length of time will legitimate a nuisance.’

“In *City of Eugene v. Garrett*³⁶⁴ a street had been dedicated to the width of 90 feet. The defendants asserted that the city was estopped to claim a greater width than 70 feet. The court said:

“‘... Most of the lot owners who made improvements on the west side of the street knew that no portion of the 90 foot street had ever been vacated. All of them could with reasonable diligence have obtained such information. This is shown and recognized by their petition to the city council to vacate a portion of the street and establish the same seventy feet wide, as proposed by the ordinance which was vetoed by the mayor...’”

The court, in *Coover*, held that the entire doctrine of equitable estoppel as applied to governmental bodies, and, in cases of the type being considered, was “‘anomalous.’”³⁶⁵

“In so far as it has been held that estoppel may arise from affirmative action by a city or its officers, the rule is at logger heads with the principle ‘well established that a public or governmental corporation like a municipal corporation is *not estopped* by the acts of its officers when they exceed their powers. The rule is that person dealing with such officers must, at their peril, ascertain the scope of their authority.’ *Tuttle v. Beem*.³⁶⁶

“‘It has been held that no estoppel can arise from an act of a municipal corporation or its officers when done in violation of, or without authority of law, even when money has been expended on the faith of a supposed license...’ *Mutual Irrigation Co. v. Baker City*.³⁶⁷

“Again in *Cabell et al v. Cottage Grove et al*, this court said:

“‘It remains only to say that since, as we have seen, it is beyond the City of Cottage Grove to close any of its streets, it is equally beyond its powers to authorize another to do so; and, consequently, the city is not estopped by its consent to the improvement and its subsequent repudiation of that consent to object to the (Highway) Commission’s unauthorized acts...’

“And in *Public Market Co. of Portland v. City of Portland*,³⁶⁸ we said:

“‘... A municipal corporation is not estopped by the acts of its officers when they exceed their powers. The rule is that persons dealing with such officers must, at their peril, ascertain the scope of their authority.’

“We have seen that a city has no legal right to surrender its platted streets to private person, but on the contrary has a duty to remove public nuisances therefrom. If then, equitable estoppel, based on affirmative action by the city, runs counter to the rule of the cases last above cited, the conflict must be even greater when estoppel is predicated upon acquiescence, *i.e.*, the laches of its officers. We have repeatedly held that estoppel in pais against a state will not arise from laches of its officers.³⁶⁹ *It is because of these conflicts that the courts have frequently cautioned that the doctrine of equitable estoppel should be applied in street cases only in exceptional instance of extraordinary hardship.*³⁷⁰

“The doctrine of *Schooling v. Harrisburg*³⁷¹ is a product of the pioneer era. It is ill-adapted to the needs of progressive and growing cities. In so far as that

case and the dicta which have approved it stand for the proposition that a city will be estopped to open a street by reason of its tacit acquiescence in the construction therein of permanent and valuable improvements by persons who knew or should have known that the erections were within the lines of dedicated though unopened streets, *it and they are overruled*. The plaintiff in the Schooling case knew that his improvements were in the street. The fact that he took a quitclaim deed to property which his grantor could not convey might have given color of title but did not give color of equity. In the case at bar (*City of Molalla v. Coover et ux*³⁷²) the defendant knew that Seventh Street had been dedicated and in any event he was chargeable with such knowledge. He knew that in certain parts of the platted property, streets had been vacated. When his right to occupy Seventh Street was challenged, he was able to, and did ascertain with certainty from the county records that Seventh Street *had not been vacated*. From the time of the vacation proceedings in the county court, the defendant was chargeable with the knowledge which he could have obtained had he exercised reasonable diligence. While he may have been honest in his belief that Seventh Street had been vacated, he is in no position to claim an estoppel against the city. *If the city had a duty to prevent and remove encroachments, the defendant also had a duty not to construct or maintain them. Here the equities are not equal. The public interest must prevail. Our decision is limited to the facts of the pending case.* Whether estoppel may in exceptional cases be predicated upon affirmative action by a city or its officers need not be and is not here decided...”

Principle 42

In Oregon, there have been cases where the public rights to dedicated ways have been extinguished by a city's or county's tacit acquiescence or by equitable estoppel. The State Supreme Court has not ruled out the possibility that in exceptional cases of extraordinary hardship, a city or county might be enjoined from opening a dedicated public way occupied by valuable improvements.³⁷³ However, this possibility is considered a product of the pioneer era, and ill-adapted to the needs of progressive and growing cities and counties. Neither the lapse of time, nonuser by the public, nor levying and assessment of taxes will constitute an estoppel.³⁷⁴

It is essential to emphasize the last point expressed in Principle 42: “The levy of taxes on property does not estop the public from claiming it as a highway.”³⁷⁵ This principle is supported by Oregon law. ORS 307.200 provides that the land of public highways are exempt from ad valorem taxation only when they are

used for the purpose for which they were dedicated. Without the exemption, and in light of the fact that the fee to the land is in the “rightful” abutting owner, such land constitutes taxable real property as defined by ORS 307.010 and required by ORS 307.030. An assessor would be remiss to willfully or knowingly omit to assess the land of a dedicated public way that failed to qualify as exempt.

*Menstell et al v. Johnson et al*³⁷⁶ provides this insight regarding the nonuser of dedicated public ways.

“To say that a dedication to the use of the future town and of the public, made when the town was in a state of nature, would be lost if not followed by immediate and continued use, or should be limited to the extent to which it was used (for lesser purposes than those purposes so dedicated), *would deprive the dedication of its intended value and would make it a mockery*. The local authorities or the corporate guardians are the ones whose duty it is to improve, adorn and embellish the public parks (or improve and maintain public ways), and where the dedication is irrevocable, as we hold it to have long since become in this case, they are the judges as to the time when the public health and public pleasure (and welfare) demand the use and enjoyment of the lands dedicated.”

Principle 43

“A municipal corporation is not bound to open a dedicated street until its use is deemed necessary by the common council. Until that time, however, the dedicator whose premises abut upon the street may make such reasonable use of the proposed highway as not inconsistent with the right of the public, or municipality, to open and improve the street when it is considered essential to the public need.”³⁷⁷ In this respect, the use of the land of an unconstructed way for lawn, garden, shrubs and even fruit trees has been considered “reasonable” use of a way. However, permanent and costly buildings and other improvements are inconsistent with the right of the public because of both the legal and physical difficulty required to open the ways for public travel.

Principle 44

The rule stated in Principle 43 also applies to dedicated subdivision streets and alleys under jurisdiction of the counties and the county courts.

Nuisance in Public Ways

*Black's Law Dictionary*³⁷⁸ defines *nuisance* as “that which annoys and disturbs one in possession of real property, rendering its ordinary use or occupation physically uncomfortable to him (or her).”³⁷⁹ It is “everything that

endangers life or health, gives offense to the senses, violates the laws of decency, or obstructs the reasonable and comfortable use of property.”³⁸⁰ A nuisance is an annoyance, anything that essentially interferes with the enjoyment of life or property. A nuisance in a public way could be a lawful use of a public way, but would be either an unreasonable or unwarrantable use of the way. Usually, a nuisance in a public way is the result of an unlawful use of the way. A nuisance *per se* is a nuisance at all times and under all circumstances, regardless of location or surroundings. A nuisance *per se* is *always* an unlawful nuisance.

ORS Chapter 221 contains the statutory laws governing the organization and government of cities. *Nuisance*, as defined in ORS 221.915, is:

“Every act or thing done, or anything existing within the limits of any city referred to in ORS 221.906, which is or may be declared by any law of this state or by any ordinance of such city to be a nuisance, hereby is declared to be a nuisance, and shall be considered and treated as such in all actions, suits and proceedings whatsoever, unless such law or ordinance is declared void by a court of competent jurisdiction.”

Nuisance law and litigation provide insight into the effect of dedication. They show the complexity of the law of dedication and provide a realistic picture of the rights of abutters and the public. Those are in contradistinction to the rather rigid restrictions and restraints implied by certain principles of law already discussed in this chapter. The danger of omitting any discussion on nuisance is that without at least a brief exposure to the subject, you will most certainly adopt an unrealistic concept of the law of dedication.

This section of the publication should be beneficial to assessors and appraisers because nuisance in public ways can affect the market value of real property.³⁸¹ The decisions of the Oregon Supreme Court indicate that it is doubtful that an individual can restrain a public nuisance or sue for damages unless the nuisance has worked a proximate, immediate and substantial injury to the value of that person’s abutting real estate.

But be advised, regardless of the information provided here, *do not, under any pressure, circumstance, or conditions, use this information to advise any taxpayer that a use, obstruction, barricade, etc., constitutes an unlawful act, public nuisance or private nuisance.* In all likelihood, your advice will be a disservice to the taxpayer and the community.

Any nuisance in a public way is a *public nuisance*, but some may not be a nuisance *per se*. They may be only technically a public nuisance, but physically a *private nuisance*. The words “public” and “private” have nothing to do with who effects the nuisance; it denotes who is affected. A public nuisance or private

nuisance can also constitute other offenses such as trespass or an unlawful taking of private property. If the issue before the court is that of a private nuisance, the court will rule on the nuisance, not on trespass (although it may consider the act of trespass in passing judgment on the nuisance). Therefore, some confusion can be avoided by always relating the decision to the issue being considered by the court.

A public nuisance affects an indefinite number of persons, or all the residents of a particular locality, or all people coming within the extent of its range. However, the extent of annoyance or damage inflicted on individuals may be unequal. There is a rule regarding public nuisance that may be confusing to students of the law of dedication. As explained in *Barrier v. Troutman*:³⁸²

“The rule is established that for a public nuisance, where rights and privileges common to the public or to all the people of the community are injuriously interfered with, no action lies in favor of an individual in the absence of a showing of unusual and special damage, differing from that suffered by the general public.”

For example, the unlawful barricading of a public way may deprive the public of its free and unobstructed use of the public way. It may also deprive an owner of a lot purchased in the same subdivision as the barricade (but located several blocks from the obstruction) from the free and unobstructed use of a public way dedicated on the subdivision plat. That owner does not have standing to maintain a suit to restrain the nuisance or to collect damages because the owner has not sustained any injury differing in kind from that suffered by the general public.

True, the barricade may be unlawful, but the ownership of the real estate is not, in itself, a qualification to speak on behalf of the public. It is not difficult to envision the practicality of the rule issued in *Barrier*. Imagine the effect of allowing every member of the community to sue for every public nuisance, or for what each person conceives to be a public nuisance. This is not to suggest that an unlawful barricade of a public way should be allowed to remain. To the contrary, the way is public; either the state or its authorized agent or official responsible for the way should maintain an action to remove the barricade in behalf of the people of the state and the county or the community.

Presumably the owner could sue to restrain the barrier on the basis that it constitutes an unlawful taking of private property. After all, the state Supreme Court has held that: (1) every purchaser of a lot or block in a townsite or subdivision is entitled to the free and unobstructed use of every public way represented on the townsite or subdivision map, plan, plat or survey, (2) that right is part of the consideration passing to the

purchaser, (3) that right is property within the meaning of the constitutional prohibition against any unlawful taking of private property. Such a suit might be successful, but not because it was a public nuisance.

A public nuisance can inflict a special injury to the real estate of a private individual that differs in kind from that sustained by the general public. When such an injury is proven in court, it is classified as a *private nuisance*, but would actually be a *mixed nuisance* because it is also a public nuisance. A private nuisance is defined as:

“Any wrongful act which destroys or deteriorates the property of an individual or of a few persons or interferes with their lawful use or enjoyment thereof, or any act which unlawfully hinders them in the enjoyment of a common or public right and causes them a special injury differing from that sustained by the general public.”³⁸³

In *Stoddard v. Snodgrass*,³⁸⁴ the court said:

“No action will lie for a nuisance in respect of damage which, even though substantial, is due solely to the fact that the plaintiff is abnormally sensitive to deleterious influences (influences having an obscure or unexpected harmful effect), or uses his land for some purpose which requires exceptional freedom from any such influences.”

If the use of a public way is lawful, then it must be unreasonable and must cause material damage to the abutting property to be a private nuisance. The lawful use of a public way for travel, even though viewed by certain abutters as excessive, has been held to be one of the tradeoffs that an urban dweller must tolerate for the benefits of living in a city. The urbanite accepts these benefits in exchange for the quiet and solitude enjoyed by rural residents. The barricading or partial obstruction of neighborhood streets for a few private residents at the expense of the general public would be unlawful and would be a public nuisance. This is so, even though the obstruction may not be a private nuisance where the owners of abutting property did not object.

The official governing body has the responsibility for preventing any hindrance to the free and unobstructed use of every public way in its jurisdiction. Where a municipality or county fails to act in such cases, the state could maintain an action on behalf of its citizens to force the removal of all obstructions so the public could use the way for travel from place to place.

Take note, although every owner of real estate that abuts a public way has special rights referred to as *abutter's rights*, the use of the word “*abutter*” in nuisance litigation usually denotes the owner of real estate at or very near the location of the nuisance.

*Lowell et al v. Pendleton Auto Co.*³⁸⁵ was a suit for an injunction to restrain the defendant from committing

certain acts which the plaintiffs alleged constituted a public nuisance.

For three years, the automobile company used Johnson Street to fix and store automobiles, day and night, and to inspect and test automobile engines. The complaint alleged that the auto company used the street to store old, used cars. The complaint said that use by the company caused outside people to believe the residents along Johnson Street had no objection to that use of the street in front of their homes. Consequently, people doing business with the auto company parked their cars in front of the residences for long periods of time. The complaint averred that:

- as a result, Johnson Street took up a shabby, neglected appearance;
- the defendant's acts caused pools of oil to be left in the street;
- oil was tracked into the homes of the plaintiffs;
- gases were often created by the testing and running of motors;
- the gases or fumes were strong enough to be offensive;
- and, in the repair of automobiles in the street, loud noises were created.

The plaintiffs alleged that Johnson Street was a *residential street*, and that the residents spent time and money to adorn their property with shade trees so their properties would be more attractive. *The plaintiffs also alleged that:*

- *the defendant's acts interfered with the plaintiffs' free access to their properties;*
- *the defendant's acts detracted from the attractiveness of their homes and from the home atmosphere;*
- *the defendant's acts interfered with the plaintiffs' view;*
- *the market value of their properties had been diminished by 25 percent;*
- *and the desirability of their properties for residential purposes had been lessened 50 percent.*

Those allegations were denied. The defendant claimed that:

- Johnson Street was devoted almost entirely to business;
- the ordinances of the City of Pendleton permitted unlimited parking along Johnson Street;
- for more than 30 years, the presence of a fire station, church and small mercantile establishments along Johnson Street had caused much of the parking along the street;
- at the time there were several automobile establishments along Johnson Street in the immediate vicinity of the plaintiffs' property;

- and whatever parking occurred there was due to the natural conditions produced by the general use of automobiles and not by any of the defendant's acts.

The lower court found in favor of the plaintiffs. It found the plaintiffs had suffered special damages and injury, in addition to and different in kind from that experienced by the public, from the negative results claimed by the plaintiffs.

The Supreme Court believed "that a preponderance of evidence supported the findings of the lower court."

Regarding certain allegations by the auto company, Mr. Justice Rossman said:

"From the evidence, we understand that Johnson Street is the only street to which the property of the plaintiffs have access; their properties are almost in the center of the block; all of the acts of which they make complaint occurred in Johnson Street immediately in the vicinity of their homes, while many of the acts of which they make complaint occurred upon property, *the fee of which is vested in the plaintiffs subject only to an easement of the public for travel purposes*. The owner of the abutting property, in one respect, at least, sustains to the street a position different from that of anyone else; this particular position has been well stated by a writer:

"For instance, the owner of the soil of the way has right to all above and under the ground, except only the right of passage for the king and his people."³⁸⁶

"The rights of one who is not an abutter are much more limited than those of the abutter or sovereign; the latter may take the rocks and soil from the roadway and use them for repair, purposes, but one who is neither an abutter nor the sovereign may commit no such act. The rights of the owner of property abutting upon a street have been stated in the following language:

"(1) the right of access, often referred to as that of ingress and egress; (2) the right of light and air; (3) the right of view; (4) *the right to have the street kept open and continued as a public street for the benefit of the abutting property*; and (5) as stated in recent New York decision, whatever adds to the value of the street to the abutter."³⁸⁷

"The abutter's rights have been recognized and protected by this Court from the earliest of times. Thus, in *Pettish v. Stephens*,³⁸⁸ we held:

"Defendants say further, that the decree ought not to stand, because an individual cannot interpose by injunction to prevent a public nuisance. The bill alleges that if the defendants proceed with their buildings, the injury to the plaintiff will be irreparable; and certain it is, that if the plaintiff is entitled to the

use and advantage of a public levee in front of and in the vicinity of his block, the exclusive occupation of such levee by the erection of houses thereon would be greatly prejudicial to his interests. The damages to the property for purposes of trade and commerce, to which it is adapted by its location, can hardly be estimated. So long as the nuisance continued, so long would the business facilities of such property be obstructed or destroyed. There is no adequate remedy at law. Suit after suit would have to be brought by the plaintiff, as the demises are forever accruing, and he would be compelled at least to submit to the wrong, or to what was less desirable, the burden of interminable litigation.'

"One of our later decisions recognized that the very nature of the situation of the abutter may cause him to suffer peculiar and special damages whenever a nuisance occurs in the street. Thus in *Bernard v. Willamette Box & Lumber Co.*,³⁸⁹ we held:

"The owner of a town lot suffers peculiar and special damages, differing in kind from that to which the public is subjected by the obstruction of a part of the public street immediately in front of his premises, whereby ingress and egress to and from such abutting property is prevented, and such owner may maintain a suit in equity to prevent or remove the common nuisance.'

"To the same effect see *Kurtz v. Southern Pacific Co.*,³⁹⁰ wherein we said:

"The plaintiff being the owner in fee, subject to the public easement of that part of Trade Street north of the middle line thereof in front of and abutting upon his real estate, the excavation in the highway near the sidewalk on the south side of the premises, for the purpose of building the spur switch, evidences a *taking* of his property without just compensation...'

"A writer expresses the rule of the law applicable in these words:

Principle 45

"An abutting owner has two distinct kinds of rights in a highway, a public right which he enjoys in common with all other citizens, and certain private rights which arise from his ownership of property contiguous to the highway, and which are not common to the public generally; and this regardless of whether the fee of the highway is in him or not. These rights are property of which he (or she) may not be deprived without (that person's) consent, except upon full compensation and due process of law.'³⁹¹ But these rights may not be deprived, under any condition, for a private purpose.

*"Luhrs v. Sturtevant*³⁹² and *Von Buskirk v. Bond*³⁹³ do not contain anything to the contrary..."

Principle 46

For there to be a nuisance, "The obstruction to access need not be continuous and complete; it is sufficient if the hindrance is only occasional and extended for a few hours at a time."³⁹⁴

Principle 47

The rights of the abutter of property on a street "concern themselves not only with the property immediately in front of his lot, but extend to a sufficient area near by to make available to him the full enjoyment of the street."³⁹⁵

The court, in *Lowell et al*, held that the plaintiffs suffered injuries sufficiently peculiar and special to enable them to present this case. It also held:

Principle 48

"The mere fact that the articles deposited in the roadway by the defendant were on wheels (automobiles), and generally used for the purposes of travel, entitle them to no greater rights than those of another individual who deposits in the roadway, other kinds of articles not commonly used for travel purposes. From the earliest of times the courts have declared that the streets and highways are for the purpose of travel."³⁹⁶

In *Pugh v. Crawford*,³⁹⁷ it was said, "No one can make a private garage of the public street." The court, in *Lowell et al*, listed the following as constituting nuisances. Regardless of whether they are on the street or are on the sidewalk, if they are within the boundary of the public way, they are nuisances. Where the community has allowed such nuisances, they might not qualify as public nuisances, but where a private abutting owner's rights are interfered with or hindered they will qualify as *private nuisances*, i.e.:

"(1) A lunch wagon in the street obstructed the ingress and egress to the plaintiff's property; the court held the plaintiff was entitled to injunctive relief."³⁹⁸

"(2) In *Reed v. City of Seattle*,³⁹⁹ the complaint alleged that the city started construction of a gasoline filling station in the street adjacent to the plaintiffs property. The lower Court sustained the defendant's (city) demurrer. The Supreme Court held this to be an error, *because the abutting property owner is entitled to insist that the street remain open for the purpose of travel*.

"(3) A bay window in the second story of a house, sixteen feet above the sidewalk, projecting be-

tween three and four feet beyond the line of the street, was held a public nuisance."⁴⁰⁰

"(4) Flower stands used in the public streets for the sale of flowers have been dealt with likewise."⁴⁰¹

"(5) While even corner loungers in the public street have been held to constitute a nuisance."⁴⁰²

"(6) A peddler's stand which interferes unreasonably with the right of travel in the streets has been held to constitute a nuisance in a suit wherein a taxpayer was the plaintiff."⁴⁰³

"(7) A public scale put in the street pursuant to municipal authority has been dealt with likewise."⁴⁰⁴

*"The entire situation resolves itself down to the well-established principle of law that the streets and the highways are for the purpose of travel, and one cannot eke out the inconvenience of his own premises by taking in the public highway."*⁴⁰⁵

In *Lowell et al*, the court said *the plaintiffs may maintain the suit unless the city ordinances permitting the parking on Johnson Street had "legalized" the defendant's acts, or unless the plaintiffs were guilty of laches. It must be presumed that this was based on the plaintiffs' charge that the auto company's acts were a public nuisance rather than a private nuisance. If, as the courts have consistently held, the abutting owner enjoys certain private rights which arise from the ownership of property contiguous to the highway (Principle 45), and if those rights are property protected from any unlawful taking by the Constitution, then neither the legislature nor the city could "legalize" this kind of "private" nuisance for any private purpose, i.e.:*

*"Acts which at common law are nuisances may be legalized by statute, if such legislation does not amount to a taking or damaging of property forbidden by constitutional provisions. The effect of such statutes is to take away the wrongful character of the acts legalized; they are no longer torts, and hence, the remedy by injunction against them, of course, ceased."*⁴⁰⁶

"But we do not believe that the parking ordinances of Pendleton were intended to convert the streets into repair shops and storage spaces, disregarding of the protests of the abutter."

Principle 49

*"A parking ordinance is nothing more than a police regulation which settles the matter only between the owner of the automobile and the city."*⁴⁰⁷

"It is well established that while additional uses may be imposed upon a street no submersive of or impairing the original street, such as subjecting a street to new modes of travel, or laying down gas

or water mains; yet the rights of the public to use it as a street and of the adjacent owner to enjoy it as a means of ingress to and egress from his property cannot be materially impaired. *The city has the right to regulate traffic, but it has no power to appropriate the easement of the street to the private business of some individual.* The ineffectiveness of franchises, licenses and various privileges granted by city ordinances to deprive one of a property right is illustrated in the following cases..."⁴⁰⁸

The court concluded that the defendant auto company's acts in Johnson Street constituted a public nuisance. One automobile parked in a street may not constitute a nuisance.⁴⁰⁹ But a constant repetition of parking many cars in a street, and a constant use of the street for such purposes, as found in this case, do constitute a nuisance. "Such acts fall within the classification of repeated and continued conduct, the damages arising from which can be estimated only by conjecture and not by any accurate standard: it is this situation which gives equity its jurisdiction to abate the nuisance.

Principle 50

"An abutter cannot object to any use of the street which is incident to public travel, unless such use interferes with the rights which that person possesses as an abutting owner."

Consequently, the court made it clear that the defendant auto company still had a right to park on Johnson Street, as in all other parts of Pendleton, "whenever this privilege is exercised by it as incident to travel and not in violation of city ordinances and state laws."⁴¹⁰

Action For Reduced Commercial Property Value Resulting From Street Use Restriction

Oregon Law provides that a city or mass transit district shall be liable for restricting use of traffic lanes, adjacent to sidewalks abutting commercial property, for more than six hours in any 24-hour period. "Commercial property" is defined in ORS 105.850.

ORS 105.855. "Whenever after January 1, 1973, a city or mass transit district, whether or not acting pursuant to its police powers or condemnation authority, restricts use of the street traffic lane immediately adjacent to a sidewalk abutting commercial property to public conveyances and the existing access to that property by the general public by means of private conveyances is thereby prohibited or materially restricted for more than six hours in any 24-hour peri-

od, the city or mass transit district *shall be liable for and shall pay the difference between the fair market value of the property prior to the restriction and the fair market value of the property subsequent to the restriction*, taking into account any special benefits to the property resulting from improvements made by the city or mass transit district in connection with the restriction. The fact that other access to the property from a public way is available shall relieve the city or mass transit district from liability if the other access is reasonably equal to the access prohibited or materially restricted." (Effective Sept. 27, 1987.)

ORS 105.860. "Any person having any right, title or interest in any such abutting real property has a cause of action against the city to enforce payment of the compensation. Any such action may commenced and maintained in the circuit court for the county in which the real property is situated. Any party to any such action has the right to appeal from the final judgement of the circuit court as in other actions. A person having or claiming any right, title or interest in such real property may join as party plaintiff and may intervene in any action involving the real property in which the interest is claimed." (Effective Sept. 27, 1987.)

ORS 105.865 provides for apportioning compensation by the circuit court among property owners, and describes when city liability terminates.

ORS 105.870. "Any cause of action granted by ORS 105.850 to 105.870 is barred unless such action is commenced within 60 days after the date upon which the change of use becomes effective and use of the streets is prohibited or restricted." (Effective Sept. 27, 1987.)

ORS 105.850 to 105.870 was enacted by the 1973 Legislature (ch. 702).

Road Hazards—County Roads

ORS 368.251. "No person shall stop, obstruct or in any other manner impair or damage any drain, ditch or other man-made or natural water way that:

"(1) Prevents water from causing damage to, flowing across or standing on a public road under county jurisdiction; or

"(2) Benefits a public road under county jurisdiction." (1981 ch. 153 subsec 26.) Statute as of Sept. 27, 1987.

ORS 368.256. "(1) Except as authorized by the county governing body, an owner or lawful occupant of land shall not allow:

"(a) Any water to overflow, seep or otherwise discharge from that land onto a public road under county jurisdiction including, but not limited to, water that is passing over the land, diverted from the land

by an obstruction on the land, flowing from the land because of rainfall or discharged from an irrigation sprinkler or other device.

“(b) Any structure, tree, drainage way, soil deposit or other natural or man-made thing on that land to present a danger to or create a hazard for the public traveling on a public road or facilities within the right of way of the public road by obstructing, hanging over or otherwise encroaching or threatening to encroach in any manner on a public road that is under county jurisdiction.

“(2) A person is not in violation of this section if there is no reasonable method for the person to control, stop or remove the cause of the violation.” (1981 ch. 153 subsec 27) as in effect on Sept. 27, 1987.

ORS 368.261 authorizes a county road official to order a person in violation of ORS 368.256 to correct the problem. It specifies the requirements of the order issued under ORS 368.261, and requires a hearing if the problem is not abated.

ORS 368.266 describes the requirements of a hearing under ORS 368.261.

ORS 368.27.1 lists the factors that would allow a county road official to abate a road hazard. It exempts counties and their officers from liability for any reasonable act performed under ORS 368.271, including trespass or conversion of personal property. This section also requires a report for any acts taken under this law.

ORS 368.276 tends to the “hearing, notice, costs and damages effected when a county abates a road hazard.”

ORS 368.281 allows for reimbursement of costs for road hazard abatement.

Provisions for Occupying a Street to Facilitate Travel, Transportation or Distribution by Port Commission, Dock Commission, Common Carrier, etc.

Anyone who has traveled the streets and other public ways in Oregon will have been exposed to railroad tracks, loading docks, machinery and other structures used for transportation, commerce, shipping and the like, located within the right of way of certain streets, alleys and roads. Many of these uses are, in a literal sense, nuisances, and a few could legally constitute public, private or mixed nuisances. But the majority of the structures, trackage and machinery are lawfully occupying the public highways as provided for in ORS Chapter 271 on the “Use of Public Lands and Easements.” ORS 271.180 to 271.210 are part of

the vacation statutes. However, they do include the provisions for authorizing the use of the highways by port and dock commissions, common carriers, railroad and terminal companies, *i.e.*:

ORS 271.180. “To the end that adequate facilities for terminal trackage, structures and the instrumentalities of commerce and transportation may be provided in cities and towns located within or forming a part of any port district organized as a municipal corporation in this state, the governing bodies of such cities and towns, upon the petition of any such port, or corporation empowered to own or operate a railroad, steamship or other transportation terminal, or railroad company entering or operating within such city or town, or owner of property abutting any such terminal, may:

“(1) Authorize any port commission, clock commission, common carrier, railroad company or terminal company to occupy, by any structure, trackage or machinery facilitating or necessary to travel, transportation or distribution, any street or public property, or parts thereof, within such city or town upon such reasonable terms and conditions as the city or town may impose.”

Subsections 2 and 3 contain the vacation provisions. They, and the acts governing consent of owners, approval, petitions, notice, hearings and grant of petitions are provided in the subsection of this publication, on “Vacation Statutes.”

Street Obstructions and Barriers

Principle 51

“The fundamental idea of a street is not only that it is public, but public for all purposes of free and unobstructed passage, which is its first and primary, but by no means sole use.”⁴¹¹ But recent decisions of the court have recognized certain obstructions of streets as lawful when they are for public safety and convenience.

This discussion will speak of street obstructions and barriers as: (1) nuisances (in some cases), (2) lawful (when done only in those situations provided for by statute), and (3) unlawful (when the act has not been authorized by the legislature). The lesson here is that the authority to barricade or obstruct a public way, by any governmental body, must come from the legislature. Moreover, the legislative authorization must be either by expressed wording in the law or by necessary implication that gives effect to the obvious and plain intention of the legislature.

In the case of *Sandstrom v. Oregon- Washington Ry. & Nav. Co.*,⁴¹² the plaintiff claimed a direct physical injury to his real estate by a “ . . . very deep and impassable excavation across Newark Street” in the

City of Portland, and by “ . . . smoke and cinders issuing from a tunnel.” The steam railroad was built after the plat was recorded and after the plaintiff had purchased his land “with reference to a regularly dedicated plat showing the streets mentioned to be public highways.”

The railway and navigation company based its actions on permission granted its predecessors by the city and Multnomah County to construct the railway along Dana Street. The company was to make the excavation under certain prescribed conditions, one of which was:

“When the City of Portland shall determine to improve Newark Street, the railway company would build, across the excavation, a viaduct of steel and concrete construction the full width of the street, according to the direction of the city authorities.”

The court held:

“It was established, as stated that the public authorities had given permission for the construction of the railway. The effect of this is thus stated in Lewis on *Eminent Domain*.⁴¹³

Principle 52

““Authority to occupy a street, whether obtained directly from the legislature or from a municipality, only protects the company to the extent of the public right or easement in the street, and leaves the company to deal with private rights⁴¹⁴...”

“In other words, the sanction of local authorities exonerates the company from the charge of maintaining a public nuisance, but does not affect the damages to be assessed for the invasion of private rights.”

The defendant contended that the plaintiff suffered no damage or injury “that was not experienced by the public at large” because the excavation was not immediately in front of the plaintiffs premises (but was 16 feet east of his northeast corner). However, “although the general public may experience inconvenience from the sequestration of a public street by a railroad company, yet if an individual from the identical act undergoes a damage or injury peculiar to himself, he may recover for the same.

“Having purchased the property with reference to the dedicated streets appearing on the plat, the plaintiff was entitled to the use of those highways as an appurtenance to his premises. In common with the general public residing in other parts of the city or state, he had a right to travel along Newark Street without let or hindrance. For the invasion of the mere right to travel, as thus far stated, he is barred from recovery

by the municipal legislation mentioned; but as he passed along the street with other members of the general public, he had a privilege which no other person possessed, to wit, that of entering upon his close from that street, and prior to the construction of the road, in the exercise of his prerogative, he could approach his premises from the east as well as from the west. The defendant is in the position of saying to him in substance:

““Although you had the right, before we came upon the ground, to go to your residence both from the east and from the west and from the west along Newark Street, yet in our judgement it is enough for you if you can reach it from the west, and we will therefore appropriate your eastern approach for ourselves.”

“This is a palpable invasion of the plaintiff’s right of access to and egress from his premises. If it is sound in principle to allow this without compensation in damages, the company could as well take from him both approaches...”

Principle 53

“The great weight of authority indicates that, where a street upon which the plaintiff’s property abuts is so obstructed that it has been transformed from a through street into a cul-de-sac, that person is entitled to damages. So, although a person may use the passage in one direction as before, yet is deprived of the same privilege in the other direction, that person can recover for the same at law. However, such an obstruction at a limited access highway is now permissible.⁴¹⁵

“We cannot establish any hard-and-fast rule declaring how far along a street shall be extended an abutter’s right to sue for damages to his close, resulting from the obstructions not immediately in front of his holding. Lewis on *Eminent Domain* says:

““This right extends at least to the next intersecting street. Consequently, if the street upon which the plaintiff abuts is wrongfully closed or obstructed in either direction at a point between the plaintiffs property and the next intersecting street, this right is violated and an action accrues.”⁴¹⁶

“What seems to be a sounder expression is found in *Robbins v. Scranton*.⁴¹⁷

““The problem before the jury was to determine whether the effect of the improvements as a whole had been to work any proximate, immediate, and substantial injury to the value of the real estate.”

Note: The fact that the excavation for the railroad was across a nonimproved street, was of no significance to the court: “Much was pressed upon our attention

about Newark Street being unimproved beyond cutting out the brush several years ago, but that cannot effect the principle, or take the case from the jury.”

It is a city’s responsibility, as a guardian of the public highways, to remove unlawful barricades of public ways. In the *Sandstrom* case, the city authorized the excavation with the condition that the railroad company build a viaduct across the full width of the street. It was, therefore, the city’s responsibility to force the railroad company to comply with those conditions. Where a city fails to remove any unlawful barricade of a street, it is the responsibility of the state to maintain an action, in behalf of the people of the state and the community, to remove the barricade. Thus, in *Sandstrom*, this litigation could have been prevented if the city or the state would have fulfilled their responsibilities. The following discussion will shed some light on this problem.

Bernard v. Willamette Box & Lumber Company⁴¹⁸

This case provides some insight into the legal remedies for the abatement of public nuisances, or for damages from irreparable injury to abutting real estate.

This suit by Charles Bernard against the Willamette Box & Lumber Company was to prevent and remove an “alleged public nuisance” and to recover damages asserted to have been caused by the nuisance.

Bernard secured legal title to lots 3 and 4, in block 26, as indicated on the recorded plat of the Town of Linnton, Oregon. His lots abutted upon F Street, which was a 60-foot public way. After Bernard obtained title to his lots, the lumber company built an elevated railroad along F Street in front of and adjacent to Bernard’s property. The company also piled lumber in the street, obstructing travel and preventing ingress to and egress from Bernard’s land. The obstructions effected a \$1,000 loss in the value of his property.

A *demurrer*⁴¹⁹ to the complaint, on the ground *inter alia* (meaning, “among other things”) that Bernard had an adequate remedy at law, was overruled. The defendant’s answer was filed denying the material allegations of the complaint and setting forth allegations as a defense.

Bernard won the dispute in the lower court, but was awarded only \$200 damages.

As to the demurrer, the court’s opinion was:

“It is maintained that for the redress of the injuries alleged the plaintiff had an adequate remedy at law, and, such being the case, an error was com-

mitted in overruling the demurrer (Section 399, L.O.L.). The statute declares that in all cases where there is not a plain, adequate, and complete remedy at law, the protection of a private right or the prevention of or redress for an injury thereto shall be by a suit in equity (Section 2210, L.O.L.). *The obstruction of a highway is a crime, and upon conviction thereof a sentence of imprisonment or a fine may be imposed.* The remedy thus prescribed may prove inadequate where the barrier is allowed to remain notwithstanding a judgement formerly pronounced by the court upon a defendant after his conviction in a criminal action for violation of that statute. If a party’s need temporarily to impede travel on a public road seemed to him to outweigh the punishment reasonably to be apprehended for a commission of the offense, the hindrance might possibly be continued until the apparent exigency ceased. The means thus given by the statute to prevent the violation of a right is *not an adequate remedy at law* precluding equitable intervention by injunction to restrain the perpetration of a common nuisance.⁴²⁰ Any person whose property is affected by a private nuisance may maintain an action at law against the person causing the annoyance to recover the damage inflicted, and, if a judgement therefor be given and an execution issued thereon, a warrant may also be obtained to abate the nuisance.⁴²¹ It has also been intimated that the right to recover damages for a ‘public’ nuisance is also predicated on that statute.⁴²² A text-writer, in discussing the subject under consideration, says:

“‘Except in those states where special provision is made therefor by statute, no power exists in a court of law in an ordinary action upon the case for damages to direct the abatement of the nuisance, after a verdict establishing it.... It is proper to say, however, that courts hesitate to employ these statutory remedies, and do not generally encourage them; and parties in a proper case will find far more easy redress for their grievances from nuisance in a court of equity than in a court of law.’⁴²³

“Any act of a party that trenches upon the rights of the public may be redressed by a suit in equity instituted by or in the name of the State as an exercise of its police power to prevent or remove a common nuisance. The power thus vested in a state to enact laws that are deemed to be for the general good and welfare of its citizens, and are not inconsistent with or repugnant to its constitution, may be delegated to and exercised by a municipal corporation, as expressly specified or necessarily implied in a city charter, which instrument emanating from the sovereign in the nature of a grant is the measure of the authority bestowed.⁴²⁴ The right of a state to protect and preserve its supreme political

authority when it is abridged by the creation of a public nuisance is not dependent upon the statute to which reference has been made, nor does the remedy prescribed by the enactment necessarily govern the procedure to be involved. If resort cannot be had to the decrees of courts recognizing, affirming, and enforcing principles of law relating to the government and security of persons and property, and the word 'private' as used in Section 341, L.O.L., is to receive strict construction, it might seem to follow that for any act of a party constituting a public nuisance, no remedy exists.

"A nuisance, however, may be at the same time both public and private. *The public wrong is redressed by an indictment, and the private injury by an action at law or a suit in equity.*⁴²⁵ The equitable maxim that wherever there is a right there is also a remedy justifies the assertion that a suit in equity can be maintained, independent of the statute, to abate a public nuisance. As a disavowal of this proposition would amount to a renunciation of sovereignty, it results that a state, or its creature, a municipal corporation when so authorized by its charter, as an exercise of its inherent police power, can maintain a suit in equity to obviate or suppress a public nuisance.

"It will therefore be taken for granted that the proper officers of Linnton were authorized to maintain a suit, and by a mandatory injunction could have caused to be removed an obstruction from a public street in that village, and what the persons charged with the right and duty of exercising certain functions were empowered to perform a private party who sustained a special injury, differing in kind from that suffered by the community at large from a public nuisance, may also do.⁴²⁶

"*The owner of a town lot suffers peculiar and special damages, differing in kind from that to which the public is subjected by the obstruction of a part of a public street in front of his or her premises, whereby ingress and egress to and from such abutting property is prevented, and such owner may maintain a suit in equity to prevent or remove the common nuisance.*⁴²⁷ The complaint herein states facts sufficient to constitute a cause of suit, and no error was committed in overruling the demurrer."⁴²⁸

The Willamette Box & Lumber Company railway crossed F Street about eight feet above the surface of the ground immediately east of the embankment. In addition to the elevated railroad bed, the company had built an inclined roadway bordering on Bernard's lots. At the southwest corner of his premises, it was elevated nearly 12 feet. At the southeast corner it was about three feet, so that the obstruction prevented ingress and egress to and from the south side of his

property. Bernard notified the company in writing that he was the owner of lots 3 and 4, block 26, and requested that it remove the roadway. However, no attention was paid to the demand.

Testimony also confirmed that the company had allowed piles of lumber to remain in F Street. This obstructed the highway, except for a narrow passage for people. F Street had not been improved, but it would have been useless to do so because the elevated railway bed would have prevented access to the street. Bernard had intended to build tenement houses on his lots, but because of the elevated railway, he decided not to make such improvements.

"After this suit was commenced, but before the decree was rendered, the defendant removed the inclined driveway from in front of the plaintiff's lots.

"In *Van Buskirk v. Bond*⁴²⁹ it was ruled that a fence built across a public road was a nuisance only when it was admitted by the pleadings or it satisfactorily appeared from the uncontradicted testimony that the barrier obstructed a highway. The word 'uncontradicted,' as thus employed, was evidently used without the exercise of the degree of care which the importance of the case demanded, as is clearly disclosed by the opinion in another case.⁴³⁰

"The denial in an answer of the existence of a public highway, alleged in a complaint to have been obstructed, ought not to defeat equitable intervention to remove the barrier at the suit of a private party who has sustained special damages differing in kind from that suffered by the community at large by the erection or maintenance of a common nuisance. A different rule would almost place such cases beyond the pale of chancery jurisdiction, for it is safe to predict that if the contrary doctrine were to prevail, it would reasonably be expected that a defendant who was charged in a complaint with having obstructed a public road or street would deny in his answer the existence of the highway. A plea to the merits on this subject ought to be heard and determined as any other disputed fact in a civil case, and from a preponderance of the evidence the question of equitable jurisdiction should be ascertained.⁴³¹

"The answer herein denied the averment of the complaint that F Street was a public highway. In order to substantiate the affirmative of this issue, there was received in evidence at the trial the recorded plat of the Town of Linnton, and what purports to be a copy thereof has been substituted and sent up with the record. F Street is represented on such assumed duplicate as a public highway. Such counterpart, however, does not contain any dedica-

tion of the streets, but, since the law requires the plat of a town to be duly acknowledged and recorded and prescribes a penalty for a failure to comply therewith,⁴³² it will be presumed, in absence of any objection to the admission of evidence on that account, that the law has been obeyed⁴³³ and that the original recorded plat was properly executed, and, this being so, F Street is a public highway.⁴³⁴

"In suits by a private party to enjoin a public nuisance, it is generally held that he or she must not only suffer an injury differing in kind from that sustained by the community at large, *but his or her detriment must also be irreparable, or, at least, not capable of full and complete compensation in damages.*⁴³⁵ In referring to this legal principle the author (Elliott) there observes:

"This is no doubt a fair statement of the general rule, but the phrase *irreparable injury* is apt to mislead. It does not necessarily mean as used in the law of injunctions, that the injury is beyond the possibility of compensation in damages, nor that it must be great. And the fact that no actual damages can be proved, so that in action at law the jury could award nominal damages only, often furnishes the very best reason why a court of equity should interfere in cases where a nuisance is a continuous one.'

"The term 'irreparable damages,' to prevent which injunction may issue, *includes wrongs of a repeated and continuing character, or which occasion damages that are estimable only by conjecture, and not by any accurate standard.*"⁴³⁶

The court held: "The plaintiff's right to egress and ingress to and from that street to his lots has been clearly established, and as the invasion of that right, by the construction of the elevated roadway, has also been substantiated, he is entitled to the relief demanded in the complaint. This redress cannot be defeated by the defendant's removal of the obstruction after this suit was instituted, for a court of equity, having obtained jurisdiction to grant injunctive relief, will retain the right to hear and determine the cause upon the question of damages."⁴³⁷

Cabell et al v. Cottage Grove et al

In the following case of *Cabell*, it is important to keep the following in mind: Although the power over roads and streets resides in the legislature, insofar as restricted by constitutional provisions, there is a limitation on that power where a legislative act would impair or destroy private rights. That is, it is not in the power of the legislature to enact any statute which would deny any citizen the equal protection of

the laws,⁴³⁸ including protection from any unlawful taking of private property. And, whatever the legislature cannot do directly, it cannot authorize any of its instrumentalities to do.⁴³⁹

In the **absence** of legislative authorization, either express or by necessary implication, the general rule is that neither the state, a city, a county nor a quasigovernmental body can barricade a public way.

In *Cabell et al v. Cottage Grove et al*,⁴⁴⁰ the Oregon Highway Commission claimed its authority to regulate traffic "implied" an authority to barricade city streets intersecting Highway 99. But the court was of the opinion that the commission presumed too much from the statute that gave it power to regulate traffic. It explained:

"We ought never to import into a statute, words which are not to be found there, unless from careful consideration of the entire statute it be ascertained that to import such words is necessary to give effect to the obvious and plain meaning of the Legislature."

In this case, the court explained that it was not "at liberty to give effect to any assumed or supposed intention or meaning in the legislation, unless the words to be imported in the statute are, in substance at least, contained in it."

Taking a different approach, the commission claimed the city had authority to close its streets. It further claimed that this authority reverted to the Highway Commission when the streets occupied by the highway ceased to be city streets. The commission also claimed that the city was estopped by its act of approving the plan for highway improvement because the plan called for the street barricading.

Four of the six justices hearing this appeal held:

"The jurisdiction of the State Highway Commission over city streets which constitute a part of the state highway system *does not include the authority to construct barricades at the edge of the highway at street intersections, so as to shut off access by vehicular traffic to the highway from the streets so intersected.*" (Note: Subsequent to that ruling, the legislature made provision for the commission to barricade such streets, but certain owners affected by barricading must be compensated.)

The court also held that a *municipality had no power to close an unvacated street unless such power had been delegated to it by the legislature.*

"The municipal corporation of Cottage Grove was created by legislative enactment. Under its charter the council is authorized and empowered to lay out, establish, vacate (by statute), extend

and open streets and alleys in said city... (subsec 1, ch. VI) and to remove and abate any nuisance, obstruction, or encroachment upon the streets, alleys, public grounds and highways, or any place within the limits of said city (Subd. 23, subsec 7, ch. IV). But neither in the charter nor in any statute to which we have been referred, or of which we are aware, is the power found to barricade a street and close it to the public travel. The city, of course, may vacate a street, but there has been no vacation."

(**Note:** Limited power has been provided subsequent to this case, that is, a street or alley converted to a pedestrian mall may be barricaded to vehicular travel. Streets intersecting a public way specifically designed as a throughway may be barricaded at the intersection with the throughway. A review of the statutes providing this limited power makes it obvious that when the legislature means to delegate the authority to close unvacated streets, it does so with explicit, express language. It will not provide such authority by locating it in some obscure subsection of the statutes. Nor will it depend on an inference or implication from general wording such as *jurisdiction, control, administration, operation or maintenance.*)⁴⁴¹

Although the court admitted that it would be

"desirable and in the public interest were the commission to be vested with the authority which it claims... the court still has only the limited function of construing the statute, not of conferring authority; we are dealing with a commission of purely delegated powers, and, regardless of what we might think the law should be, our sole duty is to determine from an examination of the statute, the extent of the powers which the legislature has vested in one of its own creatures.

"As was stated, the commission contends that the disputed power is the power to control traffic, which it has seen fit to exercise in this instance, after determining that to permit the entry of traffic to the new highway at the barricaded intersections would create an unnecessary hazard."

After consideration of the statutes delegating certain authority and responsibilities to the commission,⁴⁴² the court said:

"It is a reasonable, if not conclusive inference, that the jurisdiction and control over city streets vested in the commission was not intended by the legislature to embrace the power to impose traffic regulations....The commission may, pursuant to the express provisions of the statute, require vehicular traffic to come to a stop before entering a main traveled or through highway; or it may regulate the movement of vehicles at an intersection of highways through the use of traffic control signals;

or it may exercise the authority granted to it in the other statutes to which we have called attention. But it has not been given the much greater power to abolish, altogether, a portion of the traffic at an intersection of a state highway with a city street.

"...The highway code is drawn with meticulous care and with the evident purpose to define the powers of the commission with precision and particularity; and when adopting it, the legislature must be presumed to have been aware of provisions found in the statutes granting to the commission a measure of authority to control traffic in order to promote the safety of travelers on the state highways. It is not, therefore, reasonable to suppose that if any further authority of that kind was intended to be bestowed, the lawmakers would have manifested that intention in *express language* and not have left it to be inferred or implied from general words such as 'jurisdiction,' 'control,' 'administration,' 'operation' and 'maintenance.' Not only do we think that this is true, but we are also of the opinion that it is very much to be doubted that the power claimed by the commission would have been conferred without some definition of the circumstances and conditions which should attend its exercise, and in all probability, without making provision for the compensation of property owners who might be specially injured as a result of its exercise; for as we have seen, *it is a great and extraordinary power, and one which might readily be abused.*"

Note: As already mentioned in this discussion, the Department of Transportation now has the authority to close certain streets intersecting highways--with the city's permission."⁴⁴³ The assumption by the court that authority by the legislature would be express--on certain circumstances and conditions, and with compensation to injured land owners--was accurate. ORS 373.050 and 373.060 make express provision, under carefully defined circumstances and conditions, to close certain streets and to compensate the land owners injured by the closure. The legislative intent was not left to be inferred or implied from general words. This point should be of interest to any city that is closing streets under an assumption that its authority is implied or inferred from legislative permission to regulate traffic. As stated in the *American Journal of Jurisprudence* on "Highways,"⁴⁴⁴ grants of authority to a municipality to declare the general policy in regard to the control of streets "*are ordinarily strictly construed in the interest of the common right,*" i.e.:

Principle 54

"Subject to constitutional limitations upon the invasion of property rights, the legislature may authorize obstructions in streets or other highways which would other-

wise be nuisances, and may temporarily withdraw any highway from the general public use and devote it for the time being to a public use of a special character. As a rule, any obstruction or structure which is authorized by a statute enacted within the scope of legislative power cannot be a nuisance, but statutes authorizing such obstructions are strictly construed. Legislative power to authorize obstructions may be delegated to municipal or quasimunicipal corporations. But in absence of such legislative authorization, either express or by necessary implication, or of a constitutional provision conferring (specific) home rule powers in this respect (containing express authorization to barricade streets), the general rule is that a municipality has no right to authorize any obstruction or encroachment which would interfere with the enjoyment of the public right; and it is immaterial, so far as the rule is concerned, that the municipality may be the owner of the fee; or that the use may be a public one⁴⁴⁵ ...” (Clarification supplied.)

Again, in discussing the power of a municipal corporation to grant franchises, the *American Journal of Jurisprudence* said:

Principle 55

“In any event, municipal corporations have no power under general provisions or other such grants of power, to grant franchises which will result in destroying the usefulness of public property in their trust which is used for public purposes and for public welfare or convenience. It has been said in this connection, that in granting street franchises a municipal corporation acts as a trustee for the public.”⁴⁴⁶

“It is also well-settled that a grant of power to a city to grant any privileges or rights in streets or other public grounds is to be strictly construed, and not enlarged by construction; and if there is a fair or reasonable doubt as to the existence of its power, it will be resolved against the municipality.”⁴⁴⁷

Principle 56

The rules, advice and guidelines of Principles 45 and 46 apply equally to counties.

The court, in *Cabell*, added:

“It is, of course, to be assumed that it is the duty of the commission, in constructing and maintaining highways, to have regard for the safety of the traveling public. But that is a different thing from implying an extraordinary power to shut off access to a highway from established city streets, even though it be the judgement of the commission that the public safety would thereby be promoted.... The legislature has given the commission, in ex-

press terms, the means of controlling traffic and minimizing the hazards at dangerous intersections; but it has not told the commission that it may abolish a part of such traffic.”

Regarding the commission’s contention that the city’s approval estopped it from disapproving the closures:

“Where the City of Cottage Grove did not have the authority to close any of its streets which had not been vacated, it was equally beyond the city’s authority to authorize the Oregon Highway Commission to do so, and therefore the city was not estopped by its approval of the plan.”

Cabell was litigated in 1943. Since that time, there has been a dramatic increase in the kind, character, speed and volume of traffic moving over Oregon’s state highways and certain other public ways. For example, the *Oregon Blue Book* shows an increase of over one million vehicle registrations between 1940 and 1970. The increase in the volume and average speed of traffic resulted in a serious increase in the injury and death of people and the destruction and damage to public and private property from highway accidents. This prompted several legislative acts in the 1960s designed to restrict the entry to certain highways, freeways and throughways. These acts provide limited authority to the Department of Transportation, cities and counties to barricade public ways at their common intersection with the designated highways and limited access freeways and throughways. It was not, however, a blanket approval to barricade just any public street, alley or road.

ORS Chapters 373 and 374 will show that the power to interfere with private rights in property, and the public’s rights to the use of its public ways, is neither implied nor hidden in some obscure section or chapter of the statutes.

Before considering the statutory authorization to barricade public ways, it is important to expand on one point brought up in *Cabell*: Legislative approval can also exist in the city charters approved by the legislature, but such approval must be by express wording or by necessary implication. As was explained in *Cabell*, such power is not implied in the authorization to regulate traffic or in provisions of the charter that gives a city power and control over its public ways.

A charter⁴⁴⁸ is a city’s organic law. It contains the authority by virtue of which a municipality exists and acts. It is a contract between the state, through its legislative assembly, and the city. It defines the rights, liberties or powers of each city. So, although the statutes may provide only limited authority to close public ways, a city charter, as approved by the legislature, may include authorization to close any, or only certain, of the city highways.

Thus, in ORS 373.050, one part of the statute requires a city to abide by its ordinances and charter provisions pertaining to the closing of streets in the city (when permitting the Department of Transportation to close certain streets intersecting highways). Of course, it must be understood that a city cannot enact an ordinance to do something unless the statutes or the city charter provides such authority.

The closure of a public way, authorized in a charter, has exactly the same effect as a closure provided by statutory authorization. The fact that the charter provides for the closing of a street does not vindicate the city in a suit to collect damages for any injury to abutting property that was effected by a street or alley closure. It must be recognized that when the legislature authorizes the closing of public ways, it is removing the wrongful character (wrongful in its eyes) of the closing. However, such authorization does not mean the city is "home free." The possibility remains that the closure could constitute a new servitude on, or effect damages to, certain of the abutting real estate.⁴⁴⁹

The following are only brief explanations of statutory provisions regarding street closures. Additional information on highway, throughway, county road and city street laws will be included in the miscellaneous section of this chapter. To our knowledge, ORS Chapters 373, 374 and 376 (Pedestrian Malls) contain the only statutory authority to close public ways to vehicle traffic. For up-to-date and precise details on the laws, reference must be made to the official statutes published by the Legislative Counsel Committee of the Oregon Legislature.

Statutory Considerations

ORS 373.050 allows the Department of Transportation to close city streets where they intersect a state highway (as in *Cabell*). Such closures require a formal agreement with a city, set out in a resolution or ordinance of the city, designating the particular streets by name and intersection. The city must comply with all city ordinances or charter provisions pertaining to the closing of streets in the city (if such ordinances or provisions exist).

Subsection (3) of that statute requires an investigation and formal declaration, by resolution, that a specific closure is really necessary for safety and an expeditious and orderly movement of traffic, or both.

ORS 373.060 deals with the issue of injury to abutting properties, effected by a closure, and provides that: "Any person having any right, title or interest in any such real property has a cause of action against the state to enforce payment of such compensation or damages."

ORS 373.060 subsections (2), (3) and (4) contain the necessary provisions for giving injured parties their "day in court"--rights of appeal. They also instruct on the apportionment of compensation, liability of the state and the statutory period for any cause of action to be allowed.

ORS Chapter 374 contains the Oregon *throughway* laws.

ORS 374.060 gives the Department of Transportation, with approval of municipal authorities, and the county court or board of county commissioners (with respect to county roads) the power to: "(1) close any street, highway or road at or near the point of its intersection with a throughway...."

Because such closure will be an additional servitude on certain abutting property, ORS 374.060 must be strictly construed. Thus, the throughway must be as defined by ORS 374.010, and not a throughway in name only.

Principle 57

ORS 374.010 defines a throughway as used in ORS 374.005 to 374.095, to mean: "...a highway or street especially designed for through traffic, over, from or to which owners or occupants of abutting land or other persons have no easement of access or only limited easement of access, light, air or view, by reason of the fact that their property abuts upon the throughway or for any other reason."⁴⁵⁰

ORS 374.065 provides for the Department of Transportation to make similar closures of county roads intersecting throughways. This requires consent of the county court or county board of commissioners.

To the best of our knowledge, ORS 374.070 contains the only legislative authority for a city to close or barricade a public way street, alley, road, etc.; that is, except for the closure of pedestrian malls to vehicle traffic, or to certain types of vehicle traffic (as provided for in ORS Chapter 376).

ORS 374.070(3) reads: "Nothing in this section prohibits the closing of any street at the point where it runs into or intersects any throughway by the proper municipal authorities in the manner provided by law."

ORS 374.085, 374.090 and 374.095 tend to the problem of the severance of agricultural land and the elimination or hampering of ingress to and egress from agricultural land.

ORS 374.420 provides for county throughways; however, nothing in ORS 374.420 to 374.430 authorizes a county to barricade any public way intersecting such a throughway. Here is a situation where such authori-

zation might be necessarily implied by the definition of a county throughway, *i.e.*

Principle 58

A throughway as applied to **ORS 374.420 to 374.430** is defined as "... a proposed or existing county road especially designed for through traffic, which has been designated by resolution of the county court or board of county commissioners as a throughway, over, from or to which owners or occupants of abutting land or other persons have no easement of access or only limited easement of access, light, air or view, merely because of the fact that their property abuts upon the throughway or for any other reason."

ORS 368.056 provides for permits for gate construction on public roads under county jurisdiction. (In effect on Sept. 27, 1987.)

Police Power of Cities

Principle 59 is a summation of the authority and responsibility of cities and counties as trustees and guardians of the public's highways.

Principle 59

The power to authorize obstructions in public ways can be delegated to cities and counties by the legislature. But in absence of a charter provision or statutory enactment authorizing such an obstruction, a county or a city has no right or authority to license or maintain an obstruction or nuisance in a public way. The county or city is liable the same as a private individual would be liable for maintaining an obstruction or nuisance in a street, alley or other public road. When a city or county is vested with the power to authorize, license or maintain obstructions, such power must be exercised for the good of the whole community. Moreover, neither governmental body can authorize obstructions in the public ways for just a few people, or for any private purpose.⁴⁵¹

In *Thornburg v. Port of Portland*⁴⁵² the court held:

"If the governmental interference with the use and enjoyment of the land is substantial enough to impose a servitude upon the land, such interference may constitute a taking." However, as evinced by *Argo Investment v. Dept. of Transportation*,⁴⁵³ *Boese v. City of Salem*, *supra*; *Oregon Investment Co. v. Schrunk*, *supra*; *Hickey v. Riley*,⁴⁵⁴ and *City of Salem v. Meritt Truax*, *supra*, a multitude of actions may be exercised by cities as police power when the objective is to regulate the use of the streets to keep them in an open and safe condition. Such actions have been held to be *damnum absque injuria* and not compensable where the landowners retained

adequate access to their property for the principal purpose for which the property is used. However, ORS 105.855 to 105.870, already discussed in this chapter of the manual, provides an abutting landowner of commercial property a remedy when access is prohibited or materially restricted for more than six hours in any 24-hour period (enacted by the 1973 Legislature, ch. 702).

Argo Investment v. Dept. of Transportation, *supra*, was before the Oregon Court of Appeals in 1984. Here the Argo Investment Corporation and Pioneer Trust Company (plaintiffs) brought inverse condemnation actions against the City of Salem and the State of Oregon. They alleged that their respective business properties were *diminished in value* by the closing of Center Street N.E. at Front Street in Salem and that the street closure was a compensable taking of the plaintiff's properties.

Facts. The plaintiffs' commercial property abuts Center. Before Oct. 9, 1980, Center was a two-way street with direct access between Center and Front. As a result of the changes made to Center as part of the Front Street Bypass Project (developed from the Central Salem Development Program under a grant to the city from the United States Housing and Urban Development Department), Center became a cul-de-sac, that is, a dead-end, two-way street. Traffic access directly from Front onto Center was prevented. The access from the plaintiffs' property onto Center or Front had not been eliminated. But in order to drive from Front to Center in an automobile after the street closure, plaintiffs and their customers had to take a more circuitous route.

The court said:

"Plaintiffs argue that the impairment of the traffic flow to their businesses constitutes a substantial interference with the highest and best use of their property and a compensable taking. *We find no merit in this claim.* It is a reasonable exercise of the City's police power to change a public road to provide for public safety or convenience (*op. cit.*). Evidence was presented that Center at Front was closed to regulate traffic as part of the Front Street Bypass Project. *Plaintiffs continue to have access to their property for the principal purpose for which it is used.* The fact that traffic has to use a more circuitous route to obtain access to Center from Front may be inconvenient, affecting the use, *but it does not rise to the constitutional magnitude requiring compensation.* *Douglas County v. Briggs.*"⁴⁵⁵

Principle 60

"A landowner is not entitled to compensation under eminent domain for the circuitry of a route resulting from the construction of a limited access highway."⁴⁵⁶

The court said:

“The trial judge was correct in dismissing plaintiffs’ claims against the City.”

“In 1977, the City entered into a ‘99E Redesignation Agreement’ with the State, which provides: ‘For the purpose of furthering the development of a highway system adapted to the needs of the people of the State of Oregon, and for the safe and expeditious flow of traffic, State and City plan and propose to improve portions of Pine, Commercial, Liberty, *Front*, Ferry and Trade Streets to acceptable standards for redesignation of the route of Pacific Highway East, State Primary IE, to accommodate highway traffic volumes along said streets.’ (Emphasis supplied.)

“Plaintiffs claim that Center was closed by the State pursuant to this agreement between the City

and State, thus entitling them to compensation for the diminished value of their respective properties under ORS 373.050 and 373.060.”

If the closing was done pursuant to ORS 373.050, when all the requirements of ORS 373.050 and 373.060 had been met, the owner of real property abutting a city street which became a cul-de-sac could recover damages from the state. *State Highway Corn. v. Hazapis*, 3 Or. App. at 288.

But the closing of Center was not pursuant to ORS 373.050. There was no evidence that *Front*, at the time of the trial, had been designated as a state highway under ORS 373.010. Consequently, the court properly found that the plaintiffs had no cause of action against the state, and what was done by the city under its police power failed to constitute a compensable taking.

Endnotes

1. *Harris v. St. Helena*, 72 Or. 386 (1914); *cit. Black's Law Dictionary*, 2d ed., pp. 340, 341, *supra*.
2. *Security Investment Co. v. Oregon City*, 161 Or. 432.
3. *Id. See: Muzzy v. Wilson*, 259 Or. (1971) *Magic v. Basquin*, Ohio Com. Pl., 102 N.E.2d 42, 44: "the word 'dedicate' means a grant of an interest in land for public use." See: 26, 27 Am. Jur. 2d, Em. Dom., 56 Am. Jur. 2d; *Municipal Corp.*, Counties, subsec 532 et seq *Henderson v. Frio County*, Tex. Civ. App., 362 S.W.2d 406, 408: "Instruction properly defined 'dedicated as public road' to mean road devoted or appropriated to public use as a public road by owner, by some unequivocal acts or conduct manifested an intent to appropriate it to such use."
4. *Nodine v. Union*, 42 Or. 613; *McCoy v. Thompson*, 84 Or. (1917), *Portland Ry. L. & P. Co. v. Oregon City*, 85 Or.
5. *Nodine v. Union*, 42 Or. 613, 616; *Elliotts' Roads and Streets*, 3d ed.; See: *Muzzy v. Wilson*, 259 Or. 518.
6. *State v. Trask*, 27 Am. Dec. 554 10c; *cit.* 559. Dill on *Municipal Corporations*, subsec 491. This is Principle 22 of this publication.
7. *Huggett et ux v. Moran et ux*, 201 Or. (1954)
8. *Portland Ry., L. & P. Co. v. Oregon City*, 85 Or. 583; *cit.: Elliotts' Roads and Streets*, 3d ed. subsec 137.
9. *Estoppels in pais* (pronounced "in pays") are estoppels by conduct, as distinguished from estoppels by deed, written declaration, or by other written record. *Black's Law Dictionary*, 4th ed., 1264; *supra* footnote 6, ch. 2.
10. *Huggett et ux v. Moran et ux*, 201 Or. 105, 117 (1954).
11. *Moore v. Fowler*, 58 Or. 292.
12. *Huggett v. Moran*, *supra*.
13. 20 Or. L. Rev. 138, *cit.: Carter v. Portland*, 4 Or. 339; *Moore v. Fowler*, 58 Or.; *Hendrickson v. City of Astoria*, 127 Or.; See: *Huggett et ux v. Moran et ux*, 201 Or. 105; *Mathis v. Thunderbird Village, Inc.*, 236 Or. 439, 440 (1964); 389 P.2d 343.
14. *Huggett et ux v. Moran et ux*, 201 Or. 111 (1954).
15. *Id.*, at 112.
16. *Black's Law Dictionary*, 4th ed., 1393.
17. *Elliotts' Roads and Streets*, 1st ed., 7, *supra* footnote 2, ch. 1. But, the general public is incapable of being the "grantee" of an estate in land, but a grant to the general public may operate as a dedication of the property to public use. *Loose v. Locke*, 25 Wash.2d 599.
18. *McQuaid v. Portland & V. Ry*, 18 Or.
19. *Id. See: Huddleston v. Eugene*, 34 Or.
20. *Black's*, 1393, *supra*.
21. *Elliotts' Roads and Streets*, *supra*.
22. See: *Moore v. Fowler*, 58 Or. 292.
23. *McQuaid v. Portland & V. Ry*, *supra*.
24. *Mid-County Cemetery Dist. v. Thomason*, 267 Or. 637 (1974).
25. *Carter v. City of Portland*, 4 Or. 343 (1873).
26. *Id.*
27. See: *Lownsdale v. City of Portland*, 1 Or. (1861), discussing Daniel Lownsdale's, J. L. Parrish's, Stephen Coffin's and W. W. Chapman's interest in the Portland claim. This case supplies historical data on the creation of Portland and territorial land laws.
28. *Church v. City of Portland*, 18 Or. 75 (1889).
29. *Id.* 78 (1889).
30. *Church v. City of Portland*, 18 Or. 74 (1889).
31. *United States v. Chicago*, 185 U.S. (7 How.).
32. *Carter v. City of Portland*, 4 Or. 345, *cit-ing: United States v. Chicago*, *ibid*.
33. *Carter v. City of Portland*, *supra*, *cit.: Dovaston v. Payne*, 2 Smith's Ldg. ch. 224, 225; *Rowan's Exrs. v. Portland*, 8 Ky. (B. Mon.) 232, 237; *Barclay v. Howell's Lessees*, 206, 207 U.S. (6 Pet.); *U. S. v. Chicago*, 196 U.S. (7 How.); *Cincinnati v. White's Lessees*, 431 U.S. (6 Pet.); *Dubuque v. Maloney*, 9 Iowa 455; *Godfrey v. Alton*, 12 Ill. 35; *Asken v. Wynn*, 22 N.C. (7 Jones); *Wilder v. The City of St. Paul*, 12 Minn. 203, 204, 211; *Trustees of M.E. Church of Hoboken v. Hoboken*, 33 N.J. Laws 21.
34. *Carter v. City of Portland*, *supra*.
35. *Carter v. City of Portland*, 4 Or. 345; *Rowan Exrs. v. Portland*, *supra*; *Augusta v. Perkins*, Idaho 207; *Newport (R.I.) v. Taylor*, 16 Ky. (B. Mon.) 699; *Stone v. Brooks*, 35 Cal. 489; *Hannibal v. Draper*, 15 Mo. 634; *Schenley v. Commonwealth*, 36 Pa. 62; *Dubuque v. Maloney*, 9 Iowa 450; *Winona v. Huff*, 11 Minn. 119; *Huber v. Gazley*, 18 Ohio 18; *Logansport v. Dunn*, 8 Ind. 378. And note: regardless of any charter provision of an Oregon municipality, a common law dedication may be effected; See: *Mid-County Cem. Dist. v. Thomason*, 267 Or. 637.
36. *Commonwealth v. Rush*, 14 Pa.; *Dover v. Fox*, 9 Ky. (B. Mon.) 200; *State v. Wilkinson*, 2 Vt. 480; *Watertown v. Cowen*, 4 Paige (N.Y. Ch.), 510; *Price v. Thompson*, 48 Ky. (B. Mon.) 363; and *Abbott v. Mills*, 3 Vt. 526. See: *Menstell et ux v. Johnson*, *et ux* 125 Or. 162; and *Steel v. Portland*, 23 Or. 162.
37. *Supra*.
38. *Menstell et al v. Johnson et al*, 125 Or. 161, 162, *Op. Cit: Steel v. Portland*, 23 Or. 176, 31 P. 479; *Bakke v. Johnson*, 102 Or. 501; *Johnson v. Crawford*, 88 Or. 125; *Nicholas v. Title & Trust Co.*, 79 Or. 226, 240; *Silverton v. Brown*, 63 Or. 418, 424; *Christian v. Eugene*, 49 Or. 170, 172; *Spencer v. Peterson*, 41 Or. 257, 259.
39. *Carter v. Portland*, 4 Or. 339; *Meier v. Portland Cable Ry. Co.*, 16 Or. 500, 19 P. 610, 1 L.R.A. 856; *Hague v. City of Albina*, 20 Or. 182.
40. *McCoy v. Thompson*, 84 Or. 147.
41. *Steel v. City of Portland*, 23 Or. 176, 185.
42. Although it is often brought out in testimony that some of the lots sold "fronted on" or "abutted" the land in dispute, it is not essential that the alienated land be anywhere near the dedicated land. It is only necessary it be in the subdivision or townsite containing the dedicated land. Remember, every grantee is entitled to every easement, privilege and advantage, not reserved, which the plat represents.
43. *Carter v. City of Portland*, *supra*.
44. *Meier v. Portland Cable Ry. Co.*, *supra*.
45. *Hogue v. City of Albina*, *supra*.
46. *Carter v. City of Portland*, *supra*.
47. *Steel v. City of Portland*, 23 Or. 183.
48. *Id.*, 184.
49. 17 Am. & Eng. Enc. Law, 407; *Price v. Inhabitants of Plainsfield*, 40 N. J. Laws 608; *Trustees of M.E. Church v. Hoboken*, 33 N. J. Laws 13, 97 Am. Dec. 696.

50. *Kuck v. Wakefield*, 58 Or. 549, 555, 115 P. 428.
51. *Id.*, 552.
52. *Id.*, 553.
53. *McCoy v. Thompson*, 84 Or. 141, 152.
54. *McCoy v. Thompson*, 84 Or. 148 (1917), *cit.*: 1 *Elliott's Roads and Streets*, 3d ed., subsec 124; 8 R.C.L. 893, 897; 13 Cyc. 441.
55. *Id.*, 150, *Op. Cit.*: *Portland v. Whittle*, 3 Or. 126, 129; *Carter v. Portland*, 4 Or. 339, 340, 346; *Meier v. Portland Cable Ry. Co.*, 16 Or. 500, 1 L.R.A. 856, 19 P. 610; *Steel v. Portland*, 23 Or. 176, 184, 31 P. 479; *Mutual Irr. Co. v. Baker City*, 58 Or. 306, 321, 110 P. 392, 113 P. 9; *Moore v. Fowler*, 58 Or. 292, 297, 114 P. 472; *Kuck v. Wakefield*, 58 Or. 549, 552, 115 P. 428; *Jones v. Teller*, 65 Or. 328, 332, 133 P. 354; *Spencer v. Peterson*, 41 Or. 257, 260, 68 P. 519, 1108; *Oregon City v. Oregon & C.R. Co.*, 44 Or. 165, 176, 74 P. 924; *Christian v. Eugene*, 49 Or. 170, 172, 89 P. 419; *Hogue v. Albina*, 20 Or. 182, 186, 10 L.R.A. 673, 25 P. 386; *Nicholas v. Title & Trust Co.*, 79 Or. 226, 244, Ann. Cas. 1917A, 1149, 154 P. 391; 8 R.C.L. 890.
56. *McCoy v. Thompson*, 84 Or. 151. See footnote 42 in this chapter.
57. *Id.*, *Op. Cit.*: *Roberts v. Mathews*, 137 Ala. 523, 34 So. 624, 97 Am. St. Rep. 56; 1 *Elliott's Roads and Streets*, 3d ed., subsec 128.
58. *Id.*, *Op. Cit.*: *Parrish v. Stephens*, 1 Or. 73, 75, 76; *Portland v. Whittle*, 3 Or. 126, 129.
59. *McCoy v. Thompson*, *supra*, 148. See: *Sunset Lake v. Remington*, 45 Or. App. 973 (1980).
60. *Portland Ry., L. & P. Co. v. Oregon City*, 85 Or. 574, 586 (1917).
61. *Id.*, 582, *Op. Cit.*: *Lownsdale v. City of Portland*, 1 Or. 381, 405, F. Cas. 8578; *Lewis v. City of Portland*, 25 Or. 133, 155, 35 P. 256, 42 Am. St. Rep. 772, 22 L.R.A. 736; *Parrott v. Stewart*, 65 Or. 254, 259, 132 P. 523; *McCoy v. Thompson*, 84 Or. 141, 164 P. 589.
62. *Portland Ry., L. & P. Co. v. Oregon City*, *id.*, 583, *Cit.*: *Elliott's Roads and Streets*, 3d ed.
63. *Portland Ry., L. & P. Co. v. Oregon City*, *id.*, 582; *Op. Cit.*: *Hague v. City of Albina*, 20 Or. 186, 187. See: *Sunset Lake v. Remington*, 45 Or. App. 973, (1980).
64. *Id.*, see: *Muzzy v. Wilson*, 259 Or. 512, 525, 487 P.2d 875 (1971).
65. *Security Invest. Co. v. Oregon City*, *supra*, *cit.*: *Lownsdale v. City of Portland*, *supra*.
66. *Id.*, 433. See *Muzzy v. Wilson* 259 Or. 512, 525, 487 P.2d 875 (1971).
67. 20 Or. L. Rev., *supra*, 118.
68. *Harris v. St. Helens*, 72 Or. 377, 393, *Cit.*: *Black's Law Dictionary*, 2d ed. pp. 340, 341, 13 Cyc. 453.
69. *Parrott v. Stewart*, 65 Or. 254, 262 (1913), *Cit.*: 3 *Dillon on Municipal Corporations*, 5th ed., subsec 1079; *Kuck v. Wakefield*, 58 Or. 549; *Hague v. City of Albina*, 20 Or. 182.
70. *Id.*, 259.
71. *Carter v. City of Portland*, 4 Or. 339, 352.
72. *Steel v. City of Portland*, 23 Or. 182.
73. *McCoy v. Thompson*, 64 Or. 141.
74. *Id.*, *cit.*: 1 *Elliott's Roads and Streets*, 3d ed. Subsec 21; *City of Denver v. Clements*, 3 Colo. 472; *Smith v. City of Goldsboro*, 121 N.C. 350, 28 S.E. 479.
75. See: *Heiple v. City of East Portland*, 13 Or. 103; *Cit.*: *Republics v. Arnold*, 3 Yeates 422; *Himmelman v. Saterlee*, 50 Cal. 69; *Reed v. Erie*, 79 Pa. 352; *Hamlin v. City of Norwich*, 40 Conn. 25; *Brace v. N.Y. Cent. R. Co.*, 27 N.Y. 260; *Conner v. New Albany*, 1 Ind. (Blackf.) 88, 89; S.C. 12 Am. Dec. 207; *Debolt v. Carter*, 31 Ind. 355; *Clark v. Commonwealth*, 14 Ky. (Bush) 169; *State v. Moriarty*, 74 Ind. 104; *Clarlin v. Chicago*, 262 Ill. 564; 2 *Thompson on Real Property*, *supra*, subsec 384 pp. 549, 551.
76. *Harris v. St. Helens*, 72 Or.
77. *Harris v. St. Helens*, 72 Or. 388, 391. See: *Sunset Lake v. Remington*, 45 Or. App. 973 (dedicator may qualify dedication).
78. *Lang v. Portland*, 75 Or. 385, 395.
79. This is two blocks north northeast of the present site of the Civic Auditorium, i.e. between S.W. Second and Third Avenues and Market and Clay Streets.
80. This was known as the "Brady map" and the "Short-Brady map." It is the map discussed in *Carter v. City of Portland*, 4 Or. 339, 352.
81. *Lang v. Portland*, 75 Or. 388, 389.
82. *Id.*, 389, 390.
83. An ejectment action by which possessory titles to corporeal hereditaments may be tried and possession obtained. See: *Black's 4th ed.*, *supra*, p. 607.
84. *City of Pella v. Scholte*, 24 Iowa 288, 95 Am. Dec. 729.
85. *Hanes v. Land Co.*, 129 N.C. 311, 40 S.E. 114.
86. *Palen v. Ocean City*, 64 N.J. Laws, 46 A. 774. See: *Harris v. City of St. Helens*, 72 Or.; *Black's Law Dictionary*, 4th ed., *supra*, 1767.
87. See: *Parks' The Law of Dedication in Oregon*. 20 Or. L. Rev. 122 to 129.
88. *Parrish v. Stephens*, 1 Or. 59, 73 (Dec. 1653). The bill was filed in 1850, and an injunction was allowed. A compromise followed, but failed. The cause came to be heard in the Washington, D.C., District Court, and under a late statute was adjourned to this court.
89. Here, the court is speaking of evidence of an *express* intent to dedicate, e.g. as in a statement on a plat dedicating streets to the public.
90. The popular and commercial signification of the word "quay" involves the notion of a space of ground appropriated to the public use; such use as the convenience of commerce requires. *Black's 4th ed.*, *supra*: *cit.*: *New Orleans v. U.S.* 662 U.S. (10 Pet.) 715; 9 L. Ed. 573.
91. *Barclay v. Howell*, 498 U.S. (6 Pet.) (dealing with a plat in Pittsburgh, Pa.), *cit.*: *Parrish v. Stephens*, *supra*, 62.
92. *McLoughlin v. Stevens*, 18 Ohio 94.
93. 3 Kent 428, note.
94. *Parrish v. Stephens*, *supra*.
95. The Oregon Report (1 Or.) did not reveal the place where the table of sales was concealed.
96. *Parrish v. Stephens*, 1 Or, *op. cit.*: *Rugby Charity v. Merriweather*, 11 East 372, note; *Jarvis v. Dean*, 3 Bingham 447; *Gamble v. St. Louis*, 12 Mo. 617.
97. The court, in the *Parrish* case, was so occupied with deciphering the plat "copy" and "table of sales," as well as determining intent from the proprietors acts and declarations in 1645, 1846, 1847 and 1848, it overlooked one key point. Prior to September 1850 a settler had only the right of possession to land. The court, in *Oregon City v. Oregon & California Railroad Co.*, 44 Or. 165, ruled that the right of possession did not allow a settler, on a tract of land, to charge the land, in the hands of successors in interest, with any easement or encumbrance. Consequently, the proprietors, in *Parrish*, could not burden the land with a dedication of land for the public use. See also: *Lownsdale v. City of Portland*, 1 Or. 394.
98. *Supra*.
99. B. & C. Comp. subsec 5782; Act of Congress, Sept. 27, 1850 ch. 76, subsec 11; 9 Stat. 499.

100. Journals, Local Laws, etc., 1851 p. 34.
101. General Laws, 1862, p. 90.
102. The map was made by Jesse Applegate, and was based on his 1644 survey of the town.
103. *Oregon City v. Or. & Cal. R. Co.*, 44 Or. 175, 176 (1904), *op. cit.*: *Leland v. Portland*, 2 Or. 46; *Carter v. Portland*, 4 Or. 339; *Meier v. Portland Cable R. Co.*, 16 Or. 500 19 P. 610, 1 L.R.A. 856; *Hogue v. Albina*, 20 Or. 182, 25 P. 386, 10 L.R.A. 673; *Steel v. Portland*, 23 Or. 176, 31 P. 479.
104. *Oregon City v. Or. & Cal. R. Co.*, *supra*, 117, *cit.*: *Arnold v. Weiker*, 55 Kan. 510, 40 P. 901; *Sanborn v. Chicago & N. W. R. Co.*, 16 Wis. 21; *Indianapolis v. Kingsbury*, 101 Ind. 200, 51 Am. Rep. 749.
105. *Ibid.*, *cit.*: Angell on *Highways*, 2d ed., subsec 143; and *Elliotts' Roads and Streets*, 2d ed., subsec 119.
106. *Oregon City v. Or. & Cal. R. Co.*, *supra*, *cit.*: *Indianapolis R. Co. v. Ross*, 47 Ind. 25.
107. *Security Investment Co. v. Oregon City*, 161 Or. 421 434 (1939).
108. "Mesne conveyances" are intermediate conveyances occupying intermediate positions in a chain of title between the first grantee and the present title holder. *Black's Law Dictionary*, 4th ed., 403.
109. *Supra*. See: *Chase v. Oregon City*, 72 Or. 527, 143 p. 1111; and *Carey's History of Oregon*, Vol. 1, p 751.
110. *Security Invest. Co. v. Oregon City*, 161 Or. 425.
111. At this writing (1985) Water Street is occupied by State Highway 99, at one time referred to as "Super 99." The highway forms a bridge over the cove, i.e. directly behind the courthouse.
112. *Security Invest. Co. v. Oregon City*, *supra*, 428.
113. *Security Investment Co. v. Oregon City*, 161 Or. 430, *cit.*: *Chase v. Oregon City*, 72 Or.; *Elliotts' Roads and Streets*, 4th ed., vol. 1, subsec 130; 18 C.J. 109.
114. *Supra*.
115. *Portland Ry., L. & P. Co. v. Oregon City*, 85 Or.
116. *Supra*.
117. *City of Clatskanie v. McDonald*, 85 Or. 670, 167 P. 560; *Hogue v. City of Albina*, 20 Or. 182, 25 P. 386, 10 L.R.A. 673; *McQuillan on Municipal Corporations*, 2d ed., subsec 1694.
118. *Lownsdale v. City of Portland*, 1 Or. 397.
119. See footnote 166.
120. *Lownsdale v. City of Portland*, *supra*; *Hague v. Albina*, *supra*; *Harris v. St. Helens*, 72 Or. 377, 143 P. 941, Ann. Cas. 1916 D 1073; *Portland Ry., L. & P. Co. v. Oregon City*, *supra*; 18 C.J. 51. See: *Miller v. Roy W. Heinrich & Co.*, 257 Or. 155, 160 (Dec. 1970), 476 P.2d 183; *Mid-County Cem. Dist. v. Thomason*, 267 Or. 637, 644 (Jan. 1974), 518 P.2d 174; 23 Am. Jur. 2d, *Dedication* subsecs 28-31, C.J.S., *Dedication* subsec 10; *Muzzy v. Wilson*, 259 Or. 512, 525 (1971), 487 P.2d 875.
121. *Miller v. Roy W. Heinrich & Co.*, 257 Or. 155, 160 (1970), 476 P.2d 183.
122. *Mid-County Cem. Dist. v. Thomason*, 267 Or. 637, 518 P.2d 174.
123. *Portland Baseball Club v. Portland*, 142 Or. 13, 18 P.2d 811 (1933); *Kurtz v. Southern Pacific Co.*, 80 Or. 213, 155 P. 367 (1916); *John P. Sharkey Co. v. Portland*, 58 Or. 353, 106 P. 331, 114 P. 933 (1911); *Huddleston v. City of Eugene*, 34 Or. 343, 55 P. 868 (1899).
124. *Security & Inv. Co. v. Oregon City*, 161 Or. 421, 432, 433, 90 P.2d 467 (1939); *Jones v. Teller*, 65 Or. 328, 332, 133 P. 354 (1913).
125. *McCoy v. Thompson*, 84 Or. 141, 150, 164 P. 589 (1917); *Jones v. Teller*, *supra*, at 334; 11 *McQuillin, Municipal Corporations* 3d ed. (1964), p. 704.
126. *Curtis M. Brown, Boundary Control & Legal Principles* 2d ed. (1961), *supra*, p. 124, 125.
127. *McCoy v. Thompson*, 84 Or., *cite*: *Carter v. Portland*, 4 Or. 339, 340, 348; *Meier v. Portland Cable Ry. Co.*, 16 Or. 500, 1 L.R.A. 856, 19 P. 610; *Hogue v. Albina*, 20 Or. 182, 186, 10 L.R.A. 673, 25 P. 386; *Spencer v. Peterson*, 41 Or. 257, 260, 68 P. 519, 1108; *Oregon City v. Oregon & C.R. Co.*, 44 Or. 65, 178, 74 P. 924; *Christian v. Eugene*, 49 Or. 170, 173, 89 P. 419; *Oliver v. Synhorst*, 58 Or. 582, 585, 109 P. 762, 115 P. 594; *Moore v. Fowler*, 58 Or. 292, 297, 114 P. 472; *Silverton v. Brown*, 63 Or. 418, 424, 12 P. 45; *Harris v. St. Helens*, 72 Or. 377, 387, 143 P. 941, Ann. Cas. 1916 D 1073; *Barton v. Portland*, 74 Or. 75, 79; *Nichols v. Title & Trust Co.*, 79 Or.
128. *Carter v. Portland*, *supra*, *cite*: *Watertown v. Cowen*, 3 Paige (N.Y. Ch.), 514; *Dovaston v. Payne*, 2 Smith's lead. Cas., 237, 241; *Wyman v. Mayor of New York*; 11 Wend. (N.Y. Sup. Ct.) 499; *Langley v. Gallipolis*, 2 Ohio; *New Orleans v. U.S.*, U.S. (10 Pet.). See: *McCoy v. Thompson*, *supra*; *Johnson v. Crawford*, 88 Or. 127; *Christian v. Eugene*, 49 Or. 170, 173; and, *The Law of Dedication in Oregon*, *supra*, at 131, 133.
129. *The Law of Dedication in Oregon*, Or L. Rev. 20.
130. E.g. *McQuillan on Municipal Corporations*; *Tiffany on Real Property*.
131. *Schooling v. Harrisburg*, 42 Or.
132. *Johnson v. Crawford*, 88 Or.; See: footnotes 121, 122.
133. *Meier v. Portland Co. Ry. Co.*, 16 Or. 615.
134. *Oregon City v. Or. & Cal. R. Co.*, 44 Or. 167, 176, 74 P. 924.
135. In reference to: *Meier v. Portland C. Ry. Co.*, 16 Or., 1 L.R.A. 856, 19 P. 610).
136. *Supra*.
137. *Cit.*: *Roberts v. Mathews*, 137 Ala. 523; *Elliotts Roads and Streets*, 3rd ed., subsec 128.
138. *Supra*.
139. See: footnote 122 for citations.
140. *Carter v. Portland*, 4 Or.
141. 609 P.2d 415, 45 Or. App. 737 (1980). *Words and Phrases*, perm. ed., West Publishing Co., St. Paul, Minn.
142. *Sullivan v. City of Louisville*, 291 Ky. 60; *cit. in: Words and Phrases*, perm. ed., West Publishing Co., St. Paul, Minn.
143. *Johnson v. Watertown*, 131 Conn.; *Words and Phrases*, *supra*.
144. *Adams v. Richmond Co.*, 193 Ga. 42; *Words and Phrases*.
145. *Village of Winthrop Harbor v. Gurdes*, 257 Ill. 596; *Words and Phrases*.
146. *Twedell v. City of St. Joseph*, 167 Mo. App. 547; *Words and Phrases*.
147. *Wright v. Tukey*, 57 Mass.; *Words and Phrases*.
148. *Palmer v. East River Gas Co. of Long Island*, 101 N.Y.S. 347, 349; *Words and Phrases*.
149. *Ramstad v. Cart*, 154 N.W. 195, 203; *Words and Phrases*.
150. 2 *Thompson on Real Property*, 1961 replacement, subsec 372; *cit.*: *Hall v. Fairchild-Gilmore Wilton Co.*, 66 Cal. App. 615.
151. *Id.*, *op. cit.*: *Stratford v. Fidelity & Casualty Co.*, 106 Conn. 34; *Gietl v. Smith*, 320 Ill. 467; *Easton v. Koch*, 152 Pa.; etc.
152. *Thompson*; *cit.*: *Whitney v. Crittendon*, 112 Or.
153. *Thompson*; *cit.*: *Titusville Amusement Co. v. Titusville Iron Works*, 286 Pa.
154. *Id.*
155. *Thompson*.

156. *Id.*, *cit.*: *Collins v. Phoenix*, 269 F. 157. Atty. Gen. Op., 1966-1968, 327.
158. *Elliotts Roads and Streets*; *cit.*: *Cincinnati, etc. R.R..Co. v. Village of Carthage*, 36 Ohio St. 631.
159. *Id. cit.*: *Town Council v. Lithgoe*, 7 Rich.
160. *Ibid.*
161. *Carter v. Portland*, 4 Or.
162. *Mutual Irrigation Co. v. Baker City*, 58 Or. 306 (this and the following cases were in reference to sec 63-107 Oregon Code, predecessor to ORS 93.140 (amended in 1973 by ch. 94 subsec 6)); *Steel v. Portland*, 23 Or.; *Spencer v. Peterson*, 41 Or.; *Oregon City v. Or. & Cal. R. Co.*, 44 Or.; *Christian v. Eugene*, 49 Or.
163. *Carter v. Portland*, 4 Or.
164. *Kuck v. Wakefield*, 58 Or. 552.
165. *Moore v. Fowler*, 58 Or. 292. See also: Department of Justice opinion LS V-1520, Oct. 18, 1966, confirming the rule of Principle 21. See also: *The Law of Dedication in Oregon*, *supra*.
166. *Moore v. Fowler*, 58 Or. 292,299.
167. 58 Or. 292, 299.
168. *Moore v. Fowler*, *op. cit.*: *Tillman v. People*, 12 Mich.; *Littler v. Lincoln*, 106 Ill.; *Bethel v. Pruett*, 215 Ill.; *Bauman v. Boekler*, 119 Mo., etc.
169. *Supra*.
170. 49 Or. 170, 89 P. 419.
171. ORS 92.014 (2) requires "No instrument dedicating land to public use shall be accepted for recording in this state unless such instrument bears the approval of the city or county authorized by law to accept such dedication." 1987 ORS Subject to change.
172. 1987 ORS, subject to change; check current statutes.
173. ORS 92.225, 1987 ORS, subject to change; check current statutes. See Principle 12.
174. *Supra*.
175. *Supra*.
176. *Supra*.
177. *Supra*.
178. *Supra*.
179. *Supra*.
180. *Supra*.
181. *Supra*.
182. *Supra*.
183. *Supra*.
184. *Supra*.
185. *Supra*.
186. Although based on an actual situation, the name of the subdivision and exact nature of the dispute have been changed to prevent this discussion from casting a shadow on the right, title and interests of the purchasers of land in this development.
187. 1987 ORS, subject to change; check current statutes.
188. 1987 ORS, subject to change; check current statutes.
189. 1987 ORS, subject to change; check current statutes.
190. 1987 ORS, subject to change; check current statutes.
191. Refer to Principles 8 and 12.
192. ORS 92.090 (2) a. 1987 Statutes.
193. 20 Or L. Rev. 187; *The Law of Dedication in Oregon*, by Sheldon W. Parks.
194. *Nodine v. Union*, 42 Or.
195. *McCoy v. Thompson*, 84 Or. 148.
196. *Bernard v. Willamette Box & Lbr. Co.*, (1913) 64 Or. 223, 129 P. 1039.
197. *Portland Ry., L. & P. Co. v. Oregon City*, 85 Or. 582; *cit.*: *Hogue v. City of Albina*, 20 Or. 186, 187.
198. 1987 ORS, subject to change; check current statutes.
199. *Elliotts' Roads and Streets*, 4th ed., by Byron K. & William F. Elliott. Bobbs-Merrill Co. (1926) subsec 130.
200. *State v. Track*, 27 Am. Dec. 554,10c *cit.* 559; *Downer v. St. Paul, etc. R.R. Co.* 23 Minn. 271; *Dill on Municipal Corporations*, subsec 491; *Railroad Company v. Schurmeir*, 7 Wall. 272 (19 L. ed. 74); *City of Des Moines v. Hall*, 24 Iowa 234; *Detroit v. Detroit & Milwaukie R.R. Co.*, 23 Mich. 173.
201. *Id.*, See: *Menstell v. Johnson*, *supra*.
202. *Id.*, See: *McCoy v. Thompson*, *supra*.
203. *Menstell et al v. Johnson et al*, 125 Or., *cit.*: *Elliotts Roads and Streets*, 3d. ed., subsec 125.
204. ORS Chapter 92.
205. 1987 ORS.
206. See: 20 Or. L. Rev. 187, *cit.*: *Tulane L. Rev.* 606; *McCoy v. Thompson*, *supra*.
207. ORS Chapter 92.
208. This definition provided by 1985 Legislature, HB 2547 A-Eng, Section 5.
209. Was ORS 92.010 (10), amended by HB 2547, 1985 Legislature. (Subject to change; check current statutes.) See: ORS 92.090 (2) b.
210. *Heiple v. City of East Portland*, 13 Or. 97. See: ORS 92.090.
211. 1987 ORS, subject to change; check current statutes.
212. 1987 ORS, subject to change; check current statutes.
213. 1987 ORS, subject to change; check current statutes.
214. *Mathis v. Thunderbird Village, Inc.*, 236 Or. 439, 440; *cit.*: *Hendrickson v. City of Astoria*, 127 Or. 1, 6.
215. *Id.* See: *Kropitzer v. Portland*, 237 Or. 157 (1964).
216. 1987 ORS, subject to change; check current statutes.
217. 1987 ORS, subject to change; check current statutes.
218. 1987 ORS, subject to change; check current statutes.
219. *Bernard v. Willamette Box & Lbr. Co.*, 64 Or. 223, 129 P. 1039.
220. *McCoy v. Thompson*, 84 Or. 141,164 P. 589 (1917). See: *Nodine v. Union*, *supra*.
221. Annotations, following ORS 92.150, in the 1983 Cumulative Supplement for ORS Chapters 1 to 170; ORS vol. 7, 1983. See: n. 271.
222. *McQuaid v. Portland & V. Ry.*, 18 Or. 237, 22 P. 899 (1889); *Huddleston v. Eugene*, 34 Or. 343, 55 P. 868, 43 L.R.A. 444 (1899). Annotations exactly as quoted in 7 ORS, published by Legislative Committee of the Oregon Legislative Assembly (1983).
223. *Steel v. Portland*, 23 Or. 176, 31 P. 479 (1892); *Christian v. Eugene*, 49 Or. 170, 89 P. 419 (1907); *Menstell v. Johnson*, 125 Or. 150, 262 P. 853, 266 P. 891, 57 L.R.A. 311 (1928).
224. *McCoy v. Thompson*, *supra*; *Menstell v. Johnson*, *supra*.
225. *McQuaid v. Portland & V. Ry.*, 18 Or. 237, 22 P. 899 (1889).
226. *Carter v. Portland*, 4 Or. 339 (1873); *Meier v. Portland Cable Ry.*, 16 Or. 500, 19 P. 610, 1 L.R.A. 856 (1888); *Steel v. Portland*, 23 Or. 176, 31 P. 479 (1892); *Spencer v. Peterson*, 41 Or. 257, 68 P. 519, 1108 (1902); *Schooling v. City of Harrisburg*, 42 Or. 494, 71 P. 605 (1903); *Nodine v. Union*, 42 Or. 613, 72 P. 582 (1903); *Oregon City v. Ore. & Calif. R.R. Co.*, 44 Or. 165, 74 P. 924 (1904); *McCoy v. Thompson*, 84 Or. 141,164 P. 589 (1917).
227. *Heiple v. Portland*, 13 Or. 97, 8 P. 907 (1885); *Steel v. Portland*, *supra* (1892);

- McCoy v. Thompson*, 84 Or. 141,164 P. 589 (1917).
228. *Lewis v. Portland*, 25 Or. 133, 35 P. 256, 42 Am. St. Rep. 772 (1893); 22 L.R.A. 736; *Nodine v. Union*, 42 Or. 613, 72 P. 582 (1903); *Christian v. Eugene*, 49 Or. 170, 89 P. 419 (1907).
 229. *Miller v. Fisher*, 90 Or. 111,174 P. 1152 (1918).
 230. *Menstell v. Johnson*, 125 Or. 150, 262 P. 853, 266 P. 891 (1928).
 231. *Lewis v. Portland*, 25 Or. 133, 150, 35 P. 256 (1893); 42 Am. St. Rep. 772, 22 L.R.A. 736.
 232. 7 ORS Cumulative Supplement for ORS Chapters 1 to 170, published by the Legislative Committee of the Oregon Legislative Assembly (1983), *cit.*: *Carter v. Portland*, 4 Or. 339 (1873); *Hague v. City of Albina*, 20 Or. 182, 25 P. 386 (1890); 10 L.R.A. 673; *Nodine v. Union*, *supra*; *Oregon City v. Ore. & Calif. R.R. Co.*, 44 Or. 165, 74 P. 924 (1904); *McCoy v. Thompson*, 84 Or. 141,164 P. 589 (1917); *Nicholas v. Title & Trust Co.*, 79 Or. 226, 154 P. 391 (1916).
 233. *Carter v. Portland*, 4 Or. 339 (1873); *Hague v. City of Albina*, 20 Or. 182, 25 P. 386, 10 L.R.A. 673 (1890); *Lewis v. Portland*, 25 Or. 133, 35 P. 256, 42 Am. St. Rep. 772, 22 L.R.A. 736 (1893).
 234. *Morse v. Whitcomp*, 54 Or. 412, 103 P. 775, 135 Am. St. Rep. 832 (1909).
 235. *Portland Ry. Light & Power Co. v. Oregon City*, 85 Or. 574, 166 P. 932 (1917).
 236. *Hague v. City of Albina*, *supra*.
 237. *Carter v. Portland*, *supra*; *Whitney v. Crittenden*, 112 Or. 278, 229 P. 378 (1924).
 238. *Christian v. Eugene*, 49 Or. 170, 89 P. 419 (1907); *Silverton v. Brown*, 63 Or. 418, 128 P. 45 (1912).
 239. *McCoy v. Thompson*, 84 Or. 141,164 P. 589 (1917).
 240. *Schooling v. City of Harrisburg*, 42 Or. 494, 71 P. 605 (1903); *Oliver v. Synhorst*, 48 Or. 292, 86 P. 376, 7 L.R.A. (NS) 243 (1906); *Barton v. Portland*, 74 Or. 75,144 P. 1146 (1914); *Dabney v. Portland*, 124 Or. 54,263 P. 386 (1928).
 241. *Oliver v. Synhorst*, *supra*; *Christian v. Eugene*, *supra*; *Barton v. Portland*, *supra*; *Killam v. Multnomah County*, 137 Or. 562, 4 P.2d 323 (1931).
 242. "Laches" is a failure to do some thing which should be done or to claim or enforce a right at a proper time. *Black's rev. 4th ed.*, 1017.
 243. *Barton v. Portland*, *supra*.
 244. See footnotes 226 and 229.
 245. Definition of ORS 92.225 (2), 1987 ORS, subject to change; check current statutes.
 246. 1987 ORS, subject to change; check current statutes.
 247. The wording in italics is an amendment of HB 2547, passed by the 63rd Oregon Legislative Assembly, 1985 Regular Session. The following are Sections 2 to 4 of that act (to be made a part of ORS 92.018 to 91.170): Section 2. "(1) Each agency or body authorized to approve subdivision plats under ORS 92.040 shall have the same review and approval authority over any proposed replat of a recorded plat. (2) Nothing in this section regarding replatting shall be construed to allow subdividing of land without complying with the applicable provisions of ORS Chapter 92, Section 3. The act of replatting shall allow the reconfiguration of lots and public easements within a recorded plat. *Upon approval by the reviewing agency or body as defined in section 2 of this 1985 Act, replats will act to vacate the platted lots and easements within there plat area with the following conditions:* (1) A replat, as defined in ORS 92.010 (10) shall apply *only to a recorded plat*. (2) Notice shall be provided as described in ORS 92.225 (4) when the replat is replatting all of an *undeveloped subdivision* as defined in ORS 92.225. (3) Notice, consistent with the governing body of a city or county approval of a tentative plan of a subdivision plat, shall be provided by the governing body to the owners of property adjacent to the exterior boundaries of the tentative subdivision replat. (5) A replat shall comply with all subdivision provisions of this chapter and all applicable ordinances and regulations adopted under this chapter. Section 4. (1) The replat of a portion of a recorded plat *shall not act to vacate any recorded covenants or restrictions*. (2) *Nothing in Sections 2 to 4 of this 1985 act is intended to prevent the operation of vacation actions by statutes in ORS 271 or 368*. (3) The governing body of a city or county may use procedures other than replatting procedures in sections 2 and 3 of this 1985 act to adjust lot lines as described in ORS 92.018 (8), as long as those procedures include the recording or other central filing of the final lot line adjustment." 1987 ORS, subject to change; check current statutes.
 248. 1983 ORS with the 1985 amendments of the 63rd Oregon Legislative Assembly, 1985 Regular Session. Subject to change; check current statutes.
 249. *Carter v. Portland*, 4 Or. 339. "But not of the permanent estate," *Poskey v. Bradley*, 209 Ark. 93, 189 S.W.2d 806.
 250. 58 Or. 362.
 251. *Id. cit.*: *Parker v. Taylor*, 4 Or. 435, 477; *Lankin v. Terwilliger*, 22 Or. 97; *Huddleston v. Eugene*, 34 Or. 343.
 252. *John P. Sharkey Co. v. City of Portland*, 58 Or. 362, *cit.*: *Elliotts' Roads & Streets*, 2d ed.; *Smith v. City of Rome*, 19 Ga. 89; *City of Aurora v. Fox*, 78 Ind. 1; *Makepeace v. Worden*, 1 N.H. 16; *Fisher v. City of Rochester*, 6 Lans. (N.Y.). See: *Atty. Gen. Op.* 1952-1954 p. 110, 111.
 253. *Portland Baseball Club v. Portland*, 142 Or. 16, 18 P.2d 811.
 254. *Id. cit.*: *Huddleston v. City of Eugene*, 34 Or. 343; *Kurtz v. Southern Pacific Company*, 80 Or. 213; See: sec 56-716, Oregon Code (1930).
 255. *McQuaid v. Portland & V. Ry.* 18 Or. 237, 22 P. 899; *Huddleston v. Eugene*, 34 Or. 343; 43 L.R.A. 44. See: 70 A.L.R.; *C. W. Nell et al v. Independent Realty Co.*, 317 Mo. 1233 (cited in Oregon cases).
 256. *City of Portland v. Whittle*, 3 Or.; 20 Or. L. Rev. at 153.
 257. *Huddleston v. Eugene*, 34 Or. 343.
 258. *McQuaid v. Portland Ry. Co.*, 18 Or. 237, 22 P. 899.
 259. *Huddleston v. Eugene*, 34 Or. 343. See: 23 Am. Jur. 2d, Ded. subsec 21.
 260. See: ORS 271.140 (amended by 1981 ch. 153 subsec 58); ORS 368.366. Each of these statutes will be explained in the Section of this publication on "Vacation of Public Ways".
 261. *Nell v. Independent Realty Co.*, 317 Mo. 1233.
 262. 70 A.L.R. 550, *op cit.*: *Nell v. Independent Realty Co.*, *supra*, *cit.*: *Keown v. Brandon*, 206 Ky. 93; *Stillwater v. Hamilton*, 112 Okla. 10; *Frank W. Coy Real Estate Co. v. Pendleton*, 45 R.I. 477; *Bowers v. Atchison, T. & S. F. Ry. Co.*, 119 Kan. 202; 42 A.L.R. 228; *Texas Co. v. Texarkana Mach. Shops*, 1928 Tex. Civ. App., 1 S.W.2d 928; *Lynchburg v. Peters*, 145 Va. 1; *Gossotol Realty Corp. v. Gillman*, 224 App. Div. 63, 229 N.Y.S. 201; *Libertini v. Schroeder*, 141 Md. 484; *Peoples Sav. Bank & T. Co. v. South Side Baptist Church*, 220 Ky.; See: *Waltrous v. Southward*, 5 Conn.
 263. 4 Day Conn. 328.
 264. *Black's Law Dictionary*, rev. 4th ed. defines *juris et de jure* as: "Of law and right. A presumption *juris et de jure*, or an irrebuttable presumption, is one which the law will not suffer to be rebutted by any counter evidence, but established as conclusive," p. 990.

Consequently, Principle 25 is a presumption *juris et de jure*.

265. See: 70 A.L.R.
266. See: 70 A.L.R.
267. Elliotts' on Roads and Streets, 1st ed., 671, *cit.*: Jackson v. Hathaway, 15 Johns 447.
268. 70 A.L.R., *cit.*: Mott v. Mott, 68 N.Y. 246; Bliss v. Johnson, 73 N.Y. 529.
269. Black's Law Dictionary, 4th ed., p. 1483.
270. Elliotts' Roads and Streets, 1st ed.
271. Huddleston v. City of Eugene, 34 Or.
272. Meier v. Portland C. Ry. Co. Ry. Co, 16 Or.
273. Lankin v. Terwilliger, 22 Or. 97.
274. The land against which the easement exists is called the *servient tenement*, and the estate to which it is annexed the *dominant tenement*. The public is the *dominant owner* of a road easement, the dedicant remains the *servient owner*. "Dominant estate" does not mean "greatest estate" but as regard use of the land means "controlling" estate. A *servitude* is a charge or burden on an estate; therefore, an easement is a *servitude* on the servient estate.
275. Elliotts' Roads and Streets, 1st ed. See: Boundary Control & Legal Principles, 2d ed., Curtis M. Brown, John Wiley & Sons, Inc., p. 269, ch. 8.
276. Davidson v. Davidson, 350 Mo. 639.
277. Gray v. Blanchard, 8 Pick. (Mass.). ORS 105.770. **Note:** ORS 105.722 provides that a person owning the possibility of reversion may record a notice of an intent to preserve such an interest.
1. Elliotts', Roads and Streets.
2. Fossi v. Myers, 271 Or. 611 (1975); Hurd v. Byrnes, 264 Or.; Fahey v. City of Bend, 252 Or. 428 (1969); McAdam v. Smith, 221 Or.; Cross v. Talbot, 121 Or. See: Peck v. Smith, 1 Conn. 103.
281. Fahey v. City of Bend, *supra*. See: 23 Am. Jur. 2d., Deeds, subsec 258; 49 A.L.R. 2d 932; Fossi v. Myers, *supra*; Cross v. Talbot, *supra*.
282. ORS 307.200 reads: "All lands within the boundary of any county road, and all dedicated streets and alleys in any incorporated or unincorporated city or town, or town plat, within this state, are exempt from assessment and taxation while used for such purposes." (Subject to amendment; check current laws.)
283. Department of Justice Op. of Jan. 21, 1975.
284. ORS 307.200.
285. City of Portland v. Whittle, 3 Or. 128, 129.
286. Corporation, as used here, is usually to mean "one created by the state for administration of civil government," e.g. a city or county.
287. 18 Or. 73, 22 P. 528.
288. *Ibid*.
289. 20 Or. L. Rev., *cit.*: Carter v. City of Portland, *supra*; Church v. City of Portland, *supra*; Wessinger v. Mische, 71 Or. 239, 142 P. 612; 4 Tiffany, *op. cit. supra*, n. 84, sec 113; n. (1889) 6 L.R.A.; 10 Tex. L. Rev.
290. Iron Works v. O.R. & H. Co., 26 Or.
291. City of Salem v. Merritt Truax, 70 Or. App. 138. See: Oregon Investment Co. v. Schunk, 242 Or. 63; Boese v. City of Salem, 40 Or. App. 381; Morris v. City of Salem, *et al*, 179 Or. 666; also see: Argo Invest. v. Dept of Transportation, 66 Or. App. 430.
292. *Id. cit.*: Elliotts' Roads and Streets; Tiedman on Municipal Corporations.
293. Brand v. Multnomah Co., 38 Or. 79, 104, 50 L.R.A. 389, 60 P. 390, 62 P. 209.
294. 2 Dillon, Munic. Corp. 4th ed., subsecs 680, 683; Winters v. George, 21 Or. 251, 259, 27 P. 1041; Simon v. Northrup, 27 Or. 487, 501, 40 P. 560, 30 L.R.A. 171. See: ORS 221.916 (Powers of City Council).
295. 2 Dillon, Munic. Corp., 4th ed., subsec 656.
296. Willamette Iron Works v. Oregon Ry. & Nav. Co., 24 Or. 224; Huddleston v. City of Eugene, 34 Or. 343; Barney v. Keokuk, 94 U.S. 324, 340. See: ORS 221.916, (Powers of City Council).
297. *Supra*.
298. Elliotts' Roads and Streets, 336; 2 Dillon, Munic. Corp. 4th ed. subsec 989; Lewis, Em. Dom., subsec 96 and 97; Mills, Em. Dom., subsecs 195 and 196; 1 Harris, Dam. By Corp., subsecs 126-130; 10 Am. & Eng. Enc. Law, 2d ed., 1124.
299. 4 Am. & Eng. Enc. Law 2 ed. 920; Willis v. City of Winona, 59 Minn. 27, 26 L.R.A. 142, 60 N.W. 814; Lewis, Em. Dom., subsec 109; Randolph, Em. Dom., subsec 399; Skinner v. Hartford Bridge Co., 29 Conn. 523; Colclough v. Milwaukee, 92 Wis. 182, 65 N.W. 1039; Walish v. Milwaukee, 95 WIS. 16, 69 N.W. 818; Willets Mfg. Co. v. Mercer Co. Freeholders, 92 N.J. Law, 95, 40 A. 782.
300. Pittsburgh & W.E. Pass. Ry. v. Point Bridge Co., 165 Pa. 37, 30 A. 511, 26 L.R.A. 323.
301. Brand v. Multnomah County (rehearing), 38 Or. 99, 104.
302. P. & W.V.R.R. Co. v. City of Portland, 14 Or. 188.
303. Private use, as used here, means: Any use that is not open, unobstructed and free to the public. For example, although county shops were on land owned in fee by a public agency, the use of the property is "private" in nature because it was fenced and open only to certain county employees. The county's rights in this land are "private" as opposed to the "public" nature of its rights in a county park.
304. Dent v. Oregon City, 106 Or. 122, 133, 211 P. 909.
305. *Id. cit.*: 13 R.C.L. 251,255; White Oak Coal Co. v. Manchester, 109 Va. 749; Boque v. Bennett; 156 Ind. 478; Commonwealth v. Stodder, 2 Mass. (Cush.) 562; Cicero Lbr. Co. v. Cicero, 176 Ill. 9.
306. Macomber v. Nichols, 34 Mich. 212.
307. Special Laws of Oregon (1903) pp. 649, 650.
308. Dent v. Oregon City, *supra*, *op. cit.*: 13 R.C.L., 252; Thielke v. Albee, 79 Or. 48, 153 P. 793; Cummins v. Jones, 79 Or. 276, 155 P. 171; Frick v. City of Gary, Ind., 135 N.E. 346; Sumner Co. v. Transportation Co., 141 Tenn. 493,213 S.W. 412, 5 A.L.R., 765 and note at p. 768; Greene v. City of Antonio, Tex. Civ. App., 178 S.W. 6; Dickey v. Davis, 76 W.Va. 576, 85 S.E. 781, (1915) L.R.A., 840.
309. Dent v. Oregon City, *supra*, See: Jitney Bus Assoc. v. City of Wilkes Barre, 256 Pa. 462, 100 A. 954; Chapter 8, Laws of 1921, Special Session, Oregon Legislature; Northwestern Auto Co. v. Hurlburt, 207 P. 161; Camas Stage Co.v. Kozier, 209 P. 95.
310. 34 Or. 34~ 359, 43 L.R.A. 444.
311. See footnote 293. But in Brand the obstruction was held not a new servitude.
312. Cooley, Const. Lim., 557; Elliotts', Roads and Streets, 155; Willamette Iron Works v. Oregon Ry. & Nav. Co., 26 Or. 224; Imlay v. Union Branch R.R. Co., 26 Conn. 249; Milhau v. Sharp, 15 Barb. 193; State v. Laverack, 34 N~I.L. 201; etc.
313. Huddleston v. Eugene, *supra*, *op. cit.*: Williams v. New York Central R.R. Co., 18 Barb. 222; Fagan v. City of Chicago, 84 Ill. 227.
314. Sweet *et al* v. Irrigation Canal Co., 198 Or. 166, 204 (1953), 254 P.2d 700.

315. *McGowan v. City of Burns*, 172 Or. 63, 74, 137 P.2d 994, 139 P.2d 785; *Town of Gaston v. Thompson*, 89 Or. 412, 420; *Savage v. City of Salem*, 23 Or. 381, 363; 1 Wood on Nuisances.
316. *Willamette Iron & Steel Works v. Oregon Railway and Navigation Co.*, *supra*.
317. 26 Or. 230.
318. 23 Or. 381,363.
319. 23 Or. 363.
320. 2 Dillon, *Mun. Corp.*, subsecs 657-697; Keasby, *Electric Wires*, 86, 89; Thompson, *Electricity*, subsecs 26, 28.
321. *Baines v. Marshfield & Sub. R. Co.*, 62 Or. 510, 124 P. 672.
322. 2 Elliott, *op. cit.*, subsec 928.
323. *Town of Gaston v. Thompson*, *supra*.
324. See: *Douglas County Road Co. v. Canyonville and Galesville Road Co.*, 8 Or. 102.
325. *Lowell v. Pendleton Auto Co.*, 123 Or. 383, 402, 261 P. 415; *Tooze v. Willamette Valley S. Ry. Co.*, 77 Or. 157, 162, 150 P. 252; *Baines v. Marshfield & Sub. R. Co.*, *supra*; *Willamette Iron & Steel Works v. O.R. & N. Co.*, *supra*.
326. 2 Elliott, *op. cit.*, 1153 subsec 882. This has been held in Oregon: *Morris v. City of Salem*, 179 Or. 666; *Oregon Investment Co. v. Schunk*, 242 Or. 63; *Boese v. City of Salem*, 40 Or. App. 381 (1979); *Argo Invest. v. Dept. of Transportation*, 66 Or. App. 430, (if done for safety and convenience of the public).
327. *Sweet et al v. Irrigation Canal Co.*, 198 Or. 166, 204.
328. Recognized in: *Oliver v. Synhorst*, 48 Or.; *Christian v. Eugene*, 49 Or.; *Oliver v. Synhorst* (2nd), 58 Or. 582, 109 P. 762, 115 P. 594; *Barton v. City of Portland*, 74 Or.; *Menstell et al v. Johnson et al*, 125 Or.; *City of Molalla v. Coover et ux*, 192 Or.; *Lowell et al v. Pendleton Auto Co.*, 123 Or. 383. But see: *Schooling v. Harrisburg*, 42 Or.; *Spencer v. Peterson*, 41 Or.; *Silverton v. Brown*, 63 Or. See: Atty. Gen. Op. 40-42 p. 385, county court may prevent obstruction of platted dedicated roads outside incorporated cities.
329. *Schooling v. Harrisburg*, *supra*.
330. *Oliver v. Synhorst*, 48 Or. 292, 86 P. 376, 7 L.R.A. (N.S.) 243; but see: *Oliver v. Synhorst*, 58 Or. 582, 109 P. 762, 115 P. 594.
331. *Portland v. Inman-Poulsen Lbr. Co.*, 66 Or. 86, 133 P. 829.
332. *Nicholas v. Title & Trust Co.*, 79 Or. 226, 154 P. 391.
333. *Barton v. City of Portland*, 74 Or. 75, 144 P. 1146.
334. *Dabney v. City of Portland*, 124 Or. 54, 263 P. 386.
335. An equitable estoppel is that condition whereby justice forbids persons or corporations to deny the truth of their own acts, conduct, assertions or silence.
336. *Supra*.
337. *City of Molalla v. Coover et ux*, 192 Or. 233, 235 P.2d 142.
338. See: *City of Clatskanie v. McDonald*, 85 Or.
339. *Lowell et al v. Pendleton Auto Co.*, 123 Or. 383.
340. *Laches*, as referred to here, is the failure of a public official to do something which should be done; or the failure to claim or enforce something at the right time.
341. *City of Molalla v. Coover et ux*, *supra*, *cit.*: *Turtle v. Beem*, 144 Or. 145, 24 P.2d 12.
342. *Id.*
343. *Oliver v. Synhorst* (1st), 48 Or. 292. But see: *Oliver v. Synhorst* (2d), 58 Or. 582.
344. *City of Molalla v. Coover et ux*, 192 Or. 244.
345. 58 Or. 582, 109 P. 762, 115 P. 594.
346. *City of Molalla v. Coover et ux*, *supra*, *cit.*: *Oliver v. Synhorst*, (2d), 58 Or. 582.
347. *Oliver v. Synhorst*, (2d), 58 Or. 582.
348. *Oliver v. Synhorst*, 58 Or. 582. 349. *Schooling v. Harrisburg*, *supra*.
350. *City of Molalla v. Coover et ux*, *supra*, discussing merits of *Synhorst* (2d).
351. *Portland v. Inman-Poulsen Lumber Co.*, 66 Or.
352. *Nicholas v. Title & Trust Co.*, 79 Or. 226.
353. *Barton v. Portland*, 74 Or. 75, 144 P. 1146.
354. *Dabney v. City of Portland*, 124 Or. 54, 263 P. 386.
355. *Silverton v. Brown*, 63 Or. 418, 128 P. 45.
356. *Booth v. Prineville*, 72 Or. 75, 144 P. 1146.
357. *Dabney v. Portland*, *supra*.
358. *Hart v. City of Independence*, 84 Or. 194, 164 P. 719.
359. *Portland v. Miller*, 72 Or. 317, 143 P. 1006.
360. *Oliver v. Synhorst* (2d), 58 Or. 582.
361. *City of Molalla v. Coover et ux*, *supra*, *cit.*: *City of Newberg v. Kienle*, 60 Or. 486.
362. *Id.*, *op. cit.*: *Cruson v. City of Lebanon*, 64 Or. 593, 131 P. 316.
363. *Id.*, *op. cit.*: *Lowell et al v. Pendleton Auto Co.*, *supra*.
364. *City of Eugene v. Garrett*, 87 Or. 435, 169 P. 649, 170 P. 731.
365. *City of Molalla v. Coover et al*, *supra*, at p. 251.
366. *Tuttle v. Beem*, 144 Or. 145, 157, 24 P.2d 12.
367. *Cabell et al v. Cottage Grove et al*, 170 Or. 256, 284, 130 P.2d 1013.
368. 171 Or. 522, 593, 130 P.2d 624, 138 P.2d 916.
369. *School District 47 v. U.S. Nat'l. Bank of Portland*, 187 Or. 360, 211 P.2d 723; *Rohde v. State Industrial Accident Commission*, 108 Or. 426, 217 P. 627; *Oregon v. Portland Gen. Elec. Co.*, 52 Or. 502, 95 P. 722, 98 P. 160; *Lowell et al v. Pendleton Auto Co.*, *supra*.
370. *City of Molalla v. Coover et ux*, *supra*. 371. *supra*.
372. 192 Or. 233, 253, 235 P.2d 142 (August 14, 1951); See: C-I.S. Habeas Corpus subsec 121; 25 Am. Jun. Highways subsec 114-116; 171 A.L.R. 109, 136.
373. Based on *City of Molalla v. Coover et ux*, *supra*.
374. *Dabney v. City of Portland*, 124 Or., *cit.*: *City of Clatskanie v. McDonald*, 85 Or. 670, 167 P. 560.
375. *City of Clatskanie v. McDonald*, *supra*, *cit.*: *Johnson v. Knott*, 13 Or. 308, 315, 10 P. 418; *Campau v. Detroit*, 104 Mich. 560, 562, 62 N.W. 718; *San Leandro v. Le. Breton*, 72 Cal. 170, 177, 13 P. 405; *Rhodes v. Brightwood*, 145 Ind. 21, 30, 43 N.E. 942; *Gillelan v. City of Frost*, 25 Tex. Civ. App. 371, 377, 61 S.W. 345.
376. *Menstell et al v. Johnson et al*, 125 Or.
377. *Barton v. City of Portland*, 74 Or. 75; See: *Whitney v. Crittenden*, *et al*, 112 Or.
378. Rev. 4th ed., pp. 1214, 1215, *supra*.
379. *Id.*, *cit.*: *Yaffe v. City of Ft. Smith*, 178 Ark. 406, 10 S.W. 2d 886, 890, 61 A.L.R. 1138.
380. *Black's Law Dictionary*, Rev. 4th ed., *supra*, *op. cit.*: *Hall v. Putney*, 291 Ill App. 508, 10 N.E. 20, 204; *Holton v. Northwestern Oil Co.*, 201 N.C. 744. See: ORS Chapter 368, "Road Hazards." See: ORS Chapter 221 for acts authorized by the legislature.

381. See: ORS 105.850 to 105.870 (Action for reduced commercial property value resulting from staled use restrictions.)
382. *Barrier v. Troutman*, 55 S.E.2d 923.
383. *Black's*, *supra*, *cit.*: *Heeg v. Licht*, 80 N.Y. 582, 36 Am. Rep. 654; *Baltzger v. Carolina Midland R. Co.*, 54 S.C. 242; *Wilcox v. Hines*, 100 Tenn. 538. In *Sandstrom v. Oregon-Washington Ry. & Nav. Co.*, 75 Or. 159: "For an injury which an individual sustains in common with the general public, he or she cannot complain, though suffering more than the rest of the public, and in such case, relief, if any, is by public prosecution."
384. 117 Or. 262.
385. *Lowell et al v. Pendleton Auto Co.*, 123 Or. 383, 261 P. 415.
386. Bacon's abridge., *Highways*.
387. 3 McQuillan, *Municipal Cor.*, subsec 1322.
388. 1 Or. 73.
389. *Bernard v. Willamette Box & Lumber Co.*, 64 Or. 223, 129 P. 1039.
390. *Kurtz v. Southern Pacific Co.*, 80 Or. 213, 155 P. 367, 156 P. 794.
391. *Biogen v. Smith*, 34 Or. 394, 56 P. 292, 44 L.R.A. 522; *Baines v. Marshfield & Sub. R. Co.*, 62 Or. 510, 124 P. 672; *Wessinger v. Mische*, 71 Or. 239, 142 P. 612; See also: 14 R.C.L. 215, subsec 183, and p. 220, subsec 186.
392. *Luhrs v. Sturdevant*, 10 Or. 170.
 1. *Von Buskirk v. Bond*, 52 Or. 234, 96 P. 1103.
 2. *Lowell et al v. Pendleton Auto Co.*, 123 Or. at pp. 397, 398, *cit.*: *Baines v. Marshfield & Sub. R. Co.*, 62 Or. "It is no answer to the charge of nuisance that, even with the obstruction in the highway, there is still room for two or more wagons to pass, nor that the obstruction itself is not a fixture," *Hoefler v. Buck*, 110 Misc. Rep. 402, 180 N.Y.
395. *Id.* "Thus we said in *Morse v. Whitcomb*, *supra*: 'Nor are plaintiffs limited to the part of the roadway in front of their lots.' See also: *Cypress Lawn Cemetery Assn. v. Lievre*, 55 Cal. App. 228, 203 P. 150; *Benjamin v. Storr*, 30 Term Rep. (Eng.) 362."
396. *Id.* The English cases of *Maynel v. Saltmarsh*, 1 Keble 647, 83 Eng. Rep. 1278 (1664) and *Rex v. Cross*, 3 Camp. (Eng.) 224 (1812) was cited to supply a historical basis for the doctrine of nuisances.
397. *Lowell et al v. Pendleton Auto Co.*, 123 Or., *cit.*: *Pugh v. Crawford*, 176 Iowa 593, 156 N.W. 892, 1917 F. L.R.A. 345.
398. *Strong v. Sullivan*, 180 Cal. 331, 181 P. 59, 4 A.L.R. 343.
399. *Reed v. City of Seattle*, 124 Wash. 165, 213 P. 924, 29 A.L.R. 446.
400. *Elliotts', Roads & Streets*, subsec 830.
401. *Cypress Lawn Cemetery Assn. v. Lievre*, 55 Cal. App. 228.
402. *Norristown v. Moyer*, 67 Pa. 355.
403. *United Cigar Stores Co. v. Von Bargaen*, 7 Ohio N.P. 420.
404. *Minnich v. Lutz*, 18 Ohio N.P. 601.
405. *Lowell et al v. Pendleton Auto Co.*, 123 Or. 400.
406. Pom. Eq. Jur., sec 1955.
407. "Thus it was said by one court: 'It simply said, in effect, to the persons operating these cabs, so far as the city is concerned, in the congested district of the city, you may establish taxi stands at the following designated places, and the police will not molest you.'" *Erbank v. Yellow Cab. Co.*, 64 Ind. App. 144, 149 N.E. 647. See: ORS 221.340 (Parking Law Violation).
408. *Cohen v. Mayor of New York*, 113 N.Y. 532, 21 N.E. 700, 10 Am. St. Rep. 506, 4 L.R.A. 406; *Strong v. Sullivan*, *supra*; *McQuaid v. Portland & Vancouver Ry. Co.*, 18 Or. 237, 22 P. 899; *Baines v. Marshfield & Sub. R. Co.*, 62 Or. 510; *Kurtz v. Southern Pacific Co.*, *supra*; *Campbell v. Mayor*, 1 K.B.J. 869; *Brannan v. Cincinnati Hotel Co.*, 39 Ohio St. 333, 48 Am. Rep. 457; *Elliott, Roads & Streets*, subsec 834; 13 R.C.L., *Highways*, subsec 183.
409. *Bradley v. City of Oskaloosa*, 193 Iowa 1072, 188 N.W. 896.
410. *Lowell et al v. Pendleton Auto Co.*, *supra*. For additional information on nuisances, see: Gerald O. Dystra & Lillian G. Dystra, *The Business Law of Real Estate*, "Interference With Use & Enjoyment--Nuisance," Ch. 16, pp. 717, 762, The McMillan Co. New York; and see: Ralph E. Boyer, *Survey of Real Property*, "Nuisance", Ch XIII, pp. 310, 326, St. Paul Minn., West Publishing Co. Refer To: ORS 368.341: "Road Hazards" (on county public roads). Note: ORS 271.180 authorizing certain special uses of public ways.
411. *Cabell et al v. Cottage Grove, et al*, 170 Or. But see: *Argo Investment v. Dept. of Transportation*, 66 Or. App. 430; *City of Salem v. Merritt Truax*, *supra*.
412. *Sandstrom v. Oregon-Washington Ry. & Hav. Co.*, 75 Or. 159, 146 P. 803.
413. 1 Lewis, *Eminent Domain*, 3d ed., 169, 304.
414. *Id.*, *cit.*: *Muhlker v. New York & Harlem R.R. Co.*, 197 U.S. 544, 49 L. Ed. 872, 25 Sup. Ct. Rep. 522.
415. *Sandstrom v. Oregon-Washington Ry. & Hav. Co.*, 75 Or. 159, 146 P. 803, *cit.* 31 cases as support. But see: *Argo Investment v. Dept. of Transportation*, 66 Or. App. 430 (1984), exception made in case of limited access highway; *Douglas Co. v. Briggs*, 286 Or.; *Highway Com. v. Central Paving Co.*, 240 Or. 71.
416. 3d ed., sec 191.
417. *Robbins v. Scranton*, 217 Pa. 577, 66 A. 97.
418. 64 Or. 223, 129 P. 1039.
419. As I understand it, a "demurrer" is a formal method of disputing the sufficiency in law of the complaint (not really disputing the facts of the situation). In this case, the demurrer was on the basis that Bernard had a legal remedy, other than the lawsuit, to resolve the problem. Therefore, the defendant should not have to answer the charges.
420. 21 Am. & Eng. Enc. Law 2d ed. 704.
421. Sec 341, L.O.L.
422. *City of Roseburg v. Abraham*, 8 Or. 509.
423. *Wood, Nuisance*, 3d ed., sec 643.
424. *Joyce, Law of Nuisance*, secs 437, 439.
425. *Wood, Nuisance*, 3d ed., sec 674; *Fisher v. Zumwalt*, 128 Cal. 493, 61 P. 82; *Stamm v. City of Albuquerque*, 10 N.M. 491, 62 P. 973.
426. *Luhrs v. Sturdevant*, 10 Or. 170; *Von Buskirk v. Bond*, 52 Or. 234, 96 P. 1103; *Moore v. Fowler*, 58 Or. 292, 114 P. 472.
427. *Harniss v. Bulpitt*, 1 Cal. App. 140, 81 P. 1022; *Wilder v. DeCou*, 26 Minn. 10, 1 N.W. 48; *Baines v. Marshfield & Suburban R. Co.*, 62 Or. 510.
428. See: 64 Or. 229, 230, for complete explanation.
429. *Von Buskirk v. Bond*, 52 Or. 234, 96 P. 1103.
430. *Morse v. Whitcomb*, 54 Or. 412, 423, 102 P. 788; 103 P. 775; 135 Am. St. Rep. 832.
431. *Love v. Morrill*, 19 Or. 545, 24 P. 916; *Union Power Co. v. Lichty*, 42 Or. 563.
432. Sec 3264, L.O.L.
433. Sec 799, Subd. 34 L.O.L.
434. Sec 3260, L.O.L.
435. *Elliotts', Roads and Streets*, 3d ed., sec 850.

436. *Bernard v. Willamette Box & Lbr. Co.*, 64 Or. 223; *cit.*: 25 Or. 119.
437. *Fleischner v. Citizens Investment Co.*, 25 Or. 119, 35 P. 174.
438. *Virginia v. Rives*, 100 U.S. 313; *Ex parte Virginia*, 100 U.S. 339; *Neal v. Delaware*, 103 U.S. 370; *U.S. v. Cruikshank*, 92 U.S. 542, *cit. in Elliott on Roads and Streets*.
439. *Elliott, cit.*: *Chicago, Etc. R. Co. v. Chicago*, 166 U.S.; *Hodgson v. Vermont*, 168 U.S. 18 S. Ct. Rep. 80.
440. *Cabell et al v. Cottage Grove et al*, 170 Or. 256, 130 P.2d 103.
441. In *Cabell* the court held that these words, with exception of “jurisdiction”, when used in connection with judicial tribunals, “have no settled legal or technical signification.”
442. Subsec 115-351; 1941 Or. Laws, ch. 428, subsec 10, p. 741; subsecs 115-349, 115-309, 115-324, 115-393 and ch. 55, 1941 Or. Laws; 1941 Or. Laws, ch. 458, p. 816, subsec 115-337, subsec 115-347, and subsec 115-307. Cited in 170 Or. at pp. 278, 279 and 280.
443. ORS 373.050.
444. 25 Am. J. Juris. 549 subsec 255.
445. 38 Am. J. Juris. 210, subsec 256, *cit. in Cabell et al v. Cottage Grove et al, supra*. See: *Thornburg v. Port of Portland*, 233 Or. 178.
446. *Ibid, cit.*: *City of St. Paul v. Chicago, Milwaukee & St. Paul Railway Co.*, 63 Minn. 330, 65 N.W. 649, 34 L.R.A. 184; *Reed v. City of Seattle*, 124 Wash.
447. *Reed v. City of Seattle*, 124 Wash. 185, 213 P. 923, 29 A.L.R. 446.
448. A city charter emanates from the state, the sovereign power, in the nature of a grant. It differs from a constitution, in that the former is granted by the sovereign, while the later is established by the people themselves. *Black's Law Dictionary*, 4th ed.
449. See: *Thornburg v. Port of Portland* 233 Or. 78.
450. See: ORS 374.020 for a definition of a county “throughway” as applied in ORS 374.420 to 374.430.
451. *Elliott's, Roads and Streets*, 4th ed., Indianapolis, Bowen-Merrill Co., *cit.*: *Savage v. City of Salem, supra*. See: ORS 368.056 (gate construction authorized on certain public roads).
452. *Thornburg v. Port of Portland*, 233 Or. 178.
453. *Argo Investment v. Dept. of Transportation*, 66 Or. App. 430, 1984.
454. *Hickey v. Riley*, 177 Or. 32, 162 P.2d 371, 1945.
455. *Douglas Co. v. Briggs*, 286 Or. 151, 157, 593 P.2d 1115, 1979.
456. *Highway Comm. v. Central Paving Co.*, 240 Or. 71, 74.

"Once a highway always a highway "
is an old maxim of the common
law to which we have referred,
and so far as it concerns the
rights of abutters, or others
occupying a similar position,
who have lawfully and in good
faith invested money or obtained
property interests in the just
expectations of the highway, the
maxim still holds good. Not even
the legislature can take away such
rights without compensation.

Elliott's "Roads & Streets"

16

SUB-CHAPTER

APPORTIONING,
MAPPING AND
ASSESSING THE
ESTATES IN PUBLIC
WAYS AND VACATED
PUBLIC WAYS

The rights of abutting owners to the fee in an abutting way are seldom guarded with the vigilant care with which the abutting property is guarded.

--Elliott, *Roads & Streets*

Much of what has been supplied in this publication is to make you aware that there are reliable principles of law to be used in determining the probable *lawful* owners of the fee in public ways. This volume should communicate to you that the accurate delineation of the boundaries of lands abutting public ways is dependent on the accurate determination of the ownership of the fee in the public ways. And when the ownership of the fee extends to a point on or in the right of way, the boundary of the abutting property extends to the same point on, or in, the right of way of the public way. Another thought this volume is intended to convey is that your responsibility is to the rightful owners of the beds of the public ways. And where common law dictates the rightful owner is a private citizen or corporation, your responsibility is to that citizen or corporation. But if the law dictates that the fee is in the state, a city, or a county, your responsibility is to the rightful owner, *i.e.* the state, city or county. In any case, you must base your decision on common and statutory law (preferably with the assistance of legal counsel), not in hearsay, fallacious reasoning, assumptions and presumptions.

There are four key reasons why the ownership of the public ways is important: (1) the fee in a public way is as much realty as is the fee in the land abutting the way, (2) public ways not used for public travel constitute taxable real property, (3) the land of public ways becomes taxable real property the instant the public's easement is extinguished by statutory vacation, and (4) modern geographical information systems require an accurate inventory of governmental lands and exempt lands. In the rare case where a public way (other than a state highway) is in the ownership of the U.S., State of Oregon, a county or a city, that data becomes an important part of the geographical information system (G.I.S.). While the land of a public way is exempt from taxation, that information is maintained in the better information systems.

One important note: The *rightful owner*, designated in the statutory provisions for the vacation of city and county ways, is the *lawful owner*. Throughout this chapter, the terms are synonymous.

Review of Cases

In the previous chapters of this publication, the focus of attention was on the dedicated public ways. The rules and principles of law that related to the fee in dedicated ways were provided whenever applicable

to an element of dedication being discussed, such as the section on "Effect of Common Law and Statutory Dedications." Little was said about the fee in public ways appropriated by lawful means other than dedication; that information will be supplied in this section. But to eliminate any false impression that the courts view the fee in dedicated ways as significantly different than the fee in non-dedicated ways, please note this brief review of cases dealing with both types of public ways. The cases are in chronological order, beginning with the 1886 case of *P. & W. V. R. Co. v. City of Portland*¹ and ending with *Fossi v. Myers*² (1975).

1886. *P. & W. V. R. Co. v. City of Portland*, *supra* "... but the easement or property which the city has in public streets is of a different character. It is not private property of the city, nor can the city sell or use it for other than proper public purposes..." This case involved a levee. However, the court has held the principles of law applicable dedicated public levees are the same principles of law applicable to public ways.

1888. *Meier v. Portland C. Ry. Co.*³ "A common law dedication does not pass the legal title to the property dedicated, it merely transfers the use . . . under the statute of this state the land in a street goes to the adjoining lot owners when it is vacated..."

1889. *McQuaid v. Portland & V. Ry. Co.*⁴ "In a conveyance of land bounded by a public road or street, the grantee ordinarily takes a legal title to the center therein," and:

"The fee to the land constituting the street is generally conveyed to the adjacent lot owners in the conveyance to them of lots. The question as to whether a deed to a lot conveys to the center of the street depends, of course, upon its construction. It may limit the conveyance to the exterior line or edge of it, though ordinarily it extends *ad medium filum viae* (meaning: to the middle thread of the way)... The lot owner's interest attaches long before the rights of the public arise. The former secures rights by a deed and because the public thereafter accepts the dedication (as a consequence of the first sale by reference to the plat) it does not follow that the lot owner is thereby deprived of those rights."

1892. *Lankin v. Terwilliger*.⁵ "By the location of a county road, the public only acquires an easement in the land, while the fee remains in the owner, subject to the charge in the public; and when the road is vacated by public authority, the land covered by it immediately reverts in the owner, freed from the easement."

1889. *Huddleston v. Eugene*.⁶ "It is held that by location of the county road the public acquires only an easement in the land, while the fee remains in the owner; and when the road is vacated by public authority, the land immediately reverts to the owner."

1907. *Oliver v. Newberg*.⁷ “The plats of the Town of Newberg, and additions thereto, include the ground traversed by the county road now claimed as ‘1st. Street’, which is marked thereon as ‘First Street’ and although prior thereto, there was an easement over the same in the public for roadway, yet the fee remained in the original owner or his grantee.”

1911. *John P. Sharkey Co. v. City of Portland*.⁸ “An abutting owner on both sides of a street, where an improvement is being made, is the owner of the soil of a street in front of his (or her) lot to the center of the street, subject to the right of the city to improve the same for purposes of travel; and he does not become divested of ownership (of the soil) by the mere act of the city and contractors in excavating it in order to improve the street.”

1916. *Kurtz v. Southern Pac. Co.*⁹ “After stating the facts as above: (1) The statute of this state provides generally that when upon proper application and due notice, the county court of any county vacates a street, the land so dedicated to the public shall be attached to the lots or ground bordering on such street, and all right or title thereto shall vest in the person or persons owning the property on each side thereof, in equal proportions.” That was a statement of the *general rule*. “In construing this enactment it has been held that notwithstanding the dedication of a city street, the title in fee to the highway remains in the dedicant until it passes by a conveyance of a lot; when the grantee takes and holds title to the middle of the street upon which the land abuts, subject, however, to the public easement thereon.”

The general rule, stated in *Kurtz* and other cases, does not control in situations

“...where the street was wholly dedicated by the owner of property abutting on one side of it—in view of the constitutional prohibition against taking private property for private use—and it was entitled to such property as against those abutting owners who had not contributed any of it.”¹⁰

“...In *Watrous v. Southward*¹¹, the court explained: ‘It is a general rule of common law that the fee in the land over which a highway passes is owned equally by the owners of the adjoining ground. This rule, however, is not artificial and of positive institution (that is, the rule is not arbitrarily composed, without any substance, and is not supplied to govern in every situation), but is founded on the presumption, in absence of proof, that the highway was originally granted by the adjoining proprietors over their lands, in equal proportions. This general rule is not a presumption *juris et de jure* (of law an absolute right; an irrefutable presumption; a presumption that cannot be proven wrong by counter

evidence), but a reasonable presumption based on probability. But where it appears, however, that the highway was laid wholly over the land of one person, the presumption of the general rule is annulled.’

“So it appears that the common law rule to the effect that adjoining owners had title to the middle of the highway rested on the presumption that they had contributed equally to the road, but if the facts showed to the contrary, the rule did not apply. In other words, the facts govern rather than the mere presumption (of the general rule). Out of this grew the principle (number 26 of this publication) that if the highway is taken wholly from one man’s property, and such highway is vacated, the land in fee reverts to the original owner, or that person’s grantees, freed from the public use or easement.”¹²

“The ownership of the fee depends, therefore, on the ownership of the land at the time the highway was established, and on subsequent conveyances thereof.”¹³

“The right acquired by the public in respect of land devoted to highway purposes is ordinarily a mere easement of passage over it, with the powers and privileges incident thereto, the fee title remaining as it was before the highway was established,”¹⁴ passing to subsequent purchasers of abutting land. Neither a city nor a county had any say in the matter of ownership.

1927. *Cross v. Talbot*.¹⁵ This was an action of ejectment where the plaintiff sought to recover a small strip of land lying along the Portland-Tillamook Highway in Hebo (Tillamook County). This will be discussed in a little more detail because it has been cited as late as 1975 in *Fossi v. Myers* (271 Or. 611, 533 P2d 337, discussed in this section of this publication) as a controlling rule regarding the fee in a county road versus metes and bounds descriptions:

“Lars Jensen took up the homestead, which included the property in dispute, in the year 1888. In 1898 he and his wife conveyed a portion of said property to School District No. 13, in Tillamook County, Oregon, describing said property as follows:

“Beginning at a stake 18.5 chains south of the northeast corner of the SW1/4 SW1/4 of Sec 12, T.4S. R. 10W., W.M.; thence south 4.5 chains; thence north 55 degrees west, 3.05 chains; thence north 28 degrees west, 3.09 chains; thence east 4.02 chains to the place of beginning, containing one acre more or less lying and being in Tillamook County, Oregon...

“The above property to belong to School District No. 13 as long as used for school purposes, when otherwise it reverts to Lars Jensen, his heirs or assigns.’

“When the conveyance was made, the westerly line of the property actually coincided with the east line of the county road, although the road was not in any

way mentioned in the conveyance. The school district held the property under this deed until the seventeenth day of June, 1916, when the school district and Jensen conveyed a portion of said property to Florence V. Getcheil, the property conveyed being described as follows:

“All the north end of the school grounds lying north of a line 16 feet north of woodshed and in line with said iron pin driven in the edge of the county road.”

“It is stipulated in this case that the plaintiff herein owns, through proper conveyance, the real property described in the later deed. The evidence in this case shows that the county road, established long prior to the year 1898 (when the school district acquired the property from Lars Jensen), was, after the year 1898, moved a short distance away and westerly from the original school tract; the distance being described as from ten to thirty feet. It is this strip of land lying between that portion of the original school tract, now owned by the plaintiff, and the present highway, that is now in dispute; and this is the strip of land described in the complaint which the plaintiff seeks to recover possession.

“We find no evidence in the record as to how the road came to be shifted, whether by official order or otherwise; and no evidence tending to show whether the original road, as it existed before the change, was formally vacated. But it seems to be assumed that this part of the transaction was regularly done.

“The plaintiff claims that by reason of his purchase of the north end of the school tract, and by reason of the fact that the land described in the original deed from Jensen to the school district actually coincided with the easterly line of the highway, and that upon the vacation or the shifting of the road, that part included in the original highway reverted to the original grantor Jensen or his heirs.

“The dispute arises here from the fact that the defendants in this case procured from the heirs of Jensen a deed to this triangular strip, claiming that the part of the old highway had reverted to the heirs of Jensen, and that they therefore became the owners of it; that the true boundary was described by metes and bounds in the Jensen deed and the fact that the westerly line of the school district tract actually coincided with the original highway could not be taken in consideration, and that the school district was confined to that portion of the land described by metes and bounds, which they claimed left a triangular strip in dispute in the heirs of Jensen.”¹⁶

The following principle from *Cross* is similar to the statutory rule for construction, Principle 61, and the

rule of Principle 62. It not only provides some clarification of Principles 61 and 62, but supports the rule stated as Principle 27.

“The weight of authority is to the effect that where the land described by metes and bounds actually abuts upon the highway, the grantee, in absence of some clear intention on the part of the grantor to otherwise limit the description, will take to the center of the highway to the same extent that he would had the highway actually been mentioned as a boundary.

“The rule is thus stated in 9 C.J. 199:

“‘The general rule that the grantee of land bounded by a street or highway takes to the center thereof is *not affected by the fact that the land is not described in the deed as bounded on the highway, provided it is actually so bounded*. The presumption that it was not the intention of the grantor to withhold his (or her) interest in a street or highway to the middle of it, after having parted with all his or her right to the adjoining land, is just as strong as if the conveyance had expressly mentioned the street or the highway as a boundary.’ ”

Principle 61

“It is a well settled rule of construction that in case of ambiguity in the conveyance the construction most favorable to the grantee must be adopted. And where there is doubt as to whether it was intended to convey land to the center of the adjoining highway, it will be presumed that it was so intended?”¹⁷

“‘The presumption of an intent to convey title to the center of a street or highway is not overcome by the fact that the land conveyed is described by metes and bounds, and that the distances stated in the description of the deed do not extend to the center of the street or highway.’ ”¹⁸

“In the case of *Wright v. Day*¹⁹ the court said:

“‘The plaintiff being the owner of all the land to the river, and not stopping at the meander line as his boundary, at the time of his conveyance to Fletcher, must be presumed to have conveyed, and to have intended so to do, as he himself held, and according to his true boundary on that side, unless the deed, by clear and unmistakable words, evinces a contrary intention, and a design to make the meander line a new boundary in the direction toward the river.’

“In the case of *Buck v. Squiers*,²⁰ the court said:

“‘The rule itself is mainly one of policy, and one which, to the unprofessional, might not seem of the first importance; but it is at the same time one which the American courts especially have regarded as attended with very serious consequences when not rigidly adhered to, and its chief object is to *prevent*

the existence of innumerable strips and gores of land along the margins of streams and highways, to which the title for generations shall remain in abeyance, and then upon the happening of some unexpected event, and one consequently not in express terms provided for in the title deed, a bootless, almost objectless litigation shall spring up to vex and harass those who in good faith had supposed themselves secure from such embarrassment.”

That statement was provided in the first edition of this manual. Read it again! It represents an important as well as practical consideration of American jurisprudence deciding on the ownership of the fee in public ways and non-navigable streams.

“The case is a very instructive one, and the fact of the location in the present case shows a reason grounded in the highest public policy for such a holding. There is nothing here to indicate a contrary intent on the part of the grantor of the school tract than to convey the property with all the easements which would attach to it. It is inconceivable that the grantor would convey to the directors of the school district, a tract for the purpose of erecting a school building, and at the same time have in mind to cut off access to it by means of a county road. As before stated, we think the great weight of opinion is contrary to this.”²¹

In the *Cross* case, the court reversed the lower court decision, stating that presumably the circuit court judge was evidently misled by the language of *Lankin v. Terwillige*²². In short, it held to the following principle:

Principle 62

Where land described by metes and bounds actually abuts (touches) on the highway, the grantee, in absence of intention of the grantor or otherwise to limit the description, takes to the center of the highway, even when the highway is not mentioned as a boundary?

1928. *Menstell et al v. Johnson et al*²⁴ “The original owner, though he has the naked fee, has no right whatever to interfere with the premises, except where the use becomes absolutely impossible, or where the corporate authorities seek to put the premises to some (unlawful) use...”

1933. *Portland Baseball Club v. Portland*.²⁵ “In this state the rule is that where land has been *dedicated or appropriated* for a public street, the fee in the street remains in the original owner subject only to the public easement and, upon vacation of the street, it reverts to the owner of the abutting premises freed from the easement. Under the undisputed testimony, the plaintiff is the sole owner of the abutting premises on both sides of that portion of the street conditionally vacated, and if the condition annexed to this ordinance was void as

contended for by the plaintiff, the fee in the street become immediately vested in the plaintiff freed of the public easement; and the public easement thus lost could be restored only by condemnation, purchase or some contract entered into with the owner.”

1960. *McAdam et ux v. Smith et al*²⁶ “In the unusual circumstances where the grantor owns the entire bed (of a non-navigable river) but no land on the opposite shore, it would seem clear that the title to the entire bed would pass” (to the grantee, even though not mentioned in the deed, and where not expressly reserved by grantor). It is important to note that in cases discussing the issue of the bed of non-navigable waters, the courts apply the same rules of construction as applied in cases considering the beds of public ways. *McAdam* is an excellent example of such a case.

“Similar rules are applied where the description calls for a line running to a designated street, alley or, in some jurisdictions, a private way.²⁷ Title to the land in the street passes to the grantee; in the usual case the land up to the center line is deemed to pass²⁸ (when the street is not expressly reserved by grantor; and even though not mentioned or described in deed); or where the grantor owns the entire underlying area and no land on the opposite side of the street, all of the underlying area passes to the grantee²⁹ (when the grantor had the underlying fee in all of the bed of the street).

“Where the description does not mention the street, river or other similar boundary, but the deed describes the parcel so that, in fact, it is adjoining, *the title to the bed passes the same as in the street or other boundary was expressly mentioned.*”³⁰

1969. *Fahey v. City of Bend*.³¹ This was an action for slander of title and trespass to land.

“The land in dispute is the west one-half of a vacated street lying adjacent to Lots 1 and 2, Block 26, Bend Park, City of Bend, Oregon. The complaint alleges that the street was vacated in 1952 and that the city subsequently took title to Lots 1 and 2 for unpaid street assessments. Thereafter the city conveyed Lots 1 and 2 to the plaintiffs’ predecessors in interest. The plaintiffs allege that they acquired title to the disputed strip by virtue of these conveyances. It is then alleged that the defendants slandered plaintiffs’ title by purporting to convey the disputed strip (the vacated street abutting Lots 1 and 2). In a second count plaintiffs allege that defendants Duff and Burdett trespassed upon the strip. The demurrer to the complaint was sustained on the ground that plaintiffs’ allegation of title to the disputed strip was ‘not supported by the facts pleaded.’

“It is clear that if the street had not been vacated prior to the conveyance to plaintiffs’ predecessors

in interest, plaintiffs would have acquired title to the west one-half of the street adjoining Lots 1 and 2 by the deed which described the land simply by the lot description. The question is whether the same rule should be applied when the conveyance is made after the adjoining street has been vacated.

"There are cases which hold that the vacated strip does not pass by conveyance describing only the lot without reference to a street."³²

The reason generally given is that the vacated strip 'is then a separate tract of land in no wise appurtenant to the adjoining tract.³³ But this is a statement of a conclusion rather than a reason. The vacated strip can be treated as a 'separate tract' or as part of one single tract depending upon what ends are best served. Where the street is in existence at the time of the conveyance, the street portion of the lot is held to pass on the theory that in absence of an express reservation of the title to the strip it may be assumed that the grantor intends the title to pass. This implication is made on the ground that the grantor would normally have no use for the small narrow strips of land constituting the street portion of the lot. It has also been said that this rule of construction is founded on **the** policy of discouraging vexatious litigation."³⁴

The opinion of the court was:

"1, 2. For these reasons it has been held in some jurisdictions that a conveyance made after the vacation of the street carries with it the street portion of the lot.³⁵ We concur in this view. *No distinction should be made between conveyances made before and conveyances made after the vacation of the adjoining street; in both cases the adjoining strip should be held to pass by the deed in absence of the manifestation of a contrary intent.*"

1973. Hurd v. Byrnes³⁶ This case was cited in *Fossi v. Myers*.³⁷

"We have assumed that in absence of an express provision to the contrary the grantor, in conveying land described as bordering a street or stream, ordinarily intends to also convey title to the street portion of the lot.... This rule of construction is also founded on policy considerations, including the prevention of vexatious litigation and the prevention of the existence of strips of land the title to which would otherwise remain in abeyance for long periods of time.

"It is our opinion that the rule of construction applied in our previous cases where the strip was not described (strips bordering a street or stream) should be applied in the present case, although we recognize that not all of the reasons advanced in the

cases involving an undescribed strip are applicable where, as here, the strip and its use is described. *We think that in absence of an express provision withholding in the grantor title to the strip described or circumstances clearly indicating an intent to withhold title, it is fair to assume that a statement in the deed of a present or proposed use ordinarily indicates an intention to reserve only an easement in the strip.*³⁸

1975. Fossi v. Myers.³⁹ This case will be cited in detail because it is relatively recent, and is instructive on how the Oregon Supreme Court considers the issue of title to streets. The decision is applicable to both dedicated and non-dedicated public ways.

The issue before the Multnomah County Circuit Court was:

"In 1954 Hudson Investment Company conveyed a portion of its real property, known as Parcel B, located near the middle of its holdings, to the City of Portland for a street. Parcel B is 80 feet wide. In 1960 Hudson conveyed parcels on both sides of the street to other parties. The defendants Myers and Bishoprick can be regarded for this case as successors to these other parties. In 1971 the city vacated the street. In 1973 Hudson conveyed its interest in Parcel B (the 80 foot street) to the plaintiff. The defendants (owners of abutting real estate) claim Parcel B as owners of the property adjoining the vacated street and the plaintiff claims as grantee of Hudson's interest in Parcel B.

"The deeds by Hudson to the city recited that the property was conveyed 'for street purposes for the benefit and use of the public...' *All parties agree that by this conveyance the city obtained only an easement and Hudson retained the reversionary interest (the fee).*⁴⁰

"Hudson conveyed the parcels adjoining the street by deeds describing the property by metes and bounds. The boundary was the edge of the street. For example: '... to an iron rod at the point of intersection with the south line of that 80 foot wide parcel of land deeded for street purposes to the City of Portland...; thence south 89 degrees 42' 30' east along the south line of said 80 foot street...' ~

The circuit court entered a judgment in favor of Fossi, the grantee of the street, conveyed to him by Hudson in 1973. But the Oregon Supreme Court reversed that decision and held for the appellant, Myers. The court explained:

"Our most recent statement on this issue was in *Hurd v. Byrnes*:⁴¹

"We have assumed that in absence of an express provision to the contrary the grantor, in conveying land described as bordering a street or stream, ordinarily intends to also convey his title to the

street portion of the lot or to the bed of the stream. This rule of construction is also founded on policy considerations, *including the prevention of vexatious litigation and the prevention of the existence of strips of land, the title to which would otherwise remain in abeyance for long periods of time...*

*"Fahey v. City of Bend*⁴² *and McAdam v. Smith*⁴³ *are in accord.*

"Cross v. Talbot" had facts very similar to those in the present case. The deed to the property adjoining the road described the property by metes and bounds and the boundary was at the edge of the road. We held the fee to the center of the highway was conveyed when the grantor conveyed the property adjoining the road, *i.e.*:

*"We are of the opinion, and we take it, that the weight of authority is to the effect that where the land described by metes and bounds actually abuts upon the highway, the grantee, in absence of some clear intention of the part of the grantor to otherwise limit the description, will take to the center of the highway to the same extent that he would had the highway been actually mentioned as a boundary."*⁴⁵

"ORS 93.310 codifies the common law rule of construction relied upon in these cases.

"It provides: 'The following are the rules for construing the descriptive part of a conveyance of real property, when the construction is doubtful, and there are no other sufficient circumstances to determine it':

"... '(4) When a road or stream of water not navigable is the boundary, *the rights of the grantor to the middle of the road, or the thread of the stream, are included in the conveyance, except where the road or bed of the stream is held under another title.*⁴⁶

The court delivered the following opinion:

"1-3. At least when the evidence of the conveying party's intention is the language in the conveyance, the party's intention is not to be decided as a question of fact. ORS 93.310 and our cases provide and hold *that when a conveyance describes property as bordering on a street, absent an express provision in the conveyance to the contrary, such a conveyance includes the fee to the street.*⁴⁷

That ruling most certainly constitutes adherence to the following principle from in the 1881 case of *Knott v. Jefferson Ferry Co.*,⁴⁸ and demonstrates a very consistent attitude towards the ownership of the public ways.

Principle 63

"It is held that the presumption of intent to convey to the center is not overcome although the land is described

by metes and bounds, and the distances stated do not extend to the center of the highway."

In *Banks v. Ogden*⁴⁹ the court said:

"It is a familiar principle of... law that a grant of land bordering on a road or river, *carries title to the center of the river or road, unless the terms or circumstances of the grant indicate a limitation of its extent by the exterior lines.*" Skelton⁵⁰ comments on this rule, saying it is applied:

*"To land described as 'bounded on,' 'running along the highway,' and the like, even though the expressed dimensions exclude the highway*⁵¹ *and in no wise conflicts with the principle that a call for a monument takes to an exterior point or line of the same, as explained by Justice Gray in the following.*

*"Whenever land is described as bounded by other land or by a building or structure, the name of which, according to its legal or ordinary meaning, includes the title in the land of which it has been made a part, as a house, a mill, a wharf, or the like, the side of the land or structure referred to as a boundary is the limit of the grant; but when the boundary line is simply by an object, whether natural or artificial, the name of which is used in ordinary speech, as defining a boundary and not as describing title in fee, and which does not in its description or nature include earth as far down as the grantor owns, and yet has width as in the case of a way, a river, a ditch, a wall, a fence, a tree, or a stake and stones, then the center of the thing so running over or standing on the land is the boundary of the lot granted."*⁵²

Skelton lists six basic reasons for the rule, most of which have been covered in the citation of Oregon cases. But one reason deserves consideration: "(4) The concern of the state and other political units as to *who shall determine and pay for improvements.*"⁵³

Estates or Interests in Rights of Way Acquired by Government

An accurate real property inventory cannot be developed if the cartographer fails to recognize the right, title or interest in the real estate of any person, persons or corporation. Of course, the major concern must remain with the *lawful* right, title or interest of the private owner or owners of real estate. However, that concern cannot be at the expense of the *lawful* right, title and interest in the real property of the state, the cities or the counties. To ignore the rights

of the latter would not be in the best interest of the citizens of this state.

The emphasis, up to this point in the chapter, has been on the underlying fee in dedicated ways, *i.e.* held, in most situations, by an abutting owner or by abutting owners. It has been important to emphasize that the state, cities and counties do not acquire the fee simple absolute title merely as a consequence of having jurisdiction over certain public ways. The impression effected by this emphasis is that neither the state, the cities or the counties *may acquire or hold the fee* in any public way. With few exceptions, the governmental entities could not acquire the fee in non-dedicated ways. But the truth of the matter is that there are situations where the state, cities and counties can hold the fee in dedicated ways. They have, in certain situations, statutory authority to acquire the fee in non-dedicated public ways. The remainder of this subsection will explore some situations where a city or county holds the fee in a dedicated street, and the key legislative enactments that provide for the acquisition of rights of way by the various governments.

Dedicated Ways

Principle 1, paraphrased, defines *dedication* as: *An appropriation of realty, by the owner, to the use of the public and the adoption, thereof, by the public having respect to the possession of the land, but not the permanent estate*⁵⁴

Regarding the effect of common law and statutory dedication:

Principle 24 paraphrased. In *City of Burlingame v. Norberg*⁵⁵ and *DeCastello v. Cedar Rapids*⁵⁶ the effect of a dedication was held to be:

... not to deprive a party to title to the land, but to estop him or her, while the dedication continues in force, from asserting that right of exclusive possession and enjoyment which the owner of property has.⁵⁷

The dedication involves rather a right to the use of the land against interference from the dedicator.⁵⁸

Together, these principles make one of the most important points of this entire publication: *It is not the purpose of the dedication of a public way to grant fee simple absolute title, with the right of disposal, to the public, or to any public body or agency.* The dedication merely provides the public with the necessary interest to use the land for travel from place to place without interference from the dedicator, his or her heirs or grantees. "The public is legally incapable of being a grantee of the fee in land."⁵⁹ As for the governmental entities, the courts have made it clear that the law of dedication and statutory law already provide cities and counties with ample power and authority to

construct, maintain, repair, control and regulate public ways. Having the underlying fee in those ways would not provide them with any additional needed power and authority.

However, as stated in the introduction to this discussion, cities and counties *do possess fee simple absolute title in certain dedicated public ways*; more precisely, in "parts" of certain dedicated ways. How? The answer is simple: As a consequence of being either the dedicator or the lawful owner of realty abutting a public way; that is, an owner of abutting realty that was originally property of the dedicator at the time of dedication. Simply stated, a city or county can be vested with the fee in a dedicated way, in the same manner as a private individual can be vested with the fee in the dedicated way.

Figure 4-4 (page 3-8) illustrates an example of one way a county can be vested with the fee in a city street.

In this case, the county purchased Block 23 of R. Truscott's First Addition for the future location of the county administration building. The deed, as recorded on page 390 of volume 127, was for:

"Block 23, R. Truscott's
"First Addition."

Pacific Street, Jackson Street and Sixth Street were all dedicated to the public on the plat of R. Truscott's First Addition. Neither the dedicator nor any subsequent grantor had expressly reserved fee simple absolute in any of those streets.

Seventh Street was dedicated on the plat of J. Harper's Addition. It had never been expressly reserved by the dedicator or any subsequent grantor of Block 55 of that subdivision.

What is the extent of fee simple absolute title of the county's subject real estate? Do not be misled by "who" owns Block 23 or "who" has jurisdiction over the streets.

If this volume has been successful in communicating the pertinent principles of law to you, your answer should be: "The owner of Block 23, the county, has fee title to all the land embraced in the property bounded by lines connecting at points A, B, C and D, subject to the public easement over the abutting dedicated ways." The answer would be the same if Block 23 were owned by the city, state, a private citizen or the federal government.

Then what interest does the city have in the street? The answer is: The city is the guardian of the streets for the public. It is responsible for keeping the streets open and unobstructed for free use by the public for travel from place to place. The legislature has pro-

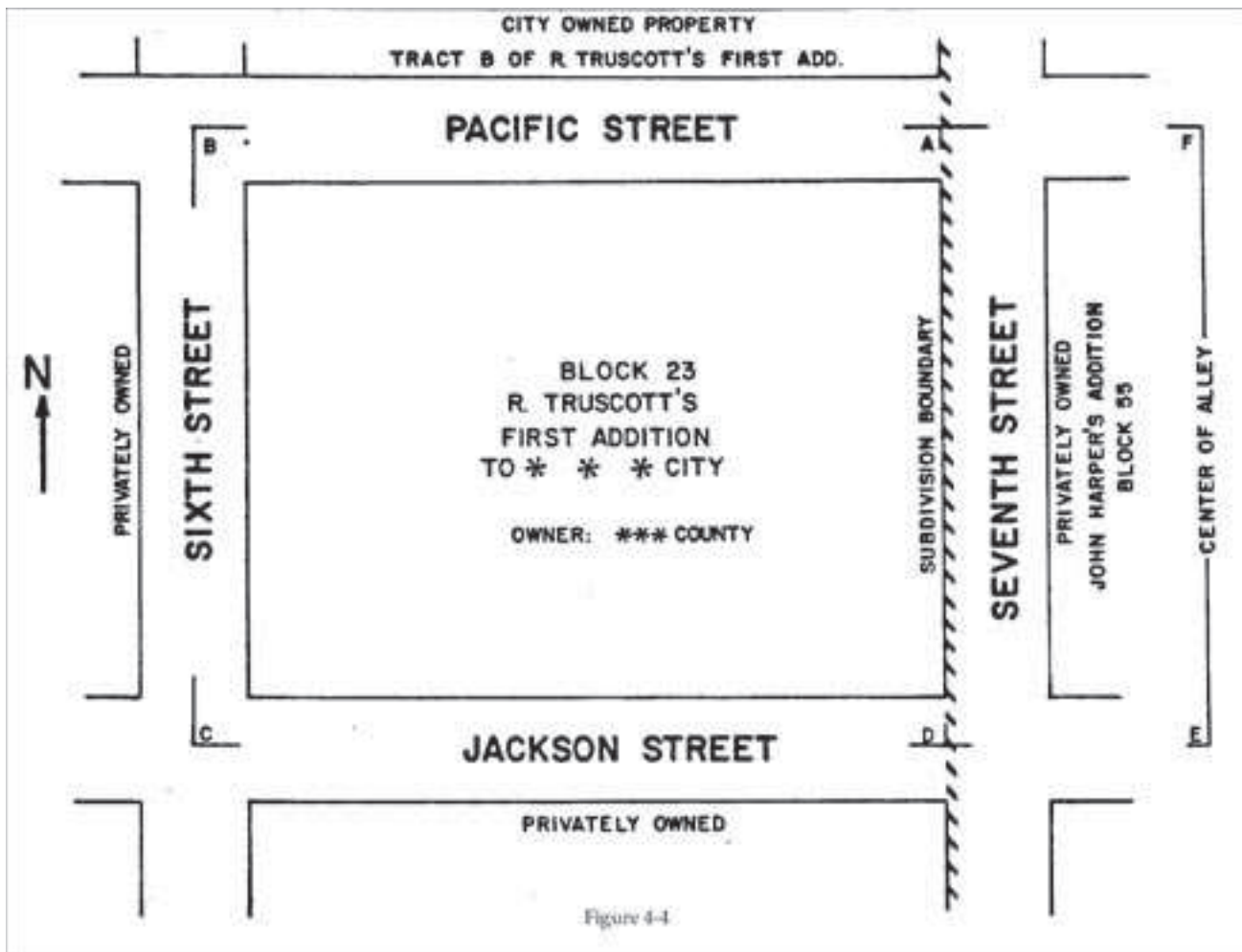


Figure 4-4

vided the city with jurisdiction to do those things necessary to maintain the way for safe, open, free, unobstructed use by the public. However, the city is neither the owner nor the trustee of the fee simple absolute estate in any of the streets within the polygon A, B, C, D. But as the owner of "Tract B" of Truscott's First Addition (north of Pacific Street), the city has the underlying fee in the north half of Pacific Street. That is not because it has jurisdiction over the street, or because the street is within the city limits, but as a consequence of being the owner of abutting real property. The lawful fee simple is absolute title to the bed of that part of the street. That estate is as subject to the public easement created by the dedication, as it would be if tract B was owned by a private citizen.

And finally, would the vacation of any of the streets abutting Block 23 change the ownership of the underlying fee in the streets? The answer is "no." The fact is, to do so would constitute an unlawful taking of real property.⁶⁰ The following statement is a bit premature, but it is important to this discussion. *A vacation is for the simple purpose of extinguishing the public's easement. It serves no other purpose.*

The reason is simple. The fee simple title in the dedicated ways exists throughout the period of time the dedication is in force. That interest has been held to be property within the meaning of the constitutional prohibition against any unlawful taking of private property. Consequently, any vacation statute enacted by the legislature that would take the property lawfully held by any owner of abutting real estate, then vest it in a different owner, would be void for want of jurisdiction, and would be repugnant to the constitution. Consequently, it would not be law. If a sovereign authority planned to use the property for public use (which is not the same as for use by a public body), it could take the property as provided for in the constitution. However, that would involve eminent domain proceedings requiring legal actions separate and distinct from the act of vacation. See the subsection on "Statutory Vacation."

Who owns that part of Seventh Street abutting Block 23 on the east-side? The answer: The private owner of that part of Block 55 of John Harper's Addition that abuts Seventh Street. As already explained, a vacation of Seventh Street would merely extinguish the public easement, thus relieving the servient tenant's

(the owner of the parcel bounded by lines connecting at points A, D, E, F) servient estate of the dominant tenant's (the public) dominant estate.

One situation litigated in other states could exist in Oregon. However, the Department of Revenue Cartographic Unit has no recollection of ever encountering it in the statewide mapping program. In this situation, the dedication of the plat included a donation of the fee in the dedicated ways "in trust" to the city. Because it is possible that such a donation has been made in this state, the problem should be discussed. But understand, no comparable Oregon Supreme Court case could be found that would tell how such a donation would be viewed in Oregon. Therefore, consider this discussion as "food for thought," rather than a solution for mapping and assessment purposes.

The donation is expressed in the part of the plat labeled "Dedication." It is usually preceded by a statement such as:

"I, (dedicator), depose and declare that I am the lawful owner of the parcel of land herein platted as ____ to ____ City; more particularly described in the Surveyor's Certificate above, and that I have caused the same to be surveyed, subdivided and platted as shown on the plat of this addition; and I do for myself, my heirs and assigns hereby dedicate, donate and convey to the public⁶¹ for use forever, the streets and alleys as platted herein."

Before examining the donation that follows the dedication statement, the words "donate and convey" need to be evaluated. The wording of the dedication statement is typical of that expressed in most of Oregon's subdivision plats, including the words "donate and convey." A few Oregon cities and counties have interpreted dedications containing "donate and convey" as constituting grants of the county.. However, that is an incorrect interpretation of the statement.

If "donate and convey" did effect a grant, it would be to the public because the public is clearly designated as the recipient of whatever is being vested. But the court has held to the principle that the public is incapable of receiving the fee to any real estate ⁶². Consequently, without a valid grantee, there could be no grant.

More importantly, the dedication statement contains words of limitation that reduces the interest being conveyed to that of an easement, *i.e.* "for public use... streets and alleys..."

Here is the donation that is attached to the dedication:

"Donating to ____ City, the fee, in trust, in all the streets and alleys herein dedicated to the public."

70 American Law Reports Annotated is instructive in the situation we have just described. It notes that in some jurisdictions similar wording was held to constitute a mere easement.

"Even in states where a statutory requirement exists, requiring the fee in public ways vest in a municipality or county 'in trust and for the uses therein named, expressed or intended, and for no other use or purpose'. ... *it would not be a conveyance of fee simple in title, but a conveyance in trust for the purposes named, expressed or intended and for no other use or purpose.*" In states making such a provision, "A city cannot vacate a street, then use the land for its own purpose,⁶³ ... A statute requiring dedication to the public, and the fee vested in the city for public purposes *does not mean that absolute fee in the streets is vested in the city with the right of disposal by deed, but simply the right for the use of the public...* The wording or ruling that the fee passed to the county for 'public purpose' *makes a mere easement* Even if called a 'conveyance in trust' the result is the same Even in light of a city charter, the fee still remains in the dedicator or grantee."⁶⁴

In *Carter Oil Co. v. Myers*,⁶⁵ it was stated that:

"A defeasible fee simple can be granted by dedication if the express language in the conveyance or other evidence makes it clear that such a limitation on the fee is intended." However. "Such a limitation upon a grant of fee simple *is not favored in the law*, and no such language will be so interpreted if the provision will bear other reasonable construction,"⁶⁶ such as an easement only. But "where the dedication is by conveyance in trust to a grantee capable of taking such title (as a fee in trust) passes as the deed purports to convey."⁶⁷

And in *Green v. Kunkel*,⁶⁸

"A dedication or title acquired by the dedication of property usually depends on the method or the nature of the dedication and the intent of the dedicator Whether a conveyance of land to a municipality or other branch of government reciting that it is made *for road or street purposes conveyed* the fee title or a mere easement depends on whether language of the deed considered as a whole indicates the grantor's intention to convey land itself or only an easement therein."⁶⁹

*Leadvie v. Bohn Min. Co.*⁷⁰ says:

"Under a statute which provides that the fee of the streets dedicated for public use shall be deemed public property *and vest in the city* it has been held that the city acquires such an estate as is reasonably necessary to enable it to utilize the surface and so much of the ground underneath as might be

required for laying gas lines, building sewers, and other municipal purposes.”

The following is pure speculation based on information that might be misinterpreted. The wording of the donation effects the donation of a fee simple defeasible, in trust, that remains in the city for the duration of the easement. Upon vacation of a street or alley, the fee simple absolute reverts to the lawful, rightful owners. Even if this is not exactly the estate donated, an excellent possibility exists that the vacation would not only act to extinguish the public’s easement, it would extinguish the conditions of the dedication and donation so far as they relate to the street being vacated. The consequence being to end the period the city held the fee in trust, and to vest the fee, released of the burden of the public easement, in the rightful owner.

It would be justifiable to ask: “If the donation did not vest the city with fee simple absolute title, with the right of continued possession, or the right of disposal, then what would be the purpose of the donation?” The purposes of such a donation may be (1) to enforce the continued use of the land of the streets and alleys for the purpose of public travel, and (2) to give the city maximum authority to prevent the bed of the streets and alleys from being used for purposes other than public travel.⁷¹

If you are faced with the problem of apportioning any dedicated way, for mapping and assessment purposes, that includes a donation like or similar to that discussed here, you should seek professional guidance from legal counsel.

Cities or Counties as Dedicators

The court, in *Mid-County Cem. Dist. v. Thomason*⁷² held that the power of a municipal corporation includes the undisputed right to dedicate its property *by implication, i.e. to make a common law dedication*. In this case the defendant’s contention was that the charter of Canyon City, which provided a method for dedicating city streets, was exclusive, and abolished the creation of any street by common law dedication. The Supreme Court disagreed, saying: “Common law dedication may be either express or implied⁷³ and the general rule as stated in *McQuillin* is:

“Statutory dedications are those made pursuant to the provisions of the statutes, but they are not exclusive of the common law method.”⁷⁴

“Ample support for this statement is found in the decisions of the courts.”⁷⁵ Therefore, regardless of the provisions of the city charter, the court held that they were not exclusive of common law dedication, either

of the municipality’s own property, or of property privately owned.⁷⁶

Figure 4-4 can be used as an example of a common law dedication by a city. The city owned Tract B north of Pacific Street. An intent to dedicate will be presumed if the city (1) decided to extend 6th Street north through Tract B, (2) treated the way as a public thoroughfare, (3) showed it as a public street on city maps, (4) placed stop signs, city lighting and other improvements associated with city streets, and (5) allowed the public to use it. However, as dedicator and abutting owner, the city is the lawful owner of the fee simple absolute title in the bed of the street. If the city sells abutting property on one side of the street, the underlying fee in one-half the street, abutting the realty sold, will be presumed to be in the grantee of that property, unless the city makes an expressed reservation of the fee in the street. In this example, the effect of the dedication, and any grant of abutting property, is exactly the same as if Tract B were owned by a private individual who made a common law dedication of the street.

Statutory Considerations

Now it is essential to introduce certain principles of law and statutory provisions governing primary and secondary state highways. You will learn that some state highways, or sections of highways, are former county roads. Moreover, some roads now under jurisdiction of counties were, at one time, under jurisdiction of the Oregon Department of Transportation (formerly the Oregon Highway Commission). The State of Oregon acquired the fee in many sections of state highways. Therefore, it stands to reason that the counties would acquire the fee in many (but not necessarily all) sections of highway transferred to county jurisdiction. In such situations, a county would acquire no greater estate in the bed of any section of former highway than the state held in the bed of the highway.

In this discussion, statutory authority for the state to acquire right, title or interest in land being obtained by purchase, agreement, donation or the exercise of the power of eminent domain will be cited. Several situations where one or another statute has been misinterpreted exist. One factor contributing to this problem has been the disregard of the correct definition of the words “owned,” “right of way,” “may,” “real property” and similar words that have common, accepted, and precise meanings that control the effect of the statutes.

“Owned,” for example, has been taken to mean, “having fee simple absolute title.” If this were the sole meaning of the word, it would be impossible

to “own” any lesser estate in real property, *e.g. an easement across real property*. But in defense of the presumption that it means having title to something, *Black’s Law Dictionary*⁷⁷ defines “owned by” as meaning’. “An absolute and unqualified title.” However, it also notes that “own” does not necessarily signify absolute ownership in fee. Regardless of its technical meaning, the statute designates the right owned as a “right of way.”⁷⁸

“Right-of-way,” as defined by *Black’s*⁷⁹ is: “The right of passage over another man’s ground; and its legal and generally accepted meaning... a mere easement in the land of others. It would be using the term in an unusual sense by applying it to an absolute purchase of the fee simple in lands....”⁸⁰

It was held in *Highway Comm. v. Pac. Shore Land Co.*⁸¹ that the term “right-of-way,” within the statute granting the State Highway Commission the power to acquire land for “rights of way,” has its usual and ordinary meaning. The power granted is simply the power to acquire property deemed necessary for the construction of a highway for use of vehicular and other travel.⁸² But the legislature has authorized the Department of Transportation to acquire fee title when acquiring land for right of way purposes. So the term “right of way” includes land acquired in fee, as well as land where only an easement has been acquired⁸³

“May” means “have permission to,” rather than “shall.” Yet, it is often presumed that the governmental body or agency vested with that permission must always acquire the full extent permitted, *i.e. the fee simple absolute title*.

Principle 64

“There are strongly reasoned cases holding that in no event can a legislature authorize the taking of a greater estate than that which is necessary for the public use, and when an easement is sufficient, no greater estate can be appropriated⁸⁴

“States may take property in fee, but only where the nature of the public purpose requires for its full enjoyment an estate in fee, or where the statute expressly authorizes the seizure of an estate of that magnitude.

“We have employed the term ‘easement’ as descriptive of the estate in which the public acquires in a road or street, and we think the term an appropriate and significant one....”

Principle 64 is not as restrictive as it appears. The right of eminent domain, vested in the state, is absolute and not subject to judicial review, being a political rather than a judicial matter. Property cannot be taken in total disregard of the necessity of its use, nor

can it be taken for other than public use and without just compensation. The legislature has the authority to limit, but not expand, the state’s power. The principle actually speaks to the abuse in the discretion exercised in determining what level of estate was necessary to accomplish the purpose of an acquisition. It was made in reference to a *taking* under eminent domain procedures, rather than the purchase of the land from a willing seller. Regardless, from a political standpoint, the principle should be considered in every situation where a governmental entity acquires rights-of-way for road, street or highway purposes.

It is presumed that the legislature recognizes the need to exercise discretion when acquiring the right, title or interest in the land needed for public highways. It is also presumed that it has delegated the authority to make such acquisition, and that the recipients will apply it in good faith, with discretion and exercising professional judgment, and in accordance with Oregon law. When the state, county or city has been delegated permission to acquire the fee in land to be used for right of way, that level of estate will be acquired only where the public use requires such an estate, *e.g. for a thruway* where controlled access, and the rights to full use necessitates acquisition of the fee. Therefore, the word “may” does not imply the total right, title or interest acquired. It merely authorizes the maximum estate that can be acquired.

“Real property” is a term used in several sections of the present Highway Code. It is not uncommon for the term to be presumed to always mean “property held in fee.” However, the term, as defined in the code, includes lesser estates and interests in property, *e.g. as in ORS 366.332*. *Black’s* includes: “Rights issuing out of, annexed to, and exercisable within or about land.”⁸⁵

“Eminent domain” is the power vested in the sovereign (the United States and each state of the Union) to take real property within its jurisdiction for public use without the owner’s consent, but upon paying due compensation.

The Oregon Highway Code provides for the taking of real property (usually the fee, easements, and sometimes leasehold interest in buildings) for right of way purposes.

The subject of eminent domain is too complex and extensive to discuss here in detail. However, refer to ORS Chapter 35 to get a feeling for how the power is exercised in Oregon. If you wish to look further into this subject, refer to Jane A. Gearhart’s⁸⁶ excellent treatise, “Condemnation Procedures in Oregon,” in Volume 46, Number 2 of the Oregon Law Review. One point made by Gearhart puts the power of eminent domain in perspective:

*"The power of eminent domain is inherent in the state; the Oregon and Federal Constitutional provisions are **not grants but limitations** of the power. Although the power is delegable to subordinate agencies of the state, the delegation must be by express statutory authority. Such authority will not be implied⁸⁷ nor can the power be exercised for purposes other than public use or benefit."⁸⁸*

This point was made in *Huddleston v. Eugene*⁸⁹ and *Portland v. Kamm*.⁹⁰ "Statutes authorizing the condemnation of private property for a public use are wholly in invitum, and since they are in derogation of vested rights, must be strictly construed."

And Elliott cites this principle from *Blackman v. Halves*.⁹¹

"The legislature may cause public roads and streets to be laid out, opened, or widened, whenever in its judgment the public welfare or convenience demands, and this it may do against the will of the land owners. Such a right to seize property for public roads and streets is an inherent attribute of sovereignty. "Every citizen acquires and holds his property subject to this paramount dominion of the sovereign. The sovereign right of eminent domain is founded on necessity. But where there is no necessity for taking private property for public use, the power cannot be successfully invoked."

The State Highway System

The authority and jurisdiction of the Oregon Department of Transportation is derived solely from the legislature. It was created by a 1917 legislative act as the "State Highway Commission." In almost every succeeding session of the legislature, the powers of the commission have been enlarged. In 1939, the legislature enacted a comprehensive Highway Code. The purpose was to change and expand related and independent state laws so there would be a more understandable, comprehensive and workable Highway Code than existed before 1939.

The legislature has continued to amend, add to and repeal certain sections of the 1939 code. However, many of the provisions of that code are, at this writing, still in effect. The statutes provided in this section are certain provisions of the Highway Code as it existed on Sept. 20, 1985. But take note: the laws quoted here are only a few key provisions that:

- define certain important terms;
- delegate authority to the Oregon Transportation Commission;
- describe limitations;
- authorize the acquisition of right of way;

- specify authority and limitations when establishing a state highway through cities;
- and the like.

For a better understanding of the state highway laws, refer to the statutes.

Beginning with ORS Chapter 366:

Principle 65

ORS 366.005 defines "state highway" as: "Any road or highway designated as such by law or by the Oregon Transportation Commission pursuant to law and includes both primary and secondary state highways."

ORS 366.215: "The Oregon Transportation Commission may select, establish, adopt, lay out, locate, alter, relocate, change and realign primary and secondary state highways."⁹²

ORS 366.220(1): "The Oregon Transportation Commission may select, establish, designate, construct, maintain, operate and improve or cause to be constructed, maintained, operated and improved a system of state highways which shall be designated by name and by the point of beginning and terminus thereof.⁹³ The system of state highways shall include such other highways as may from time to time be selected and adopted by the commission pursuant to law and all highways adopted and classified as secondary state highways which are subject to and qualified for construction, improvement, betterment and maintenance as are other state highways"⁹⁴

"(2) The commission may classify and reclassify the highways comprising the state highway system as primary and secondary highways. Secondary highways may consist of newly established highways, reclassified primary highways *and county roads selected pursuant to ORS 366.290*⁹⁵.

The authority to select county roads as state highways, or to convert state highways to county roads, is granted the department by ORS 366.290. The statute is quoted as Principle 66 to highlight this important law.

Principle 66

ORS 366.290(1): "The department may select, locate, establish, designate, improve and maintain out of the highway fund a system of state highways and for that purpose may, by mutual agreement with several counties, select county roads or public roads. By an appropriate order entered in its records, the department may designate and adopt such roads as state highways. Thereafter the construction, improvement, maintenance and repair of such roads shall be under jurisdiction of the department.

“(2) In the selection of highways or roads to comprise the state highway system, the department shall give consideration to and shall select such county roads or public roads as will contribute to and best promote the completion of an adequate system of state highways.”

“(3) With the written consent of the county, in which a particular highway or part thereof is located, the department may, when in its opinion the interests of the state will be best served, eliminate from the state highway system any road or highway or part thereof. Thereafter, the road or highway shall become a county road or (county) highway and the construction, repair, maintenance or improvement, and jurisdiction over such highway shall be exclusively under the county in which such highway or road is located.”⁹⁶

Subsection (4) of that law deals with the financial liability for the construction, maintenance and repair of the state highways.

Comment: A county could acquire the fee in a state highway that was converted into a county road as provided in ORS 366.290(3); that is, it would acquire the fee if the state had acquired the fee in the state highway right of way. Stated another way, the county can be vested in whatever right, title or interest the state held in the section of eliminated highway.

ORS 366.295: *“The Oregon Transportation Commission may make such changes in the location of highways designated and adopted by the commission, as in the judgment and discretion of the commission will result in better alignment, more advantageous and economical highway operation and maintenance, or as will contribute to and afford a more serviceable system of state highways than is possible under the present location.”⁹⁷*

Here is how sections of highways are treated when a relocated highway has caused them to be eliminated from the highway system:

ORS 366.295: *“(1) Whenever the department relocates or realigns a state highway or a section thereof, and by reason of such relocation or realignment there is eliminated from the original route of the highway a section thereof, the eliminated section shall, if needed for the service of persons living thereon or for a community served thereby, be maintained by the department at state expense, or by the county or by the state and county on such terms and conditions as may be agreed upon.”*

“(2) If such eliminated sections of old right of way, or any part thereof, in the judgment of the department, are needed or valuable for public road use, then the department shall, by appropriate action, declare the purpose of the department is to preserve the same for public road use.”

“(3) If the department determines under subsection (2) of this section that the eliminated sections are merely parts of the old right of way which are no longer needed or valuable for highway right of way purposes or any other public road use, then if such eliminated sections are not owned by the department in fee, the department shall abandon such eliminated sections and such sections shall, except as otherwise provided in this section, revert to and title thereto shall rest in the abutting owner or owners. (Note: This is acknowledgement that the legislature has neither presumed that all state highways are owned in fee, nor that the department has been directed to always acquire the fee to every section of highway.)”

“(4) Nothing in this section shall impair vested rights of property owners under existing deeds, easements or contracts whereby the state or any county acquired such rights of way. This section shall not prevent the department from contracting for the acquisition of easements or rights of way on such terms and conditions as to abandonment and reverter as it may consider advisable under the conditions then existing.”⁹⁸ (Emphasis supplied.)

ORS 366.320 provides for the acquisition of rights of way and right of access. Subsections (2) and (3) are relevant to this discussion, *i.e.*:

“(2) The department may acquire by purchase, agreement, donation or by the power of eminent domain, real property, or any right or interest therein deemed necessary for rights of way⁹⁹ either for original location or for widening, straightening or otherwise changing any highway, road or street. The department may, when acquiring real property for right of way, acquire all right of access from abutting property to the highway to be constructed, relocated or widened.”¹⁰⁰

“(3) All rights of way owned or held by the several counties over and along any roads adopted as state highways are vested in the state, by and through the department. This section does not apply to any rights of way owned by any city for city streets.”

ORS 366.332 defines “*real property*” as including any right, title or interest in real property:

Principle 67

ORS 366.360: *“In all cases where title to real property is acquired by the department either by donation, agreement or exercise of the power of eminent domain, a title in fee simple may be taken.”*

Comment. ORS 366.360 is clear: the powers conferred upon the department are well within the jurisdiction of the legislature. Regardless, Principle 64 is an important consideration when acquiring the fee, that is:

*“There are strongly reasoned cases holding that in no event can a legislature authorize the taking of a greater estate than that which is necessary for the public use, and when an easement is sufficient, no greater estate can be appropriated.”*¹⁰¹

Therefore, although the legislature has granted the department permission to acquire the fee simple title, it has not suspended the department’s authority to acquire lesser estates, such as an easement. And if the department can take no greater estate than is necessary for the public use, it stands to reason that it will take the fee only when deemed necessary for the public use: acquiring an easement when that level of estate will suffice for the public use. Consequently, ORS 366.360 does not mean that all Department of Transportation acquisitions are of fee simple title. As ORS 366.295(3) implies, some acquisitions may be only easements.

The fee is usually acquired when land is acquired for a non-access highway. However, the best evidence of the level of estate conveyed is the instrument of conveyance, not a statute or the class of highway, road or street being established. This advice is from *Green v. Kunkel*.¹⁰²

“Whether a conveyance of land to a municipality or other branch of government, reciting that it was made for road or street purposes, conveyed fee title or a mere easement depends on whether language of the deed considered as a whole indicates the grantor’s intention to convey land itself or only an easement therein.”

Consequently, the test between title and easement is the intent of the parties as revealed by instrument and the attendant facts. And whether a deed conveying a way, road or state highway passes the fee to the land, or only an easement, *depends chiefly upon the terms of the conveyance as determined from all the provisions of the deed.*¹⁰³

State Highways Through Cities

ORS 373.010: “Whenever the route of any state highway passes through the corporate limits of any city of this state, the Department of Transportation:

“(1) Shall select and designate the streets of the city over which the state highway shall be routed....

“(3) May alter or change such routing when in its opinion the interests of the motoring public will be better served.”¹⁰⁴

ORS 373.020: “(1) Complete jurisdiction and control of streets taken over by the Department of Transportation as provided in this Act, as defined in ORS 366.005, is vested in the department and extends from curb to curb, or, if there is no regular established curb, then such control extends over such portion of

the right of way as may be utilized by the department for highway purposes. Responsibility for and jurisdiction over all other portions of the street or road remains in the city.”¹⁰⁵

State Throughways

ORS 374.015: “(1) The Department of Transportation, in addition to and without restricting, limiting or repealing any powers and authority which it now has, may lay out, locate, adopt, establish, construct, designate, maintain and supervise the use and operation of new highways known as *throughways*?¹⁰⁶ (Emphasis supplied.)

“(2) Any relocated section of an existing highway and such portions of existing highways, which at the time they are designated as throughway, have less than 10 commercial businesses abutting thereon catering to the motoring public in any one mile of such existing highway may be designated as or converted into a throughway by the department. As used in this subsection, ‘relocated’ means a highway or section thereof so located that for its construction an entirely new right of way is necessary.

“(3) The authority and power of the department extends to and includes state highways within the corporate limits of cities, and with the approval of the municipal authorities may extend to and include city streets”¹⁰⁷

ORS 374.025: “Any state highway or section thereof which has been located established, designated and constructed as a throughway may, in whole or in part, be changed from a throughway to an ordinary highway by the Department of Transportation if in its judgment such action will best serve the public needs.”

ORS 374.035: “(1) The Department of Transportation may, in the name of the state, acquire by agreement, donation or the exercise of eminent domain, *fee title to or any interest in any real property, including easements of air, view, light and access*, which in the opinion or judgment of the department is *deemed necessary* for the construction of any throughway, the establishment of any section of an existing state road or highway as a throughway or the construction of a service road. The department may accomplish such acquisition in the same manner and by the same procedure as real property is acquired for state highway purposes, except that in case the acquisition is by proceedings in eminent domain the resolution required under such procedure shall specify, in addition to other provisions and requirements of law, that the real property is required and is being appropriated for the purpose of establishing, constructing and maintaining a throughway.

“(2) A resolution adopted by the department stating and settling forth that a proposed highway is to be constructed as a throughway is conclusive evidence that the highway when constructed is a throughway with all the characteristics and incidents prescribed by and provided for in ORS 374.005 to 374.095.”¹⁰⁸

Why does the Department of Transportation, on occasion, acquire more real property than is needed for highway right of way? ORS 374.040 provides an answer to this often-asked question:

ORS 374.040: “Whenever it becomes necessary to acquire any real property for use in connection with the location, relocation, construction, reconstruction, improvement and maintenance of any throughway or section thereof for a service road, the Department of Transportation may, at its discretion, acquire an entire lot, block or tract of land if by so doing the interests of the owner and the state will be best served, *even though the entire tract is not immediately needed for the high-way proper*. This provision and authority shall apply to and be effective whenever the real property is acquired by purchase, agreement or exercise of the power of eminent domain.”

ORS 374.075: “The municipal authorities of cities and the county court or board of county commissioners of any county may do anything or all things necessary to cooperate with the Department of Transportation for laying out, acquiring and constructing any section or portion of any street or highway within their respective jurisdiction as a throughway and to convert any existing street or highway into a throughway.”¹⁰⁹

ORS 374.080: “The Department of Transportation may enter into cooperative agreements with the Federal Government and with any county or city for the location, adoption, construction and maintenance of a throughway either within or without the corporate limits of any city, with respect to highways under the exclusive jurisdiction of the department, roads under the jurisdiction of the county court or board of county commissioners and streets under the exclusive jurisdiction of cities, and may, in such agreements, agree upon the allocation of costs of the project, the manner and methods of maintenance and all other relevant matters.”

ORS 374.085: “Whenever by location, relocation, establishment and construction of a throughway under ORS 374.005 to 374.095 real property, title to which is held under one ownership is severed and the land is being used for farm or other agricultural purposes, provision shall be made by the department . . . for crossing the highway from one such tract to the other or compensation for the severance of the tract shall be paid. Should such tracts at any time cease to be held under one ownership, the department may terminate and discontinue the road crossings.”¹¹⁰

ORS 374.090 makes provision for access to abutting real estate when ingress and egress has been destroyed by a throughway.

ORS 374.095 makes provision for utility roads where access to abutting property is affected by a throughway.¹¹¹

ORS 374.305 to 374.325 govern approach roads,¹¹² private crossings,¹¹³ cattle crossings, and other facilities upon rights of way.

Rights of Access to Throughways are Controlled by the Department of Transportation

ORS 374.405: “No rights in or to any state highway, including what is known as right of access, shall accrue to any real property abutting upon any portion of any state highway constructed, relocated or reconstructed after May 12, 1951, upon right of way, no part of the width of which was acquired prior to May 12, 1951, for public use as a highway, by reason of the real property abutting upon the state highway.”

ORS 374.410: “In connection with any acquisition of real property for right of way of any state highway; the Department of Transportation shall prescribe and define the location, width, nature and extent of any right of access that may be permitted by the department to pertain to real property described in ORS 374.405.”

Note: The statutes quoted or noted in this section of the chapter are only part of the Oregon highway code, county road law, and laws relating to city public ways. They are included here to make you aware of their existence, not as a substitute for the official laws published by the Oregon Legislature.

County Roads; Acquisition of Right of Way, Authority, Special Laws, County Throughways

Counties are not like private corporations, but are political agents of the state *created by the legislature for governmental purposes*.¹¹⁴ Counties act for and in behalf of the state in execution of the purposes set forth in ORS 203.010, and their rights are not determined by law applicable to private corporations.¹¹⁵ As a consequence of being created by the legislature, whatever authority a county may enjoy or possess, pertaining to roads and highways and the acquisition of rights, titles, or lesser interests in real property for their

public roads and highways, must be derived from the legislative assembly (much as the Department of Transportation received similar authority under such statutes as ORS 366.360 and 374.035). In other words, the county acts through delegated power emanating from the initial source (the legislature).

Counties receive their general powers and authority from ORS Chapter 203. But the powers and authority are subject to specific laws in other chapters of the ORS: Chapter 192 (public records, reports and meetings), Chapter 193 (legal notices), Chapter 275 (county lands), Chapters 305 to 312 (tax laws), Chapter ³²¹ (timber taxes), etc. Moreover, such power and authority must be subject to the United States and Oregon Constitutions because the source of the power and authority, the legislature, is also bound by the constitutions. Regardless, counties have been provided with considerable power over “matters of county concern”:

“The power granted by this section,¹¹⁶ in addition to other grants of power to counties, shall not be construed to limit or qualify any such grant and shall be liberally construed, to the end that *counties have all powers over matters of county concern that it is possible for them to have under the Constitutions and laws of the United States and of this state.*”

Are county roads and highways *strictly* “matters of county concern?” The answer is: They are legally matters of county concern, but as public highways of this state and common to all members of the public, without distinction,¹¹⁷ they are not “strictly” matters of county concern.

“A highway is a public way for the use of the public in general, and passage and traffic, without distinction The restrictions upon its use are only such as are calculated to secure to the general public the largest practical benefit from the enjoyment of the easement, and the inconveniences must be submitted to when they are only such as are incident to a reasonable use under impartial regulations.”¹¹⁸

This “public” nature of county roads prevents them from being “strictly” of county concern. They are “public highways of the State of Oregon.” As such, the legislature has the power to supervise, regulate and control the public ways. It can delegate that power to counties, but the “public” nature of the county roads and highways prevents the legislature from being as liberal in such delegation. It can clothe the county with authority over certain public ways “so long as such (ways) are not diverted to some use substantially different from that for which they were originally intended.”¹¹⁹ But aside from certain statutory laws, such as ORS 368.016, and certain controlling common law principles, “*The exercise of governmental powers relating to a road within a county is a matter of county concern.*”¹²⁰

Section 18, Article 1 of the Oregon Constitution and certain relevant cases help define the extent of statutory authority to take or otherwise acquire land for any public way.

“Private property shall not be taken for public use, nor the particular services of any man be demanded, without just compensation; nor except in the case of the state, without such compensation first assessed and tendered; *provided that the use of all roads, ways and waterways necessary to promote the transportation of the raw products of mine or farm or forest or water for beneficial use or drainage, is necessary to the development and welfare of the state and is declared a public use.*”¹²¹

In *Gearin v. Marion County*, *supra*, the court held:

“A taking for public use signifies a possession, occupation and enjoyment of property by the public at large or by a public agency.”

And in *Thornburg v. Port of Portland*:¹²²

“If the governmental interference with the use and enjoyment of the land is substantial enough to impose a servitude upon the land, such interference may constitute a taking.”

In *Grande Ronde Elec. Co. v. Drake*¹²³ and *Smith v. Carneron*¹²⁴ the court said:

“A taking for a private use is not authorized even though just compensation is paid.”

In *Foeller v. Housing Authority of Portland*:¹²⁵

“The term ‘public use’ demands that the public’s use be direct.”

ORS Chapter 368 gives the counties their power and authority over “county roads” and “local access roads.”

“*County road*,” as defined in ORS 368.001, means: “A public road under the jurisdiction of a county that has been designated as a county road under ORS 368.016.”¹²⁶

Here are important Oregon opinions and cases that specify which county highways are legally *county roads*:

The Oregon Department of Justice issued an opinion to the effect that: “Streets in unincorporated towns are county highways, the regulation of the use of which is within the jurisdiction of the county court regardless of the fact that such streets have not been accepted as county roads under the provision of 375, Oregon Laws 1941, ORS 365.550.”¹²⁷

“County road” is a term of specific meaning and should not be indiscriminately used as a term of

general description of roads or public ways situated within a county.¹²⁸

“A road may become an irrevocably dedicated public highway by acceptance of a plat thereof by the county court, or by a common law dedication and acceptance. But in order to establish the road as a *county road*, the county court is required to accept it expressly as such by appropriate resolution entered in its journal.”

In *Whitney v. Crittenden et al*,¹³⁰ the court held that the approval of the county court of a plat prior to recording was sufficient acceptance for the creation of a *public highway as distinguished from a county road*. Commenting on Section 100-1225 O.C.L.A., as amended by Chapter 323, Oregon Laws 1945, the court said:

“This clearly indicates that the act of approving and accepting the plat by the County Court constitutes an acceptance on the part of the public of the highway in the opinion of the legislature. In order to protect the county from being overburdened with numerous highways, the quoted part from said section 4558, Or. L. (subsecs 100-1225 O.C.L.A.) was enacted. A highway may become irrevocably dedicated highway, and yet the county is not liable for its upkeep, repair, damages or for injuries resulting from the highway becoming out of repair”

“Thus it appears that in order for a platted road or public highway to become a ‘county road’ the county court is required to expressly establish it as such and this may be accomplished by an appropriate resolution by the county court entered upon its journal.”¹³¹

“*Local access road*” is defined by ORS 368.001(3) as: “...a public road that is not a county road, state highway or federal road.”¹³²

“(5) ‘Public road’ means a road over which the public has a right of use that is a matter of public road.”¹³³

“(6) ‘Road’ means *the entire right of way of any public or private way that provides ingress to, or egress from property by means of vehicles or other means or that provides travel between places by means of vehicles*. ‘Road’ includes, but is not limited to:

“(a) Ways described as streets, highways, throughways or alleys;

“(b) Road related structures that are in the right of way, such as tunnels, culverts, or similar structures; and,

“(c) Structures that provide for continuity of the right of way such as bridges.”

ORS 368.016 is important to this discussion, *i.e.*:

“(1) *Except as provided in this section or as otherwise specifically provided by law, the exercise of governmental*

powers relating to a road within a county is a matter of county concern.

“(2) *A county governing body:*

“(a) *Does not have jurisdiction over any public road that is a state highway.*

“(b) *Shall only take action involving a local access road within a city if the city governing body consents to the action.*

“(c) *May by resolution or order make any public road within its jurisdiction a county road.*

“(3) *Any road that has a classification as a county road on November 1, 1981, shall retain that classification unless the classification is changed under ORS 368.026 or as otherwise provided by law.*

“(4) *A county governing body may seek assistance from the state Highway Engineer as provided under ORS 366.155.*”¹³⁴

ORS 368.031 provides counties with jurisdiction over public roads other than “county roads,” “state highways” and “federal roads,” that is, roads defined as “*local access roads*” by ORS 368.001. Many of the public ways created by common law dedication and by prescription, but not accepted as “*county roads*” (as defined by ORS 368.001), will fall in this classification.

ORS 368.031. “A ‘*local access road*’ that is outside a city is subject to the exercise of jurisdiction by a county governing body in the same manner as a county road, except as follows:

“(1) A county and its officers, employees or agents are not liable for failure to improve the local access road or keep it in repair.

“(2) A county governing body shall spend county moneys on the local access road only if it determines that the work is an emergency or if:

“(a) The county road official recommends the expenditure;

“(b) The public use of the road justifies the expenditure proposed; and

“(c) The county governing body enacts an order or resolution authorizing the work and designating the work to be either a single project or a continuing program.”¹³⁵

Legalization of County Roads; Statutory Procedures

Legalization statutes are the statutory procedures for making something legal or lawful. ORS 368.201 to 368.221 are the procedures for making certain roads legal, or lawful county roads.

ORS 368.201: “A county governing body may initiate proceedings to legalize a county road under ORS

368.201 to 368.221 if any of the following conditions exist:

“(1) If, through omission or defect, doubt exists as to the legal establishment of a public road.”¹⁶⁵

“(2) If the location of the road cannot be accurately determined due to:

“(a) Numerous alterations of the road;

“(b) A defective survey of the road or adjacent property; or

“(c) Loss or destruction of the original survey of the road.

“(3) If the road as travelled and used for 10 years or more does not conform to the location of a road described in the county records.”¹⁶⁶

ORS 368.216: “(1) After considering matters presented in a proceeding to legalize a road under ORS 368.201 to 368.221, a county governing body shall determine whether legalization of the road is in the public interest and shall enter an order abandoning or completing the legalization procedures on the road.

“(2) When a county governing body legalizes a road under ORS 368.201 to 368.221, the county governing body shall comply with ORS 368.106.

“(3) Courts shall receive any order filed under this section as *conclusive proof that the county road exists as described in the order*.

“(4) Upon completion of the legalization procedures under ORS 368.201 to 368.221.

“(a) Any records showing the location of the road that conflict with the location of the road as described in the order are void.”¹⁶⁷ and

“(b) The road exists as shown on the order legalizing the road.”¹⁶⁸

Special note: Any changes noted on the order required in this section must be noted on the cadastral map, and the map must be made to conform to the order produced under the legalization procedures of ORS 368.201 to 368.221.

ORS 368.221: “Notwithstanding ORS 368.036, a county governing body may legalize a road at any width that is less than the width of the road described in ORS 368.206 if the county governing body determines that:

“(1) The legalization of the road at the lesser width is in the public interest; or

“(2) An encroachment on the road may not be practically removed under ORS 368.211.”¹⁶⁹

Note: In this section only a digest of the Oregon Laws has been provided. Many provisions of the law dealing with procedures, hearings, appeal rights, statutory periods, etc. have been omitted from our discussion. For a complete, up-to-date wording of each legislative enactment, reference must be made to the ORS as published by the Legislative Counsel Committee of the Legislative Assembly.

Authority for Counties to Acquire Property for Roads

ORS 368.073 provides:

“A county governing body may initiate proceedings to acquire title or a lesser interest in real property for public road purposes:

“(1) On its own action; or

“(2) If a person files the following with the county governing body:

“(a) A petition described in ORS 368.081; or

*“(b) A written proposal to dedicate or donate land owned by that person for public road purposes.”*¹³⁶

ORS 368.091 requires a county to discontinue proceedings to acquire real property for public road purposes that are initiated by a petition described by ORS 368.081 at any time prior to acquisition of the property if a majority of the owners of property that would abut the proposed road file objections with the county governing body.

Principle 68

ORS 368.096 describes these methods for acquiring real property for public road purposes.

“(1) If proceedings to acquire real property for public road purposes have been initiated under ORS 368.073, a county governing body may acquire the property by any of the following methods:

“(a) Acceptance of a dedication or donation.

“(b) Acquisition by purchase or other agreement.

“(c) Exercise of power of eminent domain under ORS Chapter 35.

“(d) Use of road viewers under ORS 368.161 to 368.171.

“(2) Nothing in this section:

“(a) Supersedes procedures for establishing roads by subdividing or partitioning land under ORS Chapter 92.

“(b) Precludes public acquisition of any property interest by adverse possession or prescription; or

“(c) Restricts the ability of a public body to acquire an interest in property by any other method permitted by law.”¹³⁷

ORS 368.116: “(1) Whenever in the location, relocation, construction or betterment of a public road, a county governing body determines that it is necessary to locate, relocate or construct the public road, or any part thereof, upon the *right of way of a railroad company*, the county may negotiate and agree with the railroad company for the right to use or occupy the right of way, or any portion necessary for public road purposes.

“(2) If agreement cannot be reached, then the county may acquire the right of way by exercise of the power of eminent domain under ORS Chapter 35.

“(3) Nothing in this section authorizes the use or occupancy of the railroad right of way which would interfere with the operation of the railroad or its necessary appurtenances...”¹³⁸

Principle 69

ORS 368.126: “When a county governing body establishes a new public road following the general alignment of an existing public road, the final order or resolution shall identify all parts of any existing road that are to be vacated. Vacation of those parts described is effective without any other proceedings. A road so vacated shall not be closed to public use until the road laid out to replace it is actually opened to travel.”¹³⁹

Comments: In *Colombo v. Hewitt*, *supra*, it was held that the old road is vacated by final order only when the new, replacing highway leaves reasonably adequate means of ingress and egress to the owners of property abutting on the road to be vacated. An order of the county court, *nunc pro tunc*,¹⁴⁰ vacating an old road, which presumably was the intention of the court 21 years earlier, although they took no action, was invalid.

Public Roads Over Lands of the United States

ORS 368.131 allows: “The county governing body may by resolution accept the grant of rights of way for the construction of public roads over public lands of the United States. This section does not invalidate the acceptance of such grant by general public use and enjoyment.”¹⁴¹

Road Viewers Method of Acquiring Land for Public Road Purposes

ORS 368.161 provides: “(1) When proceedings have been initiated under ORS 368.073 to acquire real property for public road purposes, the county gov-

erning body may establish a board of road viewers and acquire property for the proposed road in the manner described in ORS 368.161 to 368.1717 (See published ORS for subsection (2) of this law.)

ORS 368.171: “After completion of proceedings under ORS 368.161 to 368.171 and consideration of matters and issues presented during the proceedings, the county governing body shall determine whether a public need exists for the public road and shall enter an order or resolution granting or denying the property acquisition. If the county governing body enters the order of resolution establishing a public road, the order or resolution shall:

“(a) Describe the exact location and width of any public road established;

“(b) Designate amounts of damages and costs incurred under the proceedings, person entitled to payment of costs or damages and persons liable for payment of the costs or damages; and

“(c) Assess costs under ORS 368.111; and

“(d) The requirements of this section are in addition to requirements under ORS 368.106.”¹⁴²

Acquisition of Certain Real Property as Provided for in Procedures for Legalization of County Roads

Where a structure exists on, or encroaches on a road subject to legalization proceedings under ORS 368.201 to 368.321, the county may acquire the structure (as provided by ORS 368.211, subsec (4)), or may acquire property to alter the road being legalized (as provided by ORS 368.211, subsec (5)). The legalization of public roads is described later in this subsection of this publication.

Market Roads/Ways of Public Easement

ORS 369.020: “On or before January 1, 1974, county courts of the respective counties or city councils of the respective cities may take action to designate former ‘county market roads’ as ways of public easement. If no designation is made, such roads shall become a part of the respective county or city road systems as of that date.”¹⁴³

ORS 369.025: “Notwithstanding ORS 369.020 or any action pursuant thereto, a road within a city that was designated county market road prior to January 1, 1974, shall be on the county road system until the county surrenders jurisdiction over the road within a city and the city accepts the county order and offer of surrender in the manner provided for in ORS 373.270.”¹⁴⁴

Note: ORS 369.110 to 369.280 was repealed by 1973 c. 240 (ORS 369.020 enacted in lieu of these statutes). ORS 369.290 was repealed by 1965 c. 512 subsec 1; repealed by 1973 c. 270 subsec 1 (ORS 369.020 enacted in lieu of 369.290). And, ORS 369.140 through 369.480 was repealed by 1981 c. 153 subsec 79.

County Throughways

ORS 374.420 provides: “(1) The county court or board of county commissioners may acquire by purchase, agreement, donation or exercise of eminent domain, *fee title or any interest in real property, including easements of air, view, light and access*, which is necessary for the construction of a throughway or the establishment of a section of an existing county road as a throughway.

“(2) When right of way is acquired for a throughway, no rights in or to the throughway, including what is known as right of access, accrue to real property *merely because the property abuts upon that part of the right of way so acquired*. This subsection also applies to right of way acquired, prior to August 13, 1965, pursuant to ORS 374.420 to 374.430 (1963 Replacement Parts).

“(3) ‘Throughway’, as used in this section, means a proposed or existing county road *especially designed for through traffic*, which has been designated by resolution of the county court or board of county commissioners as a throughway, over, from or to which owners or occupants of abutting land or other persons have no easement of access or only a limited easement of access, light, air or view, merely because of the fact that their property abuts upon the throughway or for any other reason.”¹⁴⁵

ORS 374.425: “In connection with the acquisition of real property for right of way for a throughway described in ORS 374.420, the county court or board of county commissioners may prescribe the location, width, nature and extent of any right of access that pertains to such real property.”¹⁴⁶

Forest Roads

ORS Chapter 376 contains the Forest Road Act that governs certain county or public roads, outside the corporate limits of any city, which is within or extends into or toward mountainous or timbered areas.

The legislative policy and purpose of this act is explained in ORS 376.305, *i.e.*:

“(1) It is declared that a substantial part of the forest resources of this state are now left unharvested and are lost by reason of the excessive cost of transportation thereof to market; that substantial forest areas can be economically managed, harvested and the products thereof transported to market only by use of certain county and public roads which the coun-

ties of this state are unable to construct, improve and maintain so as to enable their safe and economical use for such purposes.

“(2) It is declared to be the public policy of this state to conserve and develop its natural resources to encourage and facilitate the transportation of products of the forest and the salvage and utilization of such products now being wasted, and to develop and improve certain county and other public roads for such purposes.”¹⁴⁷

ORS 376.310 provides this definition of “forest road”:

“(1) ‘Forest road’ means any county or public road, or part thereof, outside the corporate limits of a city, which is within or extends into or toward a mountainous or timbered area, and which is under control and supervision of a county court of this state.”¹⁴⁸

A “contract forest road” is a forest road improved or maintained pursuant to a contract made under ORS 376.305 to 376.390.¹⁴⁹

This act authorizes a logging operator to improve or maintain, or improve and maintain, a “forest road” upon approval by a county court. The statutory provisions are contained in ORS 376.305 to 376.390. This act does not, however, prevent the use of the forest contract road by the general public.¹⁵⁰

Disincorporation of a City

A county could be vested in fee simple absolute title to a public way if a city, holding that level of an estate in the public way, surrenders its charter, *i.e.*:

ORS 221.650: Within 30 days after the authorization of the surrender of the charter (as authorized by ORS 221.610 and 221.621), “the city shall convey, grant, assign and deliver all its property real and personal, and property rights, by proper conveyance, to the county in which the city is located for the benefit and use of the county. The city at the end of 60 days from the date of the election authorizing the surrender shall cease to exist in its corporate capacity without any further or other formal action, and all its property rights and interests shall vest in the county, and the records of the city shall be deposited in the office of the county clerk by the auditor, clerk or other keeper of records of the city.”

Regardless of the disincorporation and provisions of ORS 221.650, neither the public easements nor the underlying fee title interests in public ways, held by abutting owners other than the city, are affected by the disincorporation.

Use of City Streets by a County

ORS 373.110: “(1) Whenever in its judgment it is necessary, for the purpose of connecting an existing

county road with an existing state highway, that the connecting road be located, established and designated over property within the boundaries of a city, the county court or board of county commissioners may designate, locate, establish, construct and maintain the connecting road over property within the corporate limits of the city as a county road.

“(2) The procedure for the establishment of the connecting road may be by petition of freeholders or by a resolution of the county court or board of county commissioners as provided by law for the establishment of county roads.

“(3) In addition to the authority provided by law for the acquisition of rights of way, in the event the connecting road is established by petition of freeholders or by resolution the county court or board of county commissioners *may acquire private property within the corporate limits of the city for rights of way for the connecting road by exercise of the power of eminent domain*, under the procedure provided by law for exercise of the power of eminent domain by counties for the acquisition of private property for rights of way for county roads.”¹⁵¹

ORS 373.120 authorizes: “The county court or board of county commissioners may construct and pave streets and roads through cities of less than 2,500 population, as shown by the last federal census, where such streets and roads are for the purpose of connecting county roads and highways.”¹⁵²

ORS 373.130: “Whenever any county constructs across any stream any bridge which is wholly or in part within the limits of any city within the county, the county may use as approaches for the bridge such portions as may be necessary of any street of the city leading to the bridge. *The power, domain and right of control over and to improve and maintain the portions of any street so used belong exclusively to the county.*”¹⁵³

See ORS 373.20 through 373.320 for cities having jurisdiction over certain county roads.

City Jurisdiction Over Public Ways; Acquisition of Right of Way; Powers Over City Ways; Transfer of Jurisdiction County Roads to City; Special Laws

Cities receive their basic authority over streets, alleys and other public ways from the legislative acts in

ORS Chapter 221. That chapter provides: “Except as limited by express provision or necessary implication of general law, *a city may take all action necessary or convenient for the government of its local affairs.*”

The powers granted cities under the 1893 *Incorporation Act*, in effect on Sept. 20, 1985, are codified as ORS 221.901 to 221.928. Regarding public ways, this act allows the common council of a city to:

“(1) Provide for lighting the streets and furnishing such city and its inhabitants with gas or other lights, and with pure and wholesome water. For such purpose it may construct such water, gas or other works, within or without the city limits, as may be necessary or convenient therefor. It may allow the use of the city streets and alleys to any person, company or corporation who may desire to establish works for supplying the city and inhabitants thereof with such water or lights upon such reasonable terms and conditions as the council may prescribe.

“(2) Permit, allow and regulate the laying down of tracks for streetcars and other railroads upon such streets as the council may designate, and upon such terms and conditions as the council may prescribe; and allow and regulate the erection and maintenance of poles, or poles and wires, for telegraph, telephone, electric light or other purposes, upon or through the streets, alleys or public grounds of such city; permit and regulate the use of alleys, streets and public grounds of the city for the laying down or repairing gas and water mains, for building and repairing sewers, and the erection of gas or other lights.

“(3) *Preserve the streets, lights, side and crosswalks, bridges, and public grounds from injury, prevent the unlawful use of the same, and regulate their use.*”

“(13) *Make bylaws and ordinances not inconsistent with the laws of the United States or of this state to carry into effect the provisions of ORS 221.901 to 221.928.*”¹⁵⁵

Principle 70

ORS 221.924: “The council may, whenever it deems expedient, improve the public grounds within the city referred to in ORS 221.906, and establish and open additional streets and alleys therein. The power and authority to improve streets includes the power and authority to construct, improve, pave, repair, and keep in repair sidewalks and pavements, and to determine and provide everything convenient and necessary concerning such improvements and repairs.”¹⁵⁶

County Market Roads Within Cities

ORS 369.025: “Notwithstanding ORS 369.020 or any action pursuant thereto, a road within a city that

was designated 'county market road' prior to January 1, 1974, shall be on the county road system until the county surrenders jurisdiction over the road within a city and the city accepts the county order and offer of surrender in the manner prescribed in ORS 373.270."¹⁵⁷

Powers of Cities Relating to Roads and Highways

ORS 373.210: "Any city having a population of less than 100,000 may provide for the improvement of any roads or streets within the limits of the city at the partial expense of the general fund of the city in the manner provided ORS 373.220 and 373.230, where:

"(1) Such roads or streets are parts of any general system of state or county roads or highways, or

"(2) Such roads or streets directly connect with state or county roads or highways,

"(3) Such roads or streets afford an outlet from the limits of the city to adjoining state or county roads or highways; or

"(4) Such roads or streets provide the most accessible or generally travelled route from within the city to beyond the limits of the city."¹⁵⁸

ORS 373.220 outlines the procedure required to authorize a road or street improvement mentioned in ORS 373.210.

ORS 373.230 relates to the charter or ordinance provisions governing an improvement mentioned in ORS 373.220.

ORS 373.240 explains the contents of the general road fund of a city.

ORS 373.250: "The road fund mentioned in ORS 373.240:

"(1) Shall be used by the city for the construction and repair of county roads and streets therein.

"(2) May be used for the construction and repair of roads without a city having a population of less than 100,000 which lead directly to it.

"(3) In carrying out such objects, may be used jointly with the county in which the city is located as provided in ORS 373.260."¹⁵⁹

ORS 373.260: "(1) The county court or board of county commissioners of any county and the authorities of any city within the county may enter into an agreement for the construction, improvement or repair of, and the acquisition of right of way for:

"(a) Any county road or city street within the corporate limits of the city.

"(b) Any road without such city, if it has a population of less than 100,000, but leading directly to it.

"(2) In the agreements the parties shall agree upon the proportion which each shall contribute toward such acquisition, construction, improvement or repair and upon the method and kind of acquisition, construction, improvement or repair to be made."¹⁶⁰

Transferring Jurisdiction Over County Roads Within Cities

ORS 373.270: "(1) Jurisdiction over a county road within a city may be transferred under this section whenever:

"(a) The county governing body deems it necessary, expedient or for the best interest of the county to surrender jurisdiction over any county road or portion thereof within the corporate limits of any city, and

"(b) The governing body of the city deems it necessary or expedient and for the best interests of the city to acquire jurisdiction road or part thereof to the same extent as it has over other public streets and alleys of the city."

Subsections (2), (3), (4) and (5) outlines the procedures of action taken under ORS 373.270. Subsection (6) authorizes a city to initiate action to request a county to surrender jurisdiction over a county road, i.e.:

"(6) If a city governing body determines to initiate action under this section for the surrender of jurisdiction by a county over a county road:

"(a) The city governing body may initiate the action by passage of appropriate municipal legislation...

"(b) The county governing body may surrender jurisdiction of the county road without further action by the city...

"(7) When a city adopts appropriate municipal legislation accepting a county governing body's order under subsection (5) of this section, or when a county governing body adopts an order meeting city legislation under subsection (6) of this section:

"(a) The jurisdiction of the county over the county road or portion thereof as a county road, or for its improvement, construction or repair shall cease;

"(b) The full and absolute jurisdiction over the road for all purposes of repair, construction, improvement and the levying and collection of assessments therefor shall vest in the city; and

"(c) The city shall have the same jurisdiction over the road or portion thereof as by its charter and the laws of the state are given or granted it over any of the public streets and alleys of such city.

"(8) This section is applicable to all county roads, whether acquired by the county or the public by condemnation and

*user, user or prescription or in any manner provided by law or in which the easement for road purposes is in the public.*¹⁶¹

Special Laws for Amity, Monmouth, Myrtle Point and Salem

ORS 373.290 through 373.320 give these cities control over all of, or in some cases certain, county roads and highways within the corporate limits of the city.

Amity and Salem have been provided with exclusive control and jurisdiction over all county roads within the city boundaries. In both situations the roads are legally classified as city streets. See ORS 373.290 (Amity) and 373.320 (Salem).¹⁶²

ORS 373.300 provides Monmouth with “full and exclusive jurisdiction, power and control over all that part of the highway known as Monmouth Avenue from its intersection with Main Street north to the northeast corner of University Out Lot B located within the corporate limits of the city. Such highway is a street, subject to all the burdens and servitudes thereof. *The control of such highway is excepted out of the jurisdiction of the County Court of Polk County.*”¹⁶³

ORS 373.310: “(1) The City of Myrtle Point, in Coos County, has absolute and complete jurisdiction over the following portions of the following county roads located within the corporate limits of the city:

“(a) All that portion of *any county roads* within the corporate limits of the city, *lying along First Street and the whole thereof*, as such street is described upon the plat of the original town (now city) of Myrtle Point, now on file and of record in the office of the county clerk for Coos County.

“(b) All that portion of the county roads within the corporate limits of the city, lying on or along Spruce Street and the whole thereof, as shown upon the plat of the original town (now city) of Myrtle Point...

“(c) All that portion of the county roads... lying upon or along First Street, being Spruce Street extended, and the whole thereof, as shown on the plats of Border & Bender’s addition to the town (now city) of Myrtle Point, Border & Bender’s extension to Border & Bender’s addition... Sengstacken’s addition...and J.H. Robert’s addition...

“(d) All that portion of any county roads... lying along Railroad Avenue, and the whole thereof, as shown upon the plats of the first extension to the original town... Lenherr’s addition... Brown’s first addition... .. Brown’s second addition and Smith’s addition...

“(e) the city of Myrtle Point has jurisdiction over such portion of the roads in the same manner and to the

same extent that it has jurisdiction over such streets, such portions to be streets of the city of Myrtle Point.”¹⁶⁴

Reference should be made to the subsections of this section of this publication for laws relating to “Throughways” (ORS 374.005 to 374.095; through cit-les).

The Extinguishment of Public Ways

*“‘Once a highway always a highway’ is an old maxim of the common law to which we have referred, and so far as it concerns the rights of abutters, or others occupying a similar position, who have lawfully and in good faith invested money or obtained property interests in the just expectations of the highway, the maxim still holds good. Not even the legislature can take away such rights without compensation.”*¹⁷⁰

This section will be presented in four parts:

1. Case law on vacation, rescission, and abandonment of dedicated and non-dedicated public ways.
2. Statutes for vacating or extinguishing the public way
3. Problems associated with vacation and the apportionment of vacated roads, streets and alleys.
4. Abandonment of state highways

Bostwick v. Hosier¹⁷¹

In Stewart’s Addition to Baker, Oregon, Tenth Street runs north and south between blocks 4 and 5. Crossing it at right angles, beginning on the north, are Church Street, Center Street and Jackson Street, each running east and west. Center Street appears to have been laid out through the blocks mentioned after they were platted.

The defendant, Hosier, was the owner of lot 1 and a fractional part of lot 2 in block 5, lying at the northeast corner of Tenth and Jackson Streets. On his petition, the city council passed an ordinance vacating, *for his private use*, a part of Tenth Street. Ayre and Sherman also fronted on Center, and Bostwick fronted on Jackson. They brought this suit to enjoin the vacation of that portion of the streets mentioned. They claimed that the ordinance was passed *without their consent* and without the city’s having obtained jurisdiction to enact such legislation; that no benefit would come to the city or any of its inhabitants therefrom; and that the proposed vacation of the parts of said streets is solely for the private benefit of the defendant.

The defendant said the plaintiffs were not concerned in the proceeding to vacate the portion of the streets mentioned, because their property was not contiguous to the part to be vacated. The defendant said that the defendant was the only owner to be considered in the proceeding mentioned because his was the only property that touched the strips to be vacated.

Justice Burnett said:

"It is apparent from the record that the parties bought the properties mentioned with reference to the plat of Stewart's Addition. *In other words, with their purchase they acquired at least the usufruct*¹⁷² *of the adjacent streets. It is axiomatic, as well as constitutional, that private property cannot be taken for private use. As early as the case of Willamette Iron Works v. Oregon R. & N. Co.,*¹⁷³ the question of occupancy of streets was under consideration, and the following language was used by Mr. Chief Justice Robert S. Bean, delivering judgment:

*"But there is a limitation to legislative or municipal power over a street, which cannot be exceeded without invading the constitutional rights of abutting owners. An abutting proprietor is entitled to the use of the street in front of his (or her) premises to its full width as a means of ingress and egress, and for light and air, and this right is as much property as the soil within the boundaries of his lot; and therefore any impairment thereof or interference therewith, caused by the use of the street for other than legitimate street purposes, is a taking within the meaning of the Constitution..."*¹⁷⁴

"This principle is well fortified by the precedents cited in this opinion.

"A similar doctrine was announced in *Sandstrom v. Oregon-Wash. R. & N. Co.*¹⁷⁵ where the defendant had fenced off a street which ran in front of the plaintiffs premises and made a deep and impassable cut across the street, although not immediately opposite the holding of the plaintiff...

"Although the plaintiffs do not own the property immediately opposite the ground it is proposed to vacate, yet most of them have holdings in the next adjacent blocks, so that their situation differs only in degree from that of the opposite abutter. The accessibility of their premises is *pro tanto*¹⁷⁶ impaired, which constitutes an injury to them not suffered by the general public.

"In several of the cases (cited) the defendants were public service corporations entitled to exercise the right of eminent domain, under which, after having his day in court and an opportunity to be heard, the plaintiff could have been compelled to surrender his property upon adequate compensation

first assessed and tendered. Here the proposal is to abandon parts of the streets for the private interest of one of the defendants and not for any public purpose. *The property rights of the plaintiffs cannot be thus invaded.*

"If the rights of the abutting owners in a street cannot be taken without condemnation at the suit of a public service corporation, much more they cannot be impaired in the interest of a private owner..."

Martin v. Klamath County¹⁷⁷

In this 1979 case, the plaintiff brought suit against Klamath County to quiet title to a strip of land 60 feet wide and about 450 feet long, which had previously been used by the public as a roadway. The plaintiff appealed the trial court's decision, claiming as errors: (1) failure of the court to find nonuser of the strip of land, constituting a common law abandonment of the way by the county. And (2) the holding by the court that a right of way can be abandoned only as provided in ORS 368.620.¹⁷⁸

The county cross-appealed, contending that the court erred: (1) in refusing the county's prayer that the court quiet title to the strip in the public as a right of way, and (2) in failing to enjoin the plaintiff from interfering with the public's use of the right of way.

Facts: The plaintiff was the owner of a large tract, which included the right of way in issue. In 1960, the plaintiff conveyed this right of way through her property to the United States. The plaintiff's predecessors apparently had granted the same right of way to the United States some 10 years earlier. The road was originally part of the Klamath Indian Reservation road system and was known as Sycan Road.

Following termination of the reservation, some of these roads, including the subject road, were transferred to Klamath County. At no time, however, did the county ever establish this road or any portion of it as a "county road" under ORS 368.405. However, it did accept an easement deed to it from the United States Department of the Interior, and treated it as a *public road*.

The portion of the road in issue included a bridge over the Sprague River. In 1964 a flood washed out the bridge. It had not been replaced by the time this issue came to the Court of Appeals (1979). As a result, there had been very little use of that portion of the road in issue since the washout. In about 1966, the plaintiff erected a fence across the road in order to prevent people from driving down the road and depositing trash in the vicinity, including her property on both sides of the right of way. In 1979, some of the road was overgrown with sagebrush. There was some

testimony, however, that the county was considering construction of a boat landing where the subject road intersected the Sprague River.

“The thrust of plaintiff’s argument in support of reversal (of the trial court’s ruling) runs as follows: Statutory vacation of roads under ORS 368.620 and common law abandonment are two distinctly different things; statutory vacation does not preclude common law vacation; ORS 368.620 has no application to the facts of the case at bar; and evidence established that the defendant county abandoned the strip under the doctrine of common law abandonment, *viz.*, nonuser and intent to abandon.

“Plaintiff relies on *Powers v. Coos Bay Lbr. Co.*,¹⁷⁹ *Bernards et ux v. Link and Haynes*,¹⁸⁰ *Macleay Estate Co. v. Curry County*,¹⁸¹ *Bitney v. Grim*,¹⁸² *Magee Heirs v. Slack*,¹⁸³ in support of common law abandonment.

“Defendant counters by insisting that a duly created public road may not be lost by the public unless the provisions of ORS 368.620 are complied with. Further, defendant argues that the common law pertaining to abandonment of a public easement, if it exists at all in Oregon, does not apply to this case.”

The Court of Appeals held:

“1. After examining the authorities, including those submitted by both sides to this controversy, we are of the opinion:

Principle 71

“A duly established public road may not be lost to the public except pursuant to the terms of ORS 368.620.” (See Principles 38, 39, 42, 43, 44 and ORS 221.750 and 275.027.)

“And, (2) that the doctrine of common law abandonment does not apply under the facts at bar; that plaintiff cannot prevail on her theory.

“2, 3. In enacting ORS 368.620, as amended, the legislature has provided the complete procedure for the vacation and discontinuance of a public road or highway in this state. *It is necessary to adhere to this procedure in order that the vacation be effective.* While this issue has apparently never been decided in this state, the majority rule in other jurisdictions is that when the legislature provides a method by which a county may abandon or vacate roads, *that method is exclusive.*¹⁸⁴ The fact that the legislature provides a method whereby a county might abandon a road is a positive inhibition against other methods of termination. We are of the opinion there can be no vacation of this road except under the provisions of ORS 368.620.¹⁸⁵

“4, 5. By the same token, we conclude that defendant county was entitled to have the plaintiff enjoined from interfering with the public’s use of same unless and until this road is vacated under ORS 368.620. *Plaintiff’s fence across the right-of-way is a nuisance.*¹⁸⁶

“As such, it was subject to immediate abatement and removal.¹⁸⁷ ORS 368.620 *inhibits this method of acquiring title to lands in public roads. This has been the statutory law of this state since 1895.*¹⁸⁸ Therefore, the court erred in refusing to grant such relief to the Defendant County.”

Note: In *Martin*, the plaintiff based her argument on the decisions handed down in *Powers and Bernard*, *Bitney*, *Macleay Estate*, and *Magee Heirs*. These were similar cases involving many of the same doctrines of common law. However, the court, after examining each case, found them “inappositive”, that is, irrelevant to the facts, circumstances, laws or conditions of this case. The lesson is that it is as important to examine the differences between your problem at hand and the case upon which you might base your solution, as it is to examine the similarities of your problem to that of another case.

“*Powers and Bernard* involved claimed abandonment’s of private rights-of-way, no public roads.

“*Bitney*, a 1914 case, did involve abandonment of a portion of a county road. This was, however, decided prior to the amendment of ORS 366.620 to provide for vacation on account of prolonged nonuser by the public.¹⁸⁹ Further, the opinion dealt with a realignment rather than a claim of total road abandonment as in the case at bar. Additionally the opinion of *Bitney* makes no mention whatsoever of ORS 368.620 and bases its conclusion on “(p) resuming that the road supervisor in changing the course of travel (of the county road) acted by authority...”¹⁹⁰

Thus it would appear from the opinion that the court assumed that the county road supervisor had acted according to law. In any event, *Bitney* can hardly be considered as authority for ignoring the subsequently enacted provisions of ORS 368.620 and substituting the common law doctrine of abandonment in the present case.

In *Macleay Estate*, the issue was whether the Defendant County had abandoned a road. This case is inapposite because the statute then in effect had no provision for vacating a road other than the one, which had been established but not opened, nor any provision for vacation in the event of nonuser.

“*Magee Heirs*, the Texas case, did not involve an express statutory provision such as ORS 368.620, but

rather an application of the common law doctrine of abandonment.”¹⁹¹

Hohnbaum v. City of Woodburn

In this case, the plaintiff executed a subdivision plat, dedicating a portion of their property to the City of Woodburn for public use as a street. The dedication was accepted by the city and the subdivision was approved. Over a year later, the plaintiff brought a suit in equity to rescind the dedication on the grounds that they never intended to dedicate the property. They said the dedication was executed to accommodate Wanner (a developer) and that Wanner orally misrepresented to them that they would not lose any property as a result of the dedication.

The trial court had denied the plaintiffs relief. The Court of Appeals affirmed that decision. It said: “The plaintiffs concede that the city had no knowledge of the alleged misrepresentation and had not engaged in any inequitable conduct.” The only cases cited by the plaintiff were cases involving *implied dedication* where the party asserting the dedication must show that the landowner engaged in conduct from which an intent to dedicate may be inferred. “At issue here is an *express dedication* in the form of an unequivocal written dedication as required for approval of subdivision plats under ORS 92.010 to 92.160,” *i.e.* a statutory dedication.

“We concur with the trial courts findings that plaintiff did not rely on the alleged misrepresentation. Plaintiffs, both college educated, consulted with their banker and read the document before executing it. The document contained a metes and bounds description of the dedicated streets, a large survey plat upon which the streets and lots are graphically illustrated, and four short paragraphs setting forth the dedication, which states:

“...‘We hereby dedicate to the public use forever the street laid out through said land as shown on the within plat.’

“We do not accept plaintiff’s contention that they did not understand the legal significance of their actions.”

Vacation Statutes

*Where a statute is capable of two constructions, one repugnant to the constitution, and the other in recognition of the private rights in property protected by the constitution, the latter must prevail, the unconstitutional construction being disregarded for want of legislative authority,*¹⁹³

A *vacation* of a public way is the formal, recognized process for alienating or abandoning the public’s right to use the land to travel from place to place. It is recognized as a process whereby the lawful owner of the fee, the *servient tenant*, regains right of exclusive possession and enjoyment of the *dominant estate*, the bed for the former public way. No other significance should be assigned the vacation process.

At this point, it is necessary to be familiar with what ORS Chapter 174 says about vacation.

ORS 174.010: “*In the construction of a statute, the office of a judge is simply to ascertain and declare what is, in terms or substance, contained therein, not to insert what has been omitted, or to omit what has been inserted; and where there are several provisions or particulars such construction is, if possible, to be adopted as will give effect to all.*”¹⁹⁴

ORS 271.080: Vacation in Incorporated Cities; Petition; Consent of Property Owners.

“(1) Whenever any person interested in any real property in an incorporated city in this state desires to vacate all or part of any street, avenue, boulevard, alley, plat, public square or other public place, such person may file a petition therefor setting forth a description of the ground proposed to be vacated, the purpose for which the ground is proposed to be used and the reason for such vacation.

“(2) There shall be appended to such petition, as a part thereof and as a basis for granting the same, *the consent of the owners of all abutting property and of not less than two-thirds in area of the real property affected thereby.* The real property affected thereby shall be deemed to be the land lying on either side of the street or portion thereof proposed to be vacated and extending laterally to the next street that serves as a parallel street, but in any case not to exceed 200 feet, and the land for a like lateral distance on either side of the street for 400 feet along its course beyond each terminus of the part proposed to be vacated. Where a street is proposed to be vacated to its termini, the land embraced in an extension of the street for a distance of 400 feet beyond each terminus shall also be counted. In the vacation of any *plat* or part thereof the consent of the owner or owners of two-thirds in area of the property embraced within such plat or part thereof proposed to be vacated shall be sufficient, *except where such area embraces street area, when, as to such street area the above requirements shall also apply.* The consent of the owners of the required amount of property shall be in writing and duly acknowledged before an officer authorized to take acknowledgments of deeds.” (Emphasis supplied.)¹⁹⁵

ORS 271.090. Filing of Petition; Notice. “The petition shall be presented to the city recorder or other recording officer of the city. If found by the recorder

to be sufficient, the recorder shall file it and inform at least one of the petitioners when the petition will come before the city governing body. *A failure to give such information shall not be in any respect a lack of jurisdiction for the governing body to proceed on the petition.*" (Emphasis supplied.)

ORS 271.100: Action by Council. "The city governing body *may deny the petition* after notice to the petitioners of such proposed action, but if there appears to be no reason why the petition should not be allowed in whole or in part, the governing body shall fix a time for a formal hearing upon the petition." (Emphasis supplied.)

ORS 271.110. Notice of Hearing. "(1) The city recorder or other recording officer of the city shall give notice of the petition and hearing by publishing a notice in the city official newspaper once each week for four consecutive weeks. If no newspaper is published in such city, written notice of the petition and hearing shall be posted in three of the most public places in the city. The notices shall describe the ground covered by the petition, give the date it was filed, the name of at least one of the petitioners and the date when the petition, and any objection or remonstrance, which may be made in writing and filed with the recording officer of the city prior to the time of the hearing, will be heard and considered.

"(2) Within five days after the first day of publication of the notice the city recording officer shall cause to be posted at or near each end of the proposed vacation a copy of the notice which shall be headed, 'Notice of Street Vacation,' 'Notice of Plat Vacation,' or 'Notice of Plat and Street Vacation,' as the case may be. The notice shall be posted in at least two conspicuous places in the proposed vacation area. The posting and first day of publication of such notice shall be not less than 28 days before the hearing.

"(3) The city recording officer shall, before publishing such notice, obtain from the petitioners a sum sufficient to cover the cost of publication, posting and other anticipated expenses. The city recording officer shall hold the sum so obtained until the actual cost has been ascertained, when the amount of the cost shall be paid into the city treasury and any surplus refunded to the depositor."

ORS 271.120. Hearing; Determination. "At the time fixed by the governing body for hearing the petition and any objections filed thereto or at any postponement or continuance of such matter, the governing body shall hear the petition and objections and shall determine whether the consent of the owners of the requisite area has been obtained, whether notice has been duly given and *whether the public interest will be prejudiced by the vacation of such plat or street or parts*

thereof. If such matters are determined in favor of the petition the governing body shall by ordinance make such determination a matter of record *and vacate such plat or street*; otherwise it shall deny the petition. The governing body may, upon hearing, grant the petition in part and deny it in part, and make such reservations, or either, as appear to be for the public interest." (Emphasis supplied.)

Note: The statutes contained here are those in effect on Sept. 20, 1985. They are quoted to make one aware of their existence and for discussion of vacation procedures. They are not intended as a substitute for the official statutes published by the Legislative Counsel Committee of the Legislative Assembly. Be aware that every statute was subject to amendment by the 1987 Legislative Assembly, and by any subsequent assembly.

ORS 271.130. Vacation on City Council's Own Motion; Appeal. "(1) The city governing body may initiate vacation proceedings authorized by ORS 271.080 and make such vacation *without a petition or consent of property owners.* Notice shall be given as provided by ORS 271.110, but such vacation shall not be made before the date set for hearing, nor if the owners of a majority of the area affected, computed on the basis provided in ORS 271.080, object in writing thereto, *nor shall any street area be vacated without the consent of the owners of the abutting property if the vacation will substantially affect the market value of such property, unless the city governing body provides for paying damages.* Provision for paying such damages may be made by a local assessment or in such other manner as the city charter may provide. (Emphasis supplied.)

"(2) Two or more streets, alleys, avenues and boulevards, or parts thereof, may be joined in one proceeding, provided they intersect or are adjacent and parallel to each other.

"(3) No ordinance for the vacation of all or part of a plat shall be passed by the governing body until the city recording officer has filed in the office of the city recording officer or indorsed on the petition for such vacation a certificate showing that all city liens and *all taxes have been paid on the lands covered by the plat or portion thereof to be vacated.* (Emphasis supplied.)

"(4) Any property owner affected by the order of vacation or the order awarding damages or benefits in such vacation proceedings may appeal to the circuit court of the county where such city is situated in the manner provided by the city charter. If the charter does not provide for such appeal, the appeal shall be taken within the time and in substantially the manner provided for taking an appeal from justice or district court in civil cases."

Principle 72

ORS 271.140: Title to Vacated lands. “The title to the street or other public area vacated shall attach to the lands bordering on such area in equal portions; except that where the area has been originally dedicated by different persons and the fee title to such area has not been otherwise disposed of, original boundary lines shall be adhered to and the street area which lies on each side of such boundary line shall attach to the abutting property on such side. If a public square is vacated the title thereto shall vest in the city.”

Comment: ORS 271.140 is codification of the common law principle found in *Neil v. Independent Realty Co.*, *supra*; *Keown v. Brandon.*, *supra*; *Stillwater v. Hamilton*, *supra*; *Frank W. Cox Real Estate Co. v. Pendleton*, *supra*; *Bowers v. Atchison T. & S. F. Ry. Co.*, *supra*; *Texas Co. v. TexarKana Mach. Shops*, *supra*; *Lynchburg v. Peters*, *supra*; *Gossotol Realty Corp. v. Gillman*, *supra*; 70 A.L.R.; 42 A.L.R.; and many other cases and authorities. It is also in harmony with principles of law found in: *Huddleston v. Eugene*, *supra*; *McQuaid v. Portland Ry. Co.*, *supra*; *City of Portland v. Whittle*, *supra*; *Portland Baseball Club v. Portland*, *supra*; *Kurtz v. Southern Pacific Company*, *supra*; *Carter v. Portland*, *supra*; *P & W. V. R. Co. v. City of Portland C. Ry. Co.*, *supra*; *Lankin v. Terwilliger*, *supra*; *Oliver v. Newberg*, *supra*; *John P.*

Sharkey Co. v. City of Portland, *supra*; *Cross v. Talbot*, *supra*; *McAdam v. Smith*, *supra*; *Fahey v. City of Bend*, *supra*; *Hurd v. Byrnes*, *supra*; and the 1975 case of *Fossi v. Myers*, *supra*. This statute recognizes the common law principle that the fee in a public way remains in the dedicator or grantor of land for public road purposes. This estate in the public road is an existing ownership of the fee, but is subject to the easement in the public.¹⁹⁶ In other words, *the title in the street or other vacated way or public area is not a consequence of ORS 271.140; the statute is a consequence of the established estates recognized by the courts and the legislature.*

ORS 271.150: Vacation Records to be filed: Costs. “A certified copy of the ordinance vacating any street or plat area and any map, plat or other record in regard thereto which may be required or provided for by law, shall be filed for record with the county clerk. The petitioner for such vacation shall bear the recording cost and the cost of preparing and filing the certified copy of the ordinance and map.

“A certified copy of any such ordinance shall be filed with the county assessor and county surveyor.” (Emphasis supplied.)

ORS 271.160. Vacations for Purposes of Rededication. “No street shall be vacated upon the petition of any person¹⁹⁷ when it is proposed to replat or rededicate all or part of any street in lieu of the original unless such

petition is accompanied by a plat showing the proposed manner of replatting or rededicating.¹⁹⁸ If the proposed manner of replatting or rededicating or any modification thereof which may subsequently be made meets with the approval of the city governing body, it shall require a suitable guarantee to be given for the carrying out of such replatting or rededication or make any vacation conditional or to take effect only upon the consummation of such replatting or rededication.”

ORS 271.180. Vacations in Municipalities Included in Port Districts; Petition; Power of Common Council; Vacating Street along a Railroad Easement. “To the end that adequate facilities for terminal trackage, structures and the instrumentality’s of commerce and transportation may be provided in cities and towns located within or forming a part of any port district organized as a municipal corporation in this state, the governing bodies of such cities and towns, upon the petition of any such port, or corporation empowered to own or operate a railroad, steamship or other transportation terminal, or railroad company entering or operating within such city or town, or owner of property abutting such terminal, may:

“(1) Authorize any port commission, dock commission, common carrier, railroad company or terminal company to occupy, by any structure, trackage or machinery facilitating or necessary to travel, transportation or distribution, any street or public property, or parts thereof, within such city or town, upon such reasonable terms and conditions as the city or town may impose.¹⁹⁹

“(2) Vacate the whole or any part of any street, alley, common or public place, with such restrictions and upon such conditions as the city governing body may deem reasonable and for the public good.

“(3) If any railroad company owns or has an exclusive easement upon a definite strip within or along any public street, alley, common or public place, and if the city governing body determines such action to be the advantage of the public, vacate the street area between the strip so occupied by the railroad company and one property line opposite thereto, condition that the railroad company dedicates for street purposes such portion of such exclusive strip occupied by it as the city governing body may determine upon, and moves its tracks and facilities therefrom onto the street area so vacated (remainder in Principle 73).

Principle 73

(ORS 271.180(3) continued). “The right and title of the railroad company in the vacated area shall be of the same character as previously owned by it in the exclusive strip which it is required by the city governing body to surrender and dedicate to street purposes.”

ORS 271.190. Consent of Owners of Adjoining Property; Other Required Approval. “No vacation of all or part of a street, alley, common or public place shall take place under ORS 271.180 unless the consent of the persons owning the property immediately adjoining that part of the street or alley to be vacated is obtained thereto in writing and filed with the auditor or clerk of the city or town. *No vacation shall be made of any street, alley, public place or part thereof, if within 5,000 feet of the harbor or pierhead line of the port, unless the port commission, or other bodies having jurisdiction over docks and wharves approves the proposed vacation in writing.*”

ORS 271.200. Petition; Notice. “(1) Before any street, alley, common or public place or any part thereof is vacated, or other right granted by any city governing body under ORS 271.180 to 271.210 the applicant must petition the governing body of the city or town involved, setting forth the particular circumstances of the case, giving a definite description of the property sought to be vacated, or of the right, use or occupancy sought to be obtained, and the names of the persons to be particularly affected thereby. The petition shall be filed with the auditor or clerk of the city or town involved 30 days previous to the taking of any action thereon by the city governing body.

“(2) Notice of the pendency of the petition, containing a description of the area sought to be vacated or right, use or occupancy sought to be obtained, shall be published at least once each week for three successive weeks prior to expiration of such 30-day period in a newspaper of general circulation in the county wherein the city or town is located.”

ORS 271.210. Hearing; Grant of Petition. “Hearing upon the petition shall be had by the city governing body at its next regular meeting following the expiration of 30 days from the filing of the petition. At that time, objections to the granting of the whole or any part of the petition shall be duly heard and considered by the governing body, which shall thereupon, or at any later time to which the hearing is postponed or adjourned, pass by a majority vote an ordinance setting forth the property to be vacated, or other rights, occupancy or use to be thereby granted. Upon the expiration of 30 days from the passage of the ordinance and the approval thereof by the mayor of the city or town, the ordinance shall be in full force and effect.”

ORS 271.220. Filing of Objections; Waiver. “All objections to the petition shall be filed with the clerk or auditor of the city or town within 30 day from the filing of the petition, and if not so filed shall be conclusively presumed to have been waived. The regularity, validity and correctness of the proceedings of the city governing body pursuant to ORS 271.180 to 271.210, shall be conclusive in all things on all parties, and cannot in any manner be contested in any proceeding

whatsoever by any person not filing written objections within the time provided in this section.”

ORS 271.230. Records of Vacations; Fees. “(1) If any town or plat of any city or town is vacated by a county court or municipal authority of any city or town, the vacation order or ordinance shall be recorded in the deed records of the county and shall be indexed under the letter ‘V’, title ‘Vacations.’ Whenever a vacation order or ordinance is so recorded, *the county surveyor of such county shall, upon the original plat and any copy thereof certified by the county clerk, trace or shade with permanent ink in such manner as to denote that portion so vacated, and shall make the notation ‘Vacated’ upon such original plat or copy thereof, giving the book and page of the deed record in which the order or ordinance is recorded.*” (Emphasis supplied.)

Subsection (2) provides for the collection of recording fees and fee for surveyor services provided for in subsection (1) (see published statutes).

Vacation of County Property

ORS 368.326. Purpose of Vacation Proceedings; Limitation. “ORS 368.326 to 368.366 establish vacation procedures by which a county governing body may vacate a subdivision, part of a subdivision, a public road, a trail, a public easement, public square or any other public property or public interest in property under the jurisdiction of the county governing body. The vacation procedures under ORS 368.326 to 368.366:

“(1) *Shall not be used by the county governing body to vacate property or an interest in property that is within a city.*

“(2) *Are an alternate method to the method established under ORS chapter 92 for the vacation of a subdivision.*”²⁰⁰

Principle 74

ORS 368.331: Limitation on Use of Vacation Proceedings to Eliminate Access. “A county governing body shall not vacate public lands under ORS 368.326 to 368.366 if the vacation would deprive an owner of a recorded property right of access necessary for the exercise of that property right unless the county governing body has the consent of the owner.”²⁰¹

ORS 368.336. Abutting Owners in Vacation Proceedings. “*Where the property proposed to be vacated under ORS 368.326 to 368.366 is a public road, a person owning property that abuts either side of the road is an abutting property owner for purposes of ORS 368.326 to 368.366 even when the county governing body proposes to vacate less than the full width of the road.*”²⁰²

ORS 368.341. Initiation of Vacation Proceedings; Requirements for Resolution or Petition.

“(1) A county governing body may initiate proceedings to vacate property under ORS 368.326 to 368.366 if:

“(a) The county governing body adopts a resolution meeting the requirements of this section;

“(b) *The person who holds title to property files with the county governing body a petition meeting the requirements of this section and requesting that the property be vacated; or*

“(c) *The owner of property abutting public property files with the county governing body a petition meeting the requirements of this section and requesting vacation of the public property that abuts the property owned by the person.*

“(2) A county governing body adopting a resolution under this section shall include the following in the resolution:

“(a) A declaration of intent to vacate property;

“(b) A description of the property proposed to be vacated; and

“(c) A statement of the reasons for the proposed vacation.

“(3) Any person filing a petition under this section shall include the following in the petition:

“(a) A description of the property proposed to be vacated;

“(b) A statement of the reasons for requesting the vacation;

“(c) The names and addresses of all persons holding any recorded interest in the property proposed to be vacated;

“(d) The names and addresses of all persons owning any improvements constructed on public property proposed to be vacated;

“(e) The names and addresses of all persons owning any real property abutting public property proposed to be vacated;

“(f) Signatures, acknowledged by a person authorized to take acknowledgments of deeds, of either owners of 60 percent of the land abutting the property proposed to be vacated or 60 percent of the owners of land abutting the property proposed to be vacated; and

“(g) If the petition is for vacation of property that will be redivided in any manner, a subdivision plan or partitioning plan showing the proposed redivision.

“(4) The county governing body may require a fee for the filing of a petition under this section.”²⁰³

ORS 368.346. Report, Notice and Hearing for Vacation Proceedings. “Except as provided in ORS 368.351:

“(1) When a vacation proceeding has been initiated under ORS 368.341, the county governing body shall direct the county road official to prepare and file with the county governing body a written report containing the following:

“(a) A description of the ownership and uses of the property proposed to be vacated;

“(b) An assessment by the county road official of whether the vacation would be in the public interest; and

“(c) Any other information required by the county governing body

“(2) Upon receipt of the report under subsection (1) of this section, a county governing body shall establish a time and place for a hearing to consider whether the proposed vacation is in the public interest.

“(3) Notice of the hearing under this section shall be provided under ORS 368.401 to 368.426 by posting and publication and by service on each person with a recorded interest in any of the following.

“(a) The property proposed to be vacated;

“(b) An improvement constructed on public property proposed to be vacated; or

“(c) Real property abutting public property proposed to be vacated.

“(4) During or before a hearing under this section, any person may file information with the county governing body that controverts any matter presented to the county governing body in the proceeding or that alleges any new matter relevant to the proceeding.”²⁰⁴

ORS 368.351. Vacation Without Hearing. “A county governing body may make a determination about a vacation of property under ORS 368.326 to 366.366 without complying with ORS 368.426 if:

“(1) The county road official files with the county governing body a written report that contains the county road official’s assessment that any vacation of public property is in the public interest; and

“(2) The proceedings for vacation under ORS 368.326 to 368.366 were initiated by a petition under ORS 366.341 that contains the acknowledged signatures of owners of 100 percent of any private property proposed to be vacated and acknowledged signatures of owners of 100 percent of property abutting any public property proposed to be vacated. The petition

must indicate the owners' approval of the proposed vacation."²⁰⁵

ORS 368.356. Order, Damages and Costs in Vacation Proceedings. "(1) After considering matters presented under ORS 368.346 or 368.351, a county governing body shall determine whether vacation of the property is in the public interest and shall enter an order or resolution granting or denying the vacation of the property under ORS 368.326 to 368.366.

"(2) An order or resolution entered under this section shall:

"(a) State whether the property is vacated;

"(b) Describe the exact location of any property vacated;

"(c) Establish the amounts of any costs resulting from an approved vacation and determine persons liable for payment of the costs;

"(d) Direct any persons liable for payment of costs to pay the amounts of costs established; and

"(e) If a plat is vacated, direct the county surveyor to mark the plat as provided under ORS 271.230.

"(3) When an order or resolution under this section becomes final, the county governing body shall cause the order to be recorded with the county clerk and cause copies of the order to be filed with the county surveyor and the *county assessor*. The order or resolution is effective when the order or resolution is filed under this subsection.

"(4) Any person who does not pay costs as directed by an order under this section is liable for those costs."²⁰⁶

ORS 368.361. Intergovernmental Vacation Proceedings. "(1) Notwithstanding ORS 368.326, a county governing body may vacate property that is under multiple public jurisdiction or that crosses and recrosses from public jurisdiction to public jurisdiction if:

"(a) Vacation proceedings are initiated by each public body with jurisdiction;

"(b) The public bodies proceed separately with vacation proceedings or conduct a joint proceeding; and

"(c) Each public body reaches a separate decision about the proposed vacation.

"(2) Each public body must reach a separate decision to vacate property under this section before the vacation may be completed. If each public body has determined that the property should be vacated, each public body shall issue a separate order or resolution vacating those portions of the property under their respective jurisdictions.

"(3) Public bodies vacating property under this section shall each use procedures for vacation that each uses for other vacation proceedings."²⁰⁷

Principle 75

ORS 366.366: Ownership of Vacated Property. "(1) When a county governing body vacates public property under ORS 368.326 to 368.366, the vacated property shall vest as follows:

"(a) If the county holds title to the property in fee, the property shall vest in the county.

"(b) If the property vacated is a public square the property shall vest in the county."²⁰⁸

"(c) Unless otherwise described in paragraph (a) or (b) of this subsection the vacated property shall vest in the rightful owner holding title according to law.

"(d) Except as otherwise provided in this subsection, the vacated property shall vest in the owner of the land abutting the vacated property by extension of the persons abutting property boundaries to the center of the vacated property.

"(2) Notwithstanding subsection (1) of this section, a county may determine the vesting of property vacated under ORS 368.326 to 368.366 in the order of resolution that vacates the property."²⁰⁹

Subsection (2) warrants the strictest legal interpretation because it has often been misinterpreted to mean: "The counties are authorized to disregard subsection (1) when determining the vesting of property vacated under ORS 368.326 to 368.366." But if this were true, the subsection would also mean that the legislature was authorizing counties to disregard the estate of the rightful owner holding title according to the law (recognized in Subsection 1c). And where the "rightful owner" is identified by application of the common law, and the ownership is a consequence of the common law, the courts say that any statute that alters the common law is subject to the strictest legal interpretation. That is because "where a common law exists, it very likely has the consequence of a property right protected by the constitution."

A strict legal interpretation is: *The vesting of property made in accordance with ORS 368.366(2) must be determined in recognition of the existing right, title and interest in the real property of any person, persons, corporation or body politic.* The legislature knows that any law repugnant to the constitution is void for want of jurisdiction. When it makes a law, it expects that law to be interpreted in recognition of the constitution and the

common law (because, as already emphasized in this publication, Oregon is a common law state).

*"Where the owner of land lays out and establishes a town and makes and exhibits a map or plan thereof, and sells and conveys lots by reference to such plan or map, the streets and public places designated on that documents are irrevocably dedicated to the public."*²¹⁰

*"The sale and conveyance of lots and blocks according to such plan or map implies a covenant that the streets and other places designated on the plan or map shall never be appropriated by the owner to a use inconsistent with that represented by the map."*²¹¹

*"To reclaim the land would be in violation of good faith to the public and grantees who purchased the lots with the expectation of using the streets and enjoying the public parks, squares and commons. In the case of the sale of a lot with reference to a plat there is the added feature that an easement indicated by the plat constitutes a part of the consideration passing to the purchaser."*²¹²

*"Ordinarily the sale of a single lot completes the dedication and more especially does the sale of a single lot effect a dedication of a street upon which the lot abuts."*²¹³

Undeveloped Subdivision

ORS 92.205. Policy. "(1) The Legislative Assembly finds that many subdivisions for which plats have been approved and recorded have not been developed and that many such subdivisions were approved prior to the adoption of a comprehensive plan, zoning regulations and ordinances and modern subdivision control standards by the jurisdiction within which the lands described in the subdivision plats are situated.

"(2) The Legislative Assembly finds, therefore, that it is necessary for the protection of the public health, safety and welfare to provide for the review of undeveloped subdivisions for the purpose of modifying such subdivisions, if necessary, to comply with the current comprehensive plan, zoning ordinances and regulations and modern subdivision control standards, or, if such modification is not feasible, of vacating the nonconforming, undeveloped subdivisions and to vacate any lands dedicated for public use that are described in the plat of each such vacated subdivision."²¹⁴

ORS 92.215. Review Authorized; Manner. "(1) Each agency or body authorized to approve subdivision under ORS 92.040 may:

"(a) Review each subdivision approved on or after October 5, 1973, after the expiration of 10 years after the date of such approval.

"(b) Review each subdivision plat approved more than 10 years prior to October 5, 1973.

"(2) Each review conducted pursuant to subsection (1) of this section shall be conducted in the manner and subject to the conditions prescribed in ORS 92.225."²¹⁵

ORS 92.225. Determining Whether Subdivision Subject to Review and Need for Revision or Vacation; Determining Need for Revision or Vacation of Undeveloped Subdivision; Hearings; Notice to Landowners.

"(1) The agency or body required to conduct the review under ORS 92.215 shall investigate the status of the lands included within a subdivision to determine whether the subdivision is undeveloped.

"(2) For the purpose of this section, the lands described in the plat of any subdivision under review shall be considered to be developed if any of the following conditions are found by the agency or body conducting the review to exist on such lands:

"(a) Roadways providing access into and travel within the subdivision have been or are being constructed to meet the specifications prescribed therefor by the agency or body that approved the plat of the subdivision;

"(b) Facilities for the supply of domestic or industrial water to lots created by the subdivision have been or are being constructed;

"(c) Sanitary sewerage disposal facilities have been or are being constructed for lots created by the subdivision, or septic tanks have been or are being installed on the land or permits have been issued for their installation on the land;

"(d) Buildings have been or are being constructed upon the land or permits have been issued for the construction of buildings upon the land; and

"(e) One or more lots described in the plat of the subdivision have been sold or otherwise transferred prior to the date of the initiation of such review." (See comments that follows the quotation of ORS 92.245.)

"(3) If the agency or body determines that a subdivision is undeveloped after its investigation of the subdivision under subsection (1) of this section, it shall also determine:

"(a) If the undeveloped subdivision complies with the comprehensive plan, zoning regulations and ordinances and regulations then in effect with respect to lands in the subdivision; and

"(b) If the subdivision does not comply with such plan and ordinances and regulations whether the subdivision may be revised to comply with such plan and ordinances and regulations.

"(4) If the agency or body determines that a subdivision is undeveloped after its investigation of the subdivision under subsection (1) of this section, it

shall hold a hearing to determine whether the undeveloped subdivision should be revised and the subdivision re-platted or vacated and all lands within the subdivision that have been dedicated to public use vacated. Not later than 30 days before the date of a hearing held by an agency or body under this section, the agency or body shall notify, in writing, each owner of record of land described in the plat of the subdivision under review of the date, place, time and purpose of such hearing.”²¹⁶

ORS 92.234. Revision, Vacation of Undeveloped Subdivisions; Vacating Proceedings; Effect of Initiation by Affected Landowner. “(1) Following a hearing conducted as required under ORS 92.225 (4), the agency or body conducting the hearing may:

“(a) Require the revision of a subdivision and a re-plat of the subdivision as it considers necessary, if it finds that the subdivision may be revised to comply with the comprehensive plan, zoning ordinances and regulations and other modern subdivision control standards not in existence when the subdivision was initially approved; or

“(b) *Initiate proceedings, as provided in subsection (3) of this section, for vacation of the subdivision, if it finds that the subdivision cannot be revised in accordance with the comprehensive plan, zoning ordinances and regulations and other modern subdivision control standards not in existence when the subdivision was initially approved.*

“(2) If an agency or body requires the revision and re-plat of a subdivision under paragraph (a) of subsection (1) of this section, it shall approve the subdivision only upon the completion of the revisions as required by it and the re-plat of the subdivision as provided in ORS 92.180 to 92.190.

“(3) *If the agency or body determines that it is necessary to vacate a subdivision, the agency or body shall adopt an ordinance vacating the subdivision and providing for the vacation of lands within the subdivision that have been dedicated for public use. Title to lands within a vacated subdivision shall vest as provided in ORS 271.140 and 368.366. Any owner of lands described in the plat of the vacated subdivision who is aggrieved by the action of the agency or body in vacating the subdivision may appeal such action in the manner provided in ORS 34.010 to 34.100.*²¹⁷ *The ordinance adopted by the agency or body for the vacation of the subdivision and the lands therein dedicated to public use shall be filed with the county recording officer as provided in ORS 271.150.*

“(4) Nothing in ORS 92.205 to 92.245 shall prevent the owner of any lands within an undeveloped subdivision from seeking vacation of such subdivision under city or county vacation procedures and, if such vacation proceedings are commenced after the date of the notice of review of the subdivision by the agency or body, the review proceed-

ing shall be suspended during such vacation proceedings. If the subdivision is vacated at the initiation of an owner, the review proceedings under ORS 92.205 to 92.245 shall be discontinued; but, if the subdivision is not vacated at the request of an owner, the review proceedings under ORS 92.205 to 92.245 shall be resumed at the termination of the proceedings brought by an owner of lands in the subdivision.”²¹⁸

ORS 92.245. Fees for Review Proceedings Resulting in Modification or Vacation. “The governing body of a city or county may, by ordinance or regulation adopted in accordance with ORS 92.048, prescribe fees sufficient to defray the costs incurred in the review and investigation of, and action upon undeveloped subdivisions for which the plat is modified or vacated under ORS 92.205 to 92.245.”²¹⁹

Comment. The legislature has taken great care to insure that the review and actions provided in ORS 92.205 to 92.245 do not infringe on the rights of the owners of a subdivision, developers of land in a subdivision, and especially the grantee of any lot of a subdivision. ORS 92.225(2)e was enacted in recognition of the principles of law announced by the Oregon Supreme Court. It is cited in this chapter as the introduction to the statutes governing the review of undeveloped subdivisions. Those same principles of law must be considered when approving *re-platting* as provided by the following statutes (ORS 92.180 to 92.190).

Re-platting

ORS 92.180. Authority to Review Re-plats. “(1) Each agency or body authorized to approve subdivision plats under ORS 92.040 shall have the same review and approval authority over any proposed re-plat of a recorded plat.

“(2) Nothing in this section regarding re-platting shall be construed to allow subdividing of land without complying with all the applicable provisions of this chapter.”²²⁰

ORS 92.185. Reconfiguration of Lots and Public Easements; Vacation; Notice; Utility Easement. “The act of re-platting shall allow the reconfiguration of lots and *public easements* within a recorded plat. Upon approval by the reviewing agency or body as defined in ORS 92.180, *re-plats will act to vacate the platted lots and easements within the re-plat area with the following conditions.*”

“(1) A re-plat, as defined in ORS 92.010 (10) shall apply only to a recorded plat.

“(2) Notice shall be provided as described in ORS 92.225(4) when the re-plat is re-platting all of an undeveloped subdivision.

“(3) Notice, consistent with the governing body of a city or county approval of a tentative plan of a subdivision plat, shall be provided by the governing body to the owners of property adjacent to the exterior boundaries of the tentative subdivision re-plat.

“(4) When a utility easement is proposed to be realigned, reduced in width or omitted by a tentative re-plat approval, all affected utility companies of public agencies shall be notified, consistent with a governing body’s notice to owners of property contiguous to the tentative plat.

“(5) A re-plat shall comply with all subdivision provisions of this chapter and all applicable ordinances and regulations adopted under this chapter.”²²¹

ORS 92.190. Effect of Re-plat; Operation of Other Statutes; Use of Alternate Procedures.

“(1) The re-plat of a portion of a recorded plat shall **not** act to vacate any recorded covenants or restrictions.

“(2) Nothing in ORS 92.180 to 92.190 is intended to prevent the operation of vacation actions by statutes in ORS chapter 271 and 368.

“(3) The governing body of a city or county may use procedures other than re-platting procedures in ORS 92.010 (8), as long as those procedures include the recording or other central filing of the final lot line adjustment.”²²²

Vacation Problems

“While a highway exists there is nothing more than a mere suspension of the abutter’s right.”

Elliott, *Roads and Streets*

This discussion will focus on the typical mapping and assessment problems effected by the vacation of public ways. The crux of most of the problems is the ownership of the bed of the public way. Consequently, the problems are not a *result* of a vacation, but only brought to the attention of the cartographer by the act of vacating a public way. If there is a problem of ownership of vacated land, the problem existed long before the vacation of the land. By keeping that point in mind, most vacation problems will be easier to resolve.

Be aware that principles of law that seem absolute in one problem will be less absolute in similar problems with slightly different fact or circumstances. So where you are relying on the solution provided here to solve a problem similar to that defined here, it is important to analyze the *differences* between the problems to determine if those differences will allow the application of the same principle of law. In every case, *pay attention to detail*.

Problem 1: Siegenthaler v. N. Tillamook San.²²³

Note: This case was before the Oregon Court of Appeals. In such cases, the court is reviewing the action of an inferior court to determine if the decision of that court was made in accordance with well-recognized principles of judicial procedure. In such cases, the only facts, evidence, testimony, etc. that can be considered are those introduced in the records of the trial court. Although other problems, solutions and considerations can be identified in such cases, the court can only consider the charges, claims and complaints made in the lower court.

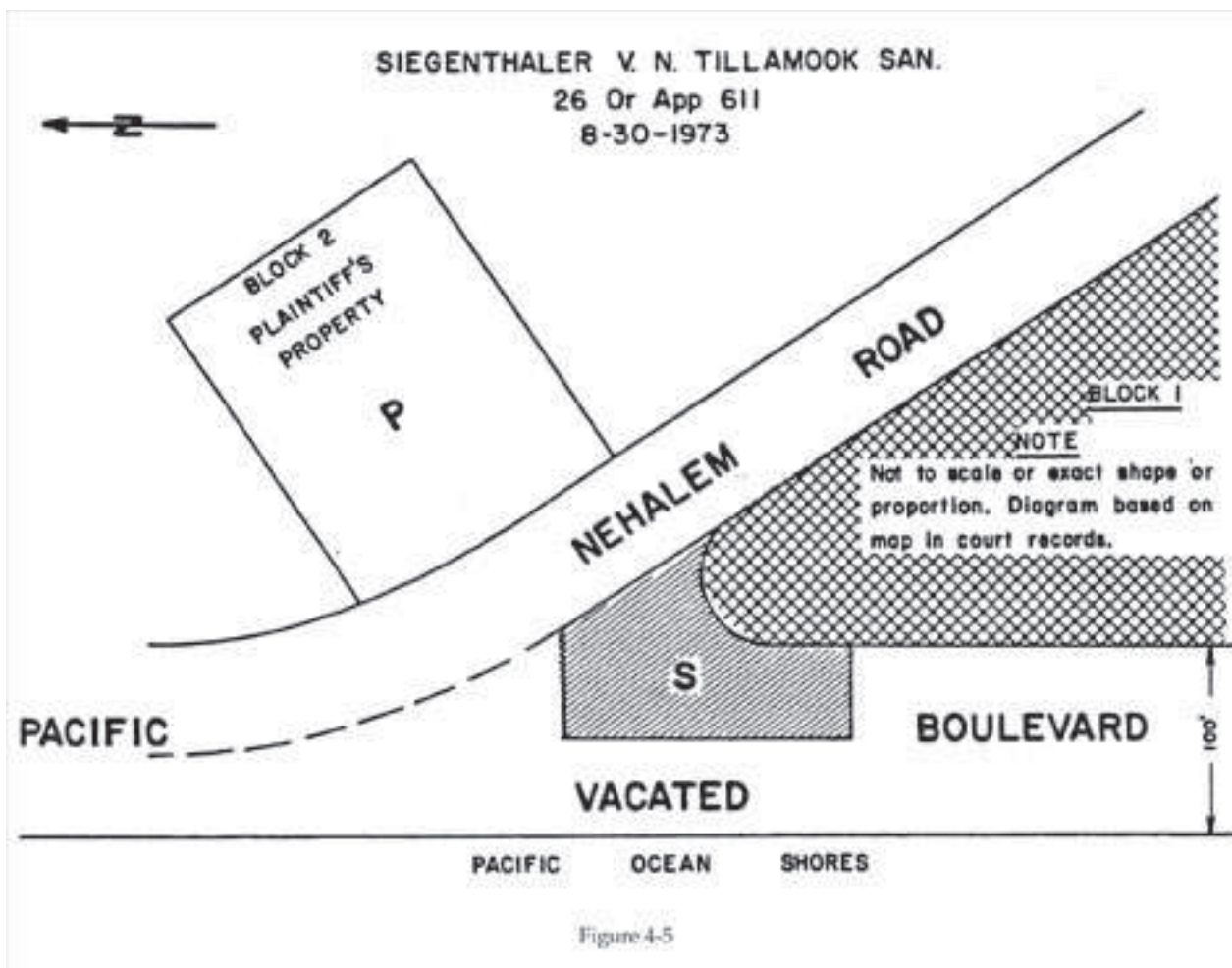
In 1910, S.G. Reed and Beulah K. Reed filed a plat with Tillamook County covering this area (see figure 4-5). Included in the plat was a dedication to the county, for road purposes, of a 100-foot-wide strip of land, running roughly parallel to the ocean beach. The strip was designated “Pacific Boulevard.” By the dedication, the county received an easement for the stated purpose. In this case, it was undisputed that the parcel of land at issue (“S” as shown and hatched in figure 4-5), the land on which the defendant sanitary authority was building a pumping station, was part of the 100-foot strip dedicated to the county by the Reeds in 1910.

Sometime before 1950, the plaintiff and his late wife acquired several lots in this area (labelled “P” on the map in figure 4-5).

In September 1950, the plaintiff, along with several other landowners in the area, executed quitclaim deeds to the county for the disputed parcel, limiting its use to park purposes.

In December 1950, the county vacated Pacific Boulevard. The vacated land, including the disputed parcel, remained unoccupied until 1972 when the defendant expressed an interest in it as a possible site for a pumping station. The county then leased the disputed parcel to the defendant. When the defendant sought the conditional use permit, necessary for it to build the pumping station on this parcel, several landowners expressed disapproval, but the permit was granted. Then, for reasons not disclosed in the record, the sanitary authority brought a condemnation proceeding against the county to obtain the parcel outright. The plaintiff sought to intervene, but the request was refused. The county allowed a default judgment to be entered, and the defendant obtained the parcel for \$100. The plaintiff then brought this suit to enjoin construction of the pumping station.

The plaintiff’s suit was based on the theory that his quitclaim deed of 1950 gave the disputed parcel to the county and limited its use to park purposes. He contended that when the county vacated Pacific Boulevard, the disputed parcel, being a part of Pacific Boulevard, passed to him as the successor to the original dedication of the boulevard, *i.e.* the Reeds. He claimed that the quitclaim deed was effective to pass the disputed parcel to the county for park purposes, even though



it was prior to the vacation, because he owned the underlying fee in Pacific Boulevard.²²⁴

The court held that the plaintiff's contention that "the road reverts to the successors of the original owners upon vacation" cannot be sustained. *Under such circumstances, title passes to the then abutting property owners.*²²⁵

A clarification is necessary because that statement appears contradictory. The court is pointing to the error in the plaintiff's claim. The rule is not that the road reverts to the successors *only*; it reverts to the successors or grantees of *property abutting the dedicated way*. In this case, the plaintiff is not technically the abutter to the vacated land in question. The true abutter would be the owner of abutting land in block 1.

The court further explains:

"While in most cases the successor to the original dedication will also be the abutting property owner, this is not always the case. Here, another public street, namely Nehalem Road, lies between the plaintiffs property and the disputed parcel. While it is possible that by virtue of the 1910 dedication the

plaintiffs predecessor retained some interest the fee underlying Nehalem Road (**Note:** this is very likely), and it is even possible they retained some interest in a part of that road abutting the vacated property (**Note:** and this is also very likely), the plaintiff has not attempted to prove this. Moreover, this court would not be able to make such a determination from the record before us in any event. Therefore, since the plaintiff has not shown that any of his property abutted the vacated property at the time of the 1950 vacation, he has established no interest in the disputed parcel. The plaintiffs 1950 quitclaim deed was then ineffective to pass any interest in the disputed parcel to the county; and was likewise ineffective in restricting the county use of that parcel. Accordingly, the court below (the trial court) properly denied plaintiff requested injunctive relief."²²⁶

Problem 2: Does the Deed Convey the Fee? Or Merely an Easement?

A county is about to vacate a part of a county road. The county board of commissioners has requested the cartographer to determine the fee title owner of

the land to be vacated. The determination is to allow the inclusion of the vesting of the fee (*i.e. the reversionary rights to the land*) in the order of resolution vacating the land (as provided in subsection 2 of ORS 368.366).²²⁷

The only evidence before the cartographer is a warranty deed for the 60-foot strip of land described in two parts: "Parcel 1" and "Parcel 2." The county legal counsel has informally suggested the deed operated to convey the fee because: "(1) Warranty deeds are not used to convey easements," relying on ORS 93.850(2) that provides that a warranty deed in the form prescribed by statute has the effect of conveying "the entire interest in the described property..." (2) ORS 93.120 operates to pass all the estate of the grantor, and (3) The right of way was not described as "running over and across lands of the grantors."

In addition to the informal advice of legal counsel, the cartographer relies on rules of construction handed down by former cartographers (some rules having their roots in Department of Revenue advice) to determine the intent of the deed. One of the rules is the "warranty deed" rule suggested by legal counsel. The rules, and the analysis of each rule, are as follows:

1. Warranty deeds are not used to convey easements. False.

In *Cappelli v. Justice*²²⁸ the Oregon Supreme Court did not consider that rule as valid, stating. "... We are sure that many deeds denominated 'warranty deed' contain grants of easements described as rights-of-way."

And indeed they do. Anyone involved in making or maintaining cadastral maps has encountered warranty deeds that not only convey the fee to a tract of land, but convey the right of ingress and egress across the land of another to the tract conveyed in fee, *i.e. an easement appurtenant*. If a warranty deed can operate to convey both levels of estate at once, then it stands to reason that such a deed is capable of conveying either level of estate without conveying the other. A warranty deed is used to designate the quality of the conveyance, not the level of estate being conveyed. The entire language of the deed is used to show the level of estate conveyed. The warranty deed is a covenant by the grantor of lands to warrant and defend the title and possession of the estate granted to the grantee; that is, a deed that contains a covenant of warranty.

It is true that Oregon law provides that a statutory warranty deed (*in the form of Subsection 1 of ORS 93.850*): "... shall convey the entire interest in the described property at the date of the deed *which the deed purports to convey*." But such statements regarding modern warranty deeds are to emphasize that the words "and heirs" are no longer necessary to create

a fee simple estate. The statutory deed form was provided to show the minimum wording necessary to pass the maximum estate. It was not provided to prohibit the use of a warranty deed to convey an estate less than fee simple absolute. *The deed will convey whatever interest the "deed purports to convey."*²²⁹

The claim that ORS 93.120 acts to pass all the estate of the grantor was refuted by the Court in *Cappelli*, *i.e.* that ORS 93.120 (like ORS 93.850) was:

"... enacted principally to abolish the ancient rule that the words 'and heirs' were necessary to create a fee simple estate. The statute was not designed to inhibit inquiry into the grantor's intent where he has used ambiguous language in his deed."

2. The use of the word "parcel," as in "Parcel 1," "Parcel 2," "Parcel 3," etc., as a heading for separate descriptions in a deed denotes an intent to convey the land rather than a right to use the land. False.

The Oregon Supreme Court has held that such words only serve as "... a heading for a description, whether the grantor intended to describe an easement or a fee."²³⁰

3. Wording such as "for public road," "for county road," "for highway purposes," "for use as a public highway," etc., always constitute words of limitation. And when such language is used in a deed for a public way, it always limits the estate to an easement. False.

This is a convenient but erroneous rule that cartographers have relied on in the past. When such language operates as words of limitation, it will limit the estate to an easement. But it has been held that such language *is not always words of limitation*. When stated a certain way, or provided outside of the granting clause, it has been held to merely define the *contemplated use of the land*. In such cases the courts have followed the rule codified here as Principle 76.

Principle 76

Whether the provisions of a deed operate to convey fee simple absolute title, or merely to create an easement, must be determined from the language of the entire instruments; giving effect to all recitals if possible.²³¹

*"The presumption is that the intention of the parties is expressed by the language of the deed itself."*²³² This, of course, means the language of the entire deed. Thus it is essential to follow the cardinal rule that the construction of a deed be made on the entire deed, and not merely upon a particular part. Having thus taken the instrument by the four comers, you can endeavor to ascertain its true *intent* (*which is the essence of every agreement*).²³³

Consequently, true words of limitation that limit or restrict the use of the land to that of public travel will reduce the level of estate, conveyed by a deed, to an easement. However, the words that make up words of limitation do not themselves constitute words of limitation unless the language of the entire deed, the situation of the property, and the circumstances indicating the purpose for which the land is conveyed allow such an interpretation.²³⁴

4. The use of the words “grant and convey” are words that always denote an intent to convey fee simple absolute. False.

The courts have explained that this rule seeks to give maximum effect to the words “grant and convey,” yet completely ignore other terminology of an instrument. One court commented: “The words grant and convey are not incompatible with the conveyance of a lesser interest than the fee, and where it appears from the other language of an instrument that something other than a conveyance in fee was contemplated, effect must be given to such other language.”²³⁵

5. It is the intent of the grantor, not the grantee, that shows the intent of a conveyance. False.

*The courts are unanimous in their support of this rule: It is the joint intent of the grantor and the grantee that governs in such cases. The court’s duty is to assume the position of the parties and to consider the circumstances of the execution of the conveyance, and therefrom, if possible, gain the intent of the parties to a conveyance.*²³⁶ *The conveyance in its entirety and each part thereof is to be considered to give effect to the true intent of the grantor and grantee.*²³⁷

A clarification must be made here. Analysis of legal counsel’s viewpoint of example Problem 2 (i.e. that warranty deeds cannot be used to convey easements) will appear as a contradiction of the recommendation, elsewhere in this publication, to refer such problems to legal counsel. But this is not the case; the recommendation stands as before. The objective here was to set the scenario of Problem 2 to reflect the usual sequence of activities that take place before legal counsel formally reviews a problem. “Off-the-cuff” viewpoints are seldom as reliable as formal opinions or official “informal opinions.” The reasons are many, but it is reasonable to conclude that had legal counsel been certain of the validity of its viewpoint, the problem would have never reached the cartographer.

Fallacious rules, such as those just analyzed, is a result of our need for simple answers to complex problems. But the problems, such as construing deeds to determine the intent of parties, are complex because they have no simple solutions. But there are rules of construction that will assist in (not simplify) the determination of the intent of the parties to a conveyance. Those rules, as well as some principles of law

applicable to transactions for acquiring rights of way for public highways, will now be discussed.

There is a presumption of common law in this state that has been recognized in the courts and supported in the Oregon Revised Statutes:

*A deed purporting to convey land intended for a public highway will, in absence of some indicia of a contrary intention of the parties, be construed as passing an easement only, and not fee simple absolute title. The exception is when the right of way is for a non-access thoroughway, or in the case of land acquired by condemnation.*²³⁸

The root of that presumption is in the rebuttable presumption in *Portland Baseball Club v. Portland*, supra:

In this state, the rule is that where land has been dedicated or appropriated for a public way, the fee in the way remains in the original owner (and subsequent purchasers) subject only to the public easement,²³⁹ or, as stated in *Lankin v. Terwilliger*, supra:

“By the location of a county road, the public only acquires an easement in the land while the fee remains in the owner, subject to the charge in the public; and when the road is vacated by public authority, the land covered by it immediately reverts in the owner, freed from the easement.”

Similar wording was used in *Huddleston v. Eugene*, supra.

The weight of reason is for the fee remaining with the abutting land, i.e.:

1. The ownership of the soil over which a public way is located is not essential to the free, open and unobstructed use, by the public, of the right of passage over it.
2. The ownership of the soil over which a public way is located is not necessary to the governmental bodies responsible for the public highways, streets, alleys, roads, etc. *The statutes provide all the necessary power and authority for the state, cities and counties to construct, maintain, regulate and administer the public easements.*
3. As has been held in many jurisdictions: “It is against public policy to allow hostile owners to own small strips of land that are (physically) created upon the abandonment of a highway.”²⁴⁰
4. The prevention of disputes regarding precise boundaries,²⁴¹ and the embarrassment and confusion which would prevail if a different rule existed.²⁴²
5. The concern of the state, cities and counties about who shall determine and pay for improvements.²⁴³
6. The presumption of common law that the fee in non-dedicated public ways remains in the grant-

or and subsequent purchasers of abutting lands is consistent with the principle of law that the fee in dedicated public ways remains in the dedicator and subsequent purchasers of land abutting the dedicated ways.

7. The owners of land *abutting a public way that owns the underlying fee in that way has more rights to the unused part of the right of way than the general public. Consequently, in certain circumstances that owner can be held liable for injuries or damages occurring on the unused part of the right of way. But the owner of land abutting a public highway that is owned in fee by a political subdivision is not responsible for maintaining any of the right of way in good repair. That includes the part used for public travel and the unused land.*

Regardless of the seven reasons for the fee remaining with the abutting real estate, the presumption (that by the location of a non-dedicated road the fee remains in the original owner), being rebuttable, can be invalidated by a weightier presumption, or by contradictory evidence. The legislature has provided the state and counties with authority to acquire the fee when acquiring public highways. It is safe to assume that authority is being exercised in certain situations.

*The general rule of construction of a deed is: "Everything passes which is necessary to the full enjoyment of the right, title or estate which is included in the words of a grant, **but nothing more.**"*

Thus, the "grant of a way," without other words indicating an intent to enlarge the natural intent of the word, carries an easement only.

An equally important rule is:

*A construction which gives validity to an instrument of conveyance will be preferred over a construction which defeats its validity.*²⁴⁴

In other words:

A construction which would make a deed legal is preferred to one having the opposite effect.

Therefore, if by construing a deed as a conveyance of the fee it would be void for uncertainty of description, while as a conveyance of a right of way easement it would be valid, the language of the deed permitting, *the latter construction should be adopted*, although such construction might not be the most natural or reasonable upon the language alone.²⁴⁵

Oregon law requires the courts to follow specific rules of construction when determining the intent of parties to a deed—for example, the rule required by ORS 42.230:

"In the construction of an instrument, the office of a judge is simply to ascertain and declare what is, in terms or in

*substance, contained therein, not to insert what has been omitted, or to omit what has been inserted; and where there are several provisions or particulars, such construction is, if possible, to be adopted as will give effect to all."*²⁴⁶

Thus, any "legal construction" (that is, having legal significance) is for the courts.²⁴⁷ However, the construction to be performed is for mapping, assessment and taxation. Although legitimate when made strictly for those purposes, such construction has no legal significance or effect on the estate being conveyed or parties to the deed.

*Hertel v. Woodard*²⁴⁸ is an example of how ORS 42.230 is applied.

In that case, a memorandum of sale of realty described the real estate by street and house number but did not mention the city, county or state in which the realty was located. The Oregon Supreme Court held that the word "my" could not be inserted by implication in front of "lot and house" to sustain the writing as against the vendor's demurrer,²⁴⁹ although the alleged subject matter was the vendor's only realty.

Another statutory rule of construction is provided by ORS 42.240.

*"In the construction of an instrument the intention of the parties is to be pursued if possible; and when a general and particular provision are inconsistent, the latter is paramount to the former. So a particular intent shall control a general one that is inconsistent with it."*²⁵⁰

There are words and terminology used in deeds having more than one meaning: (1) the common, generally accepted meaning (which is, more often than not, the legal meaning), (2) sometimes a local or otherwise peculiar meaning or significance, (3) a technical meaning, and (4) in the arguments of a few litigants, a strained or unusual meaning. ORS 42.250 was provided as a rule of construction to be applied in such cases.

*"The terms of a writing are presumed to have been used in their primary and generally acceptance, but evidence is admissible that they have a technical, local, or otherwise peculiar signification and were used and understood in the particular instance, in which the agreement shall be construed accordingly."*²⁵¹

Therefore, if a deed is drafted in ordinary and popularly understood language to which no local or technical and peculiar meaning is attached, *parol* evidence is not admissible to show that, in the particular case, the words were used in any other than their ordinary and popular sense.²⁵²

As explained in *Boyd v. Olcott*,²⁵³ "Words found in an instrument are to be interpreted and understood in their most natural and obvious meaning, unless it ap-

pears from the subject or the text that they have been used in a technical sense.”

And in Boling v. Nork,²⁵⁴ “Words are to be given their common and ordinary meaning. A strained or unusual meaning is not presumed.”

For example, where a deed conveyed land “for all legitimate railroad depot and warehouse purposes,” *parol* evidence of the understanding of the parties, at the time the instrument was executed, was not admissible to show that the words “legitimate railroad purposes” were used with a particular or special meaning.²⁵⁵

Another roadblock to construing deeds is discovering the intended definition of ambiguous terms. ORS 42.260 is applicable in such cases, *but not where the language of a deed is plain, unambiguous, and having but one meaning*. The fact that the parties disagree about the meaning of all or part of a deed, or are uncertain as to the meaning of all or part of a deed, does not mean the language of the deed is ambiguous or uncertain.

ORS 42.260. “When the terms of an agreement have been intended in a different sense by the parties, that sense is to prevail, against either party, in which the party supposed the other understood it. When different constructions of a provision are otherwise equally proper, that construction is to be taken which is most favorable to the party in whose favor the provision was made.”²⁵⁶

Thus, where there is doubt in the meaning of a deed, or any part thereof, the doubt shall be resolved in favor of the promise and against the grantor.

ORS 42.300 provides that the parties to written instruments are estopped from denying the truth of the facts in a recital of a written instrument, except for the recital of a consideration.²⁵⁷

It can be concluded from a review of statutory rules of construction that where the language of a deed is plain and unambiguous, having but one meaning, there is no room for construction.²⁵⁸ In such cases, the parties’ intention is gathered from the language used, and that intent controls. It is the responsibility of the court to ascertain and enforce such language according to its legal effect.²⁵⁹

REVIEW OF CAPPELLI V. JUSTICE

Cappelli v. Justice, *supra*, has been cited for its lesson on construction of a deed for a road easement. One essential point must be clarified: the road in this situation was a private way. The court had the problem of determining whether it was the intent of the parties to convey the land, or merely the right to use the land for ingress and egress. The distinction between the road as being private, and as being public, may have affected the courts final decision. However, the rules

and principles of law for construing the language of a deed for a private road differ little from that of a public way, and are applicable here.

This was a suit to quiet title.

The property in question was a 30-foot strip of land, which ran from the Nehalem Highway to the north-eastern of Cappelli’s land. The plaintiffs, R. & K. Cappelli, claimed the following deed operated to convey the fee in the 30-foot strip of land used for ingress and egress to their land. The defendants claimed the fee in the land, and further argued that the following deed merely operated to convey an easement to the Cappellis.

WARRANTY DEED

“(The grantors) hereby grant, bargain, sell and convey unto (the grantees--Cappellis) the following described real property, with tenements, hereditaments and appurtenances, to-wit:²⁶⁰

“*Parcel 1:* All that portion of the (E 1/2SW 1/4, Sec. 8, T4N, R4W, W.M.), Columbia (Co.) Oregon, lying (s’ly of the S.P. & S. RR R/W).

“*Parcel 2:* A right of way 30 feet in width lying (E’ly and N’ly) of the following described line: (description of line); the said 30 foot right of way to terminate at the (SE’ly) right of way line of the Nehalem Valley Highway on the (N) and the (N’ly) line of the S.P. & S. (RR R/W) on the (S).

“EXCEPTING THEREFROM reservation of 30 foot right of way as described in deed from (I. M. Harris to R. L. Justice) and (W.M. Justice) and the rights of others to use same, recorded (date) in (book & page) Deed Records of (county, state) (affects both tracts).

“ALSO EXCEPTING subject to a permit for the crossing of the S.P. & S. (RR R/W) located between the parcels described in this description.²⁶¹

“TO HAVE AND TO HOLD²⁶² the said premises unto said Grantees, their heirs and assigns forever. And the said Grantors hereby covenant that they are lawfully seized in fee simple of said premises; that they are free from all incumbrance,

“EXCEPTING THEREFROM reservation of 30 foot right of way as described in deed from (I.M. Harris to R.L. Justice) and (W.M. Justice) and the rights of others to use same, recorded (date) in (book and page) Deed Records of (county, state) (affects both tracts).

“ALSO EXCEPTING subject to a permit for the crossing of the S.P. & S. (RR R/W) located between the parcels described in this description.

“and that they will warrant and defend the above granted premises against all lawful claims whatsoever, except as above stated.”

The plaintiffs marshaled a variety of rules relating to the construction of deeds to support their contention, *i.e. that the deed was a warranty deed, not simply a right of way deed*, thus showing intent to convey the fee. This was the invalid “warranty deed” rule discussed at the beginning of this problem. The court ruled: “*That deed which conveyed a ‘right of way 30 feet in width’ was designated as a ‘warranty deed’ did not indicate intention to convey fee simple title.*”

Also, as explained, the court held that ORS 93.120 was not helpful to the plaintiffs’ case (as was contended by the plaintiffs).

The court disagreed with the plaintiffs’ argument that the words, “running over and across the lands of grantors,” were essential to create an easement.

The plaintiffs placed significance on the use of the words, “Parcel 2,” claiming this indicated intent to convey land, rather than a right to use land. The court said the words were a heading for a description, but failed to show intent to convey the fee simple estate.

Now it is important to emphasize that the courts have a right to take into consideration the situation of the parties, the object they must have had in view, and the circumstances.²⁶³ As announced in *Baker Co. v. Huntington*,²⁶⁴ *Wade v. Northup*,²⁶⁵ *Allen v. Hendrick*²⁶⁶ and other Oregon cases:²⁶⁷

“Where the language of a written instrument is ambiguous, equivocal or susceptible of conflicting interpretations, it is competent to ascertain by parol evidence the purposes and object of the parties from the surrounding circumstances, and thereafter to enforce it in accordance with such intention.”

“The circumstances under which a deed to real property is made may be shown by parol evidence” was held in *Hicklin v. McClellan*²⁶⁸ and in the case of *Wills v. Leverich*.²⁶⁹ “Where the description in a deed is not clear and intelligent, the intention of the parties and the circumstances surrounding the transaction may be considered in connection with its provisions to ascertain the intention and give it practical effect.”

This is supported in statutory law by ORS 42.220:

“In construing an instrument, the circumstances under which it was made, including the situation of the subject and of the parties, may be shown so that the judge is placed in the position of those whose language the judge is interpreting.”²⁷⁰

So the court, in *Cappelli*, was justified in looking beyond the deed to the situation of the land, the circumstances and background on previous conveyances to determine the intent of the parties to the transaction. The following was its findings:

“The land in question is a narrow strip of land, which, standing alone, has little if any utility except to provide a means of access to the highway for neighboring land. It could, of course, have been conveyed to increase plaintiffs’ acreage, but the history of transactions involving the land now owned by plaintiffs and defendants demonstrate that the strip was conveyed to provide access rather than expand the ownership of the grantee:

“Tracing back the title of (I.M.H.) we find a deed from her to (R. & W. J.) in 1941, conveying to them the land now owned by the defendants and the (plaintiffs). In that deed, Mrs. (I.M.H.) reserved ‘a right of way 30 feet in width’... to be for the use and benefit of the lands of the grantor in the (NW1/4SE 1/4, Sec. T. & R., W.M.); this being the land east of and adjacent to the property later conveyed to the Cappellis. The 30-foot strip described is the same strip later described (although in different words) in the deed to the Cappellis. *The (I.M.H.) deed quite clearly indicates intent to create an easement across the 30-foot parcel.* (R. & W. J.) conveyed to (C. & I. J.), who then conveyed a part to the Cappellis and a part to the defendants as we have already explained.”

The court noted language and format in the Cappelli deed similar to that encountered often in the cadastral cartography and map and record maintenance activity. This language and format has confused nearly every cartographer involved in interpreting deeds for mapping, assessment and property taxation. That is, the conveyance of a narrow right of way, then the exception of the same right of way, followed by an exception of the same right of way in the habendum. The court noted:

“It will be observed that the deed to the Cappellis conveys a 30-foot ‘right of way’ and in the following paragraph excepts therefrom the 30-foot ‘right of way’ reserved in the (LM.H.) deed. As we have previously noted, these two 30-foot strips have the same description. If we were to give the term ‘right of way’ the same construction in both the Cappelli deed and the deed from (I.M.H.) to (R. & W. J.)²⁷¹ the two paragraphs in the Cappelli deed would make no sense because the second paragraph would purport to except from the deed that which the first paragraph purported to convey.

“Plaintiffs’ argument must, then, rest on the assumption that the first paragraph operated to convey an estate and the second paragraph excepted therefrom the previously created easement.”

But the “defendants’ position rests upon the assumption that the first paragraph conveyed only an easement and that the second paragraph simply gave rec-

ognition to the previously created easement; *making the easement granted to the Cappellis non-exclusive.*"

The court held:

"We think the defendants' position is more reasonable. It would seem uncontradictable that the 30-foot strip was intended to serve only as an easement to give access from the land now owned by the Cappellis to the highway. The subsequent conveyances do not reveal intent to treat the strip in any other way.

"The factor which provides greatest support for this conclusion is the language of the Cappelli deed itself. The deed purports to convey only '... a right of way 30 feet in width...'

"In common parlance the term 'right-of-way' signifies an easement. In absence of special circumstances indicating a contrary meaning the courts generally construed the term in accordance with common usage."²⁷²

"We find nothing in the present case evidencing an intent to use the term 'right of way' in any special sense. There is no evidence showing special circumstances which would prompt (C. & I. J.) to convey to the Cappellis a fee rather than an easement in the narrow strip."

In the *Carter Oil Co. v. Myers*²⁷³ case, previously cited for the ruling on the wording *grant and convey*, the appellants urged the court to apply significance to the consideration which was, at the time, an amount that could be considered market value of the land in fee. In some cases such a presumption has been stronger than other presumptions, and the consideration showed an intent to convey the fee, such as the following case of *Texas & Pac. R. Co. v. Martin*.²⁷⁴ But in *Carter Oil Co.* the presumption--that the wording "dedication of right of way for public road purposes" showed intent to convey an easement--was weightier than the presumption that the consideration showed intent to convey the fee.

In *Texas & Pac. R. Co. v. Martin*, *supra*, it was the consideration that convinced the court that the deed operated to convey the fee simple estate. In this case, language that appeared as words of limitation were held to merely describe the contemplated use of the land.

The heirs of D. Martin owned, in fee simple absolute, the subject property. They executed and delivered to the railway company a deed worded as follows:

"Terrell Martin & Sela Martin
"To Deed "
Texas & Pacific R.R. Co.

"Know all men by these presents, That we, (the grantors), of the County of... in consideration of the sum of Four Hundred and Fifty silver dollars, paid to us by... have granted, bargained, sold & released

by these presents, do grant, bargain, sell and release unto the Texas and Pacific Railroad Co. for Depot purposes and uses, all the tract of land in the city of Dallas, being part of an acre sold to us by John J. & Susan A. Good, bounded as follows, viz: Beginning at the S.E. line of... to the beginning, the same to be permanently used by said R.R. Co. for depot purposes, on the Pacific Avenue route through Dalles. Together with all and singular the rights, members, hereditaments and appurtenances to the same belonging, or in anywise incident or appertaining.

"To have and to hold all and singular the premises above mentioned unto the said Texas and Pacific R.R. Co., Their heirs and assigns forever. And we do hereby bind ourselves, our heirs, executors and administrators to warrant and forever defend all and singular the said premises unto the said Company, their heirs, and assigns against every person whosoever lawfully claiming or to claim the same or any part thereof.

"Witness our hands and seals, using scrow] for seal this 11th day of November, 1872.

"(signatures)"

The Supreme Court said:

"The above deed was duly acknowledged as required by law.

"The railway company went into possession of the property described in the above deed and used and occupied it 'for depot purposes and uses' until 1922, when it finally abandoned it for such purposes and uses. Since that time the railway company has used the Union Depot about a mile distant. We will not attempt to go into the history leading up to the abandonment...

"If we understand their briefs, counsel for Martin and Rogers contend that when viewed in the light of this record, the above deed conveyed a mere easement, and if not an easement, it was a conveyance on condition. *We think the deed conveyed a fee simple title, not an easement, and not a title on condition.*

"In connection with the above, we hold it is a rule in this state, and also a general rule (in common law states) that the fee passes by a deed containing a recital which merely declares the contemplated use of the land, *where the other parts of the deed operate as a fee simple conveyance. We think further that this deed clearly comes under such rule.*"²⁷⁵

Quoting *Downen v. Rayburn*, *supra*:

"On July 28, 1856, William R. Downen was the owner in fee of lot 16 in block 5, in the original town, now the Village of Industry, and on that day

he and his wife executed a deed, conveying such lot to five persons. "Trustees of the Industry Congregation of the Cumberland Presbyterian Church of the county of McDonough and State of Illinois." The deed recited that William R. Downen and wife, party of the first part, for and in consideration of the sum of one dollar paid by said trustees as party of the second part, granted, bargained and sold unto the said party of the second part and their successors in office, "a certain tract or parcel of land to be used as a church location, situated in the State of Illinois, county of McDonough; being a part of the Southeast quarter., and more particularly described as follows: Lot no. 16, in block no. 5, in the town of... together with all and singular the hereditaments and appurtenances thereunto belonging or in any way appertaining, to have and to hold the said premises as above described, with the appurtenances unto the said party of the second part, and their successors in office forever...'

"The Supreme Court of Illinois construed the above deed as a conveyance of the fee simple title: holding that the clause, 'to be used as a church location' was merely declaratory of the purpose of the conveyance, and did not render the estate conveyed (as being) conditional.

"When we come to construe this deed (Martin to Texas & Pac. R.R. Co.) in light of the above rule (laid down in Downen), we must conclude that it conveyed the absolute fee simple title. It recites a cash consideration of \$450. Certainly this was not a nominal consideration, and there is nothing in the record to show that it was not then the lot's fair value. The land was not a strip across a larger tract for right of way purposes, but was a distinct tract in the city of Dallas. The granting clause does not purport to grant an easement over this land; on the other hand, the land itself is granted. The habendum and warranty clauses are in the usual form for conveying the fee simple title. Certainly no court would hold that this instrument only conveyed an easement, or a title on condition, merely because it recited that the land was conveyed for depot purposes.

"We have carefully examined this record together with the briefs and arguments filed by counsel for Martin and Rogers and in our opinion there is nothing in this record that would justify a holding that this deed is anything but a fee simple conveyance."²⁷⁶

Thus, in *Texas & Pac. R. Co.* the court held that the \$450 consideration was the value of the land in fee, and sufficient to show an intent to convey fee simple absolute title. But in *Carter Oil Co.* the court recognized the \$425 consideration as the market value of the land, but insufficient to invalidate the intent to

dedicate the easement for a public way, with the fee remaining in the dedicator and subsequent purchasers of land abutting the public way. Is there a contradiction here? A careful examination of the reports of each case will reveal that the judgments were sound and equitable. What better evidence than the wording "dedication of right of way for public road purposes" to show an intent to convey a *right to use the land* rather than the land itself (that is, in a state, like Oregon, where a dedication for road purposes operates to create an easement in the public)?

In another case, *Valentine v. Lamont*,²⁷⁷ the consideration was held to show an intent to convey an estate in fee simple absolute:

In *Valentine* the board of education paid \$13,000 for the subject property. It exercised complete control and dominion over the property for many years, but in 1945 it adopted a resolution declaring that the land was no longer needed for school purposes, and it was subsequently sold. The heirs of the condemnee claimed the board of education took only an easement, or at best *fee simple determinable*²⁷⁸ by the condemnation; and when the land was no longer needed for school purposes, it must revert to the plaintiff.

The defendants maintained that the board acquired the fee simple absolute title. The court agreed with the argument presented by the defendant:

"There is no claim or evidence that the owner received less than the value of the property... It would strain reason to say now she believed she was only parting with an easement in the lands in return for the value paid; or that the school board acquired less than absolute fee..."²⁷⁹

As *Texas & Pac. R. Co.* and *Valentine* demonstrate, the consideration can suffice to show an intent to convey the fee simple estate rather than a mere easement in land; that is, where the language of the whole deed makes such an interpretation possible. But the fact that the consideration is of a sizable amount, such as in the *Carter Oil Co.* case, does not mean it is for the estate in fee. Factors such as valuable improvements located where the right of way is to pass, or negative effect on the remaining property, could make the acquisition of an easement very expensive. Consequently, where the other language of a deed is unclear as to the intention of the parties, the consideration in the deed should not be used to determine the level of estate conveyed unless a certified appraiser reviews it. It is highly recommended that legal counsel also review the determination.

*Swan E. Sanborn v. City of Minneapolis et al*²⁸⁰ is another case that can be helpful in analyzing the language of a deed to determine the level of estate conveyed (fee simple absolute or an easement?).

On July 27, 1874, R.P. Johnson, then the owner of the land in question, and his wife, duly executed and delivered the deed, referred to in the opinion as Exhibit B, which was in the following words:

"This indenture made this twenty-seventh day . . . between R.P. Johnson and Matilda Johnson, his wife, of the county of... parties to the first part, and Frank Strobeck and others who do or may own property along the within described alley, of the county of... parties to the second part:

"Witneseth, that the said parties of the first part, in consideration of the sum of one dollar (\$1) to them in hand paid by the said parties of the second part, or their heirs and assigns forever, all the following described piece or parcel of land lying and being in the county of Hennepin... to wit: Commencing eighty (80) feet southerly from the northwest corner of lot ten (10) in block one hundred and forty three, (143,) in the easterly line of Fourteenth avenue south., according to a plat now on record in the office of the register of deeds in and for Hennepin county., thence in an easterly direction (metes and bounds description) to the place of beginning.

"The above-described property is deeded for alley purposes; and whenever it ceases to be kept and used for said alley purposes, this title will be null and void.

"To have and to hold the same, together with all the hereditaments and appurtenances thereto in any-wise appertaining. And the said R.P. Johnson, party of the first part, does covenant with the said parties of the second part, or their heirs and assigns, as follows: That he is lawfully seized of said premises in fee-simple, and that he has good right and power to grant and convey the same; that the same is free of all incumbrances; that the said parties of the second part, their heirs and assigns, shall quietly enjoy and possess the same; and that the said parties of the first part will warrant and defend the title to the same against all lawful claims.

"In testimony whereof of the said parties...

"R.P. Johnson, (Seal)

"Matilda A. Johnson, (Seal)

"Afterwards, and on August 4, 1874, said R.P. Johnson caused a plat to be made of part of said block 143, in which plat the land described in Exhibit B was indicated as an alley, and was duly dedicated for that purpose. On August 5, 1874, the plat and dedication of the alley were accepted by a vote of the common council of the city of Minneapolis. Since August 5, 1875, this alley has been continuously used as a public alley. Notwithstanding this, the property included within the alley was placed on the tax list, and was sold for taxes of 1880 and

1881, and the plaintiff has acquired such tax titles, and has no other title."

Mr. Justice Mitchell, delivering the opinion of the court, explained:

"The first question in this case is whether the deed (Exhibit B) from Johnson to Strobeck conveyed the fee of, or only an easement in, the premises in controversy. It purports to be a deed between Johnson and wife, parties of the first part, and Strobeck, 'and others who do and may own property along the within-described alley,' parties of the second part the premises in question, which are declared to be 'deeded for alley purposes; and whenever it ceases to be kept and used for said alley purposes, this title will be null and void.' Some parts of the instrument, if considered alone, would indicate a conveyance of the premises in fee. But if we adopt a cardinal rule of the construction of deeds, *that it be made on the entire deed, and not merely upon a particular part, and, having thus taken the instrument by the four corners, we endeavor to ascertain its intent, which is the essence of every agreement*, we will be led to the same conclusion to which the learned district judge came, viz., *that this deed grants merely an easement of a right of way as an alley*:

"The right granted has all the characteristics of a mere easement, as distinguished from an estate in land.

"In the first place, it is evident that what was granted was not intended to be an exclusive right or interest in Strobeck, but in him, and 'others who do or may own property along the within-described alley.' Two distinct tenements are here referred to, viz., the property 'along the within-described alley,' and the land described in the deed, and here called an alley. A right of way as an alley was evidently intended to be imposed over the latter tenement for the benefit of the former. The right granted excluded the idea of the grantees taking actual possession. The right was merely one of accommodation (a right to pass over) as distinguished from those which are directly profitable. The grantee of such a right is not the owner or occupant of the estate over which the right of way is given. Such being the effect of this deed, Johnson remained the owner of the premises, and (may) afterwards dedicate the same as a public alley. Such dedication would not impair or interfere with the right of way granted to Strobeck.

"If Johnson's attempt to make a statutory dedication was ineffectual because the map was not recorded, yet it appears from the findings of the court (fourth and fifth) that there was a good *common law dedication*. There was on the part of Johnson, the owner of the fee and appropriation of land to this specific public use and on the part of the public an

acceptance of the land for such use. The appellant suggests, although apparently with doubt, that there cannot be any such thing as a common law dedication of land for streets or alleys in the city of Minneapolis; that the statutory method prescribed (by specific sections of the city charter and laws) was intended to be exclusive." The court said: "There is clearly nothing in (the appellant's) suggestion."

Great care must be taken when the deed being written is for a narrow strip of land acquired to widen an existing dedicated way or other existing public way where the fee has remained in the original owner and subsequent owners of land abutting the way. The presumption here is that such a widening merely acts to widen the existing estate, i.e. to create a wider easement. Part of the mason for this rebuttable presumption is that a city or county would have no practical use for such narrow strips of land (that is, legitimate use). Another presumption is that an owner would not purposely restrict or eliminate rights of access by conveying a strip of land in fee simple between the owners realty and the public easement. Naturally, the deed can be construed for intent, but it would not be incorrect to consider the situation of the property and circumstances to determine intent in such cases. Other convincing reasoning has been provided earlier in this discussion.

Problem 3: The Park Avenue Case²⁸¹

In this situation, a city had an ordinance, which read:

"The vacated property shall vest in the abutting properties in equal proportions..."

Consequently, when the city vacated Park Avenue, the vacation ordinance included the determination of the vesting of property that showed parcels 300 and 400 as fee simple owners of the north one-half of the vacated avenue (see figure 4-6.) The ordinance showed the fee in the south one-half as vesting in the owner of parcel 4400.

When the assessor refused to recognize the erroneous ordinance, the city officials claimed the ordinance controlled over the Oregon vacation statute, ORS 271.140, because of ORS 271.170, which provided:

"The provisions of ORS 271.080 to 271.160 are alternative to the provisions of the charter of any incorporated city and nothing in those statutes shall in anywise affect or impair the character or other provisions of such cities for the preservation of public access to and from transportation terminals and navigable waters."

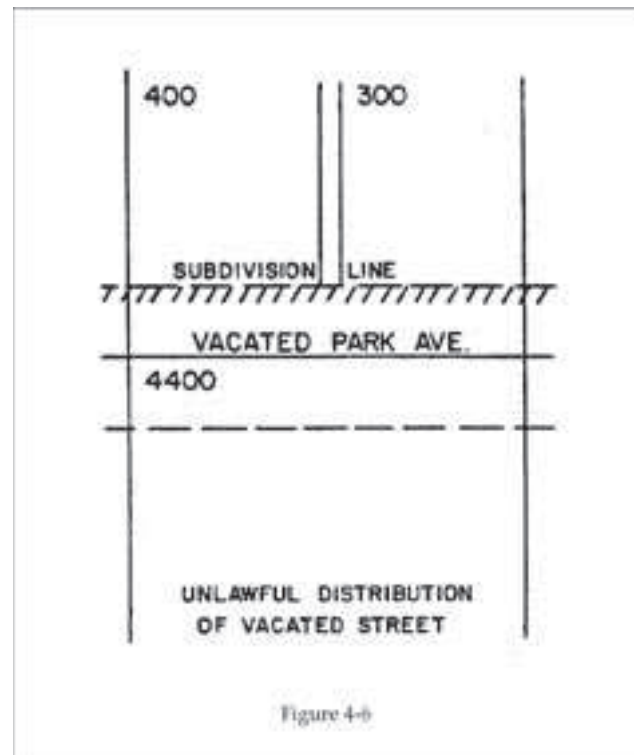
Obviously the city was not aware of the principle of law that the public acquires only an easement of dedication. The fee remains with the dedicator and passes to the grantees of land abutting the dedicated public way. The city was merely the guardian of the

public's easement. Since neither the public nor the city held the underlying fee in Park Avenue, it could not dispose of the fee upon vacation of the street. To attempt to do so, and to enforce its determination of the ownership in Park Avenue, would constitute an unlawful taking of private property (1) without just compensation, and (2) for private, rather than public purposes, as prohibited by both the United States Constitution²⁸² and the Oregon Constitution.²⁸³

The Department of Justice examined this problem and was of the opinion the city ordinance, and subsequent determination of the fee in Park Avenue, was void for want of jurisdiction, explaining.

*"The statutes and ordinances must be construed together and be given a construction which violates no constitutional provision."*²⁸⁴

The department further held that the city could not vest the fee simple estate in the owners of parcels 300 and 400 because neither of these owners, nor their predecessors in title, dedicated any of that part of Park Avenue.



In *Neil v. Independent Realty Co.*, *supra*, the court held that the defendant (who had received one-half of a vacated dedicated street as did parcels 300 and 400 in figure 4-6) was not entitled to any part of the vacated street. It explained that neither the defendant nor predecessors in title had contributed to the street. In that ruling, the court said:

"The common law rule to the effect that adjoining owners had title to the middle of the highway rested

on the presumption *that they had contributed equally to the road*, but if the facts showed to the contrary, the rule did not apply. In other words *the fact would govern rather than mere presumption*. Out of this grew the rule that if the highway was taken wholly from one man's (or woman's) property, and such highway is vacated, *the land in fee reverts to the original owner, or his grantees, free from the public use or easement.*" This principle has been announced and upheld in the Oregon Supreme Court (cases cited in this publication).

ORS 271.140, as well as the city ordinance quoted in this problem, merely express the common law rule that adjoining owners hold title to the middle of a street or road.²⁸⁵ And the Oregon court has held that the rule is based on the rebuttable presumption that the adjoining owners, or their predecessors in title, contributed equally to the road. But where the facts are to the contrary, an exception to the rule applies, *i.e.: where the street is contributed entirely by one owner and is substantially vacated, title to the whole street reverts to the original owner or the owner's grantees*. The rule applies to every vacation, regardless of which vacation statute is being applied.

Problem 4: Abutting Property of the Dedicator²⁸⁶

Subdivision lines provide the first clue as to the correct owner of the underlying fee in dedicated streets. In most situations, the fee is in the owners of abutting land within the subdivision, and is not held by the owners of abutting land adjacent to the subdivision boundary (as in figure 4-6 of Problem 3). However, there is a situation where the owner of land abutting

a subdivision is the owner of the fee simple estate in the bed of a dedicated street of that subdivision. That situation is illustrated in figures 4-7, 4-8 and 4-9.

In figure 4-7, J. Zimmerman owns all of parcel 700, and is planning to develop the north 300 feet of this parcel of real estate. Figure 4-8 is the resulting subdivision. Zimmerman still owns the undeveloped land abutting and south of his First Addition.

Applying what has been learned so far in this publication, if Zimmerman were the dedicator of Benson

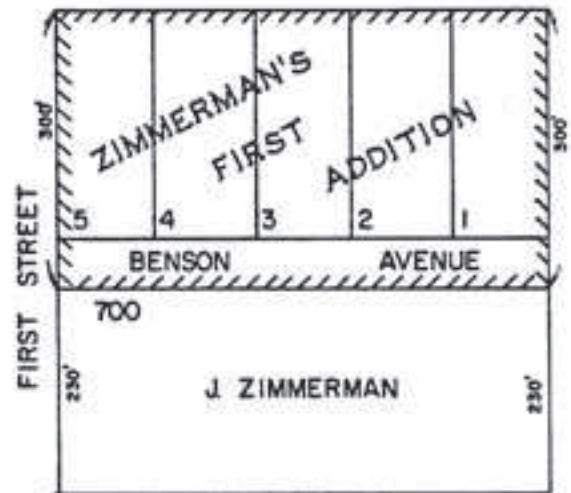


Figure 4-8

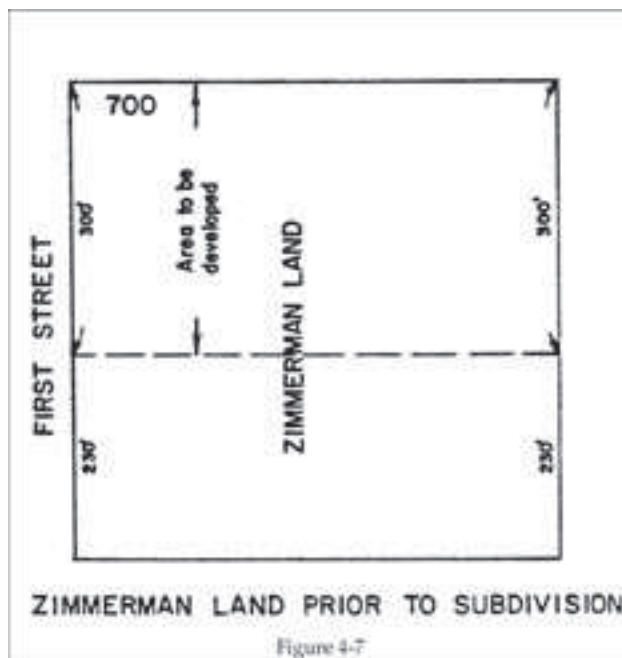


Figure 4-7

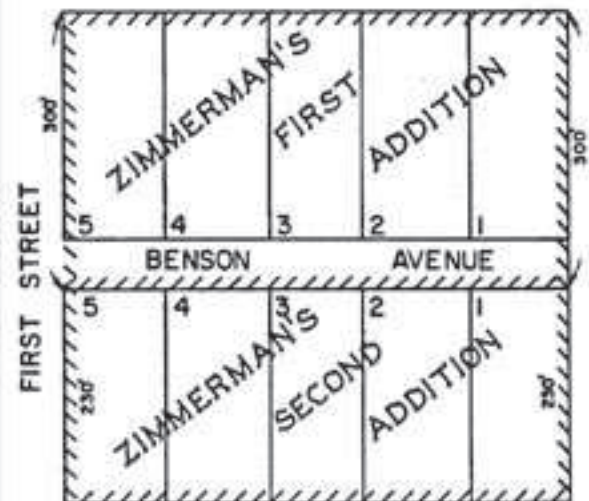


Figure 4-9

Avenue, he would remain the fee title owner of all of Benson Avenue prior to the sale of land abutting the street. However, this would be subject to the rights of the public in Benson Avenue.

Unless otherwise expressly reserved in the instruments conveying lots one through five of Zimmerman's First Addition, the owners of those lots, as abutters, would acquire the underlying fee in the north one-half of Benson Avenue. As the dedicator, Zimmerman would retain the underlying fee in the south one-half of the street. Remember this common law principle:

"The rule that the owners of abutting real property hold title to the middle of a street is based on the presumption that the adjoining owners, or their predecessors in title, contributed equally to the road."

Consequently, since Zimmerman contributed the entire street, he retains the fee in the south one-half of Benson Avenue.

It is justifiable to ask: "If Zimmerman intended to retain the south one-half of Benson Avenue, why didn't he run the subdivision boundary down the center of Benson Avenue?" The answer is that by including all of Benson Avenue in the subdivision, the entire street is statutorily dedicated by the approval and acceptance of the subdivision. This is, in most cases, the only way this kind of subdivision will be approved. By requiring the developer to include the entire street in the subdivision, the purchasers of lots in the subdivision will be assured that the street will remain open for public use.

If Zimmerman had owned only the land subdivided as "Zimmerman's First Addition," and did not own the land to the south of and abutting the south right of way line of Benson Avenue, this fact would govern, rather than the presumption that the owners on each side of the street had contributed equally to the street. *But where the owner has contributed the entire street and still retains land abutting the street, the presumption that the adjoining owners, or their predecessors in title, contributed equally to the road becomes fact, and governs.*

To develop this problem beyond the scenario illustrated by figure 14-8, presume that Zimmerman subdivided the south 230 feet of original parcel 700 shortly after his subdivision of the north 300 feet of parcel 700 (figure 4-9).

If, for some future reason, it is necessary to vacate Benson Avenue, the owners abutting each side line of Benson Avenue (north and south of the street) will regain the fee in Benson Avenue, freed of the dominant estate in the public, to the centerline. They will hold the fee because the owner, or predecessor in title, on each side of the street (Zimmerman) contributed (equally to) the street.

Important: The solution provided here must give way to the wording in the deeds in the chain of title, as well as the wording of the plat. It may also have to give way to the peculiar circumstances of the case, because:

*In arriving at a proper construction of the effect of a deed granting lots bounded on a street and the intention of the parties to the extent of a grant in a street, regard must be given to the situation of the lots and streets and the state of the title as well as the language of the entire deed. This is the recognized rule of interpretation and intent.*²⁸⁷

Problem 5: Variation of Problem 4

The question will be asked: "If Zimmerman had conveyed the south 230 feet of his original parcel 700 before subdividing the north 300 feet and dedication of Benson Avenue, would the grantees of the south 230 feet acquire the fee in the south one-half of the Benson Avenue as a consequence of the dedication of the street?" After all, the south 230 feet was the land of the dedicator, and is the land of his grantee of land abutting the street; relying on the rule that: "*If a highway was taken wholly from one person's property, and such highway is vacated, the land in lee reverts to the original owner or that person's grantees...*"

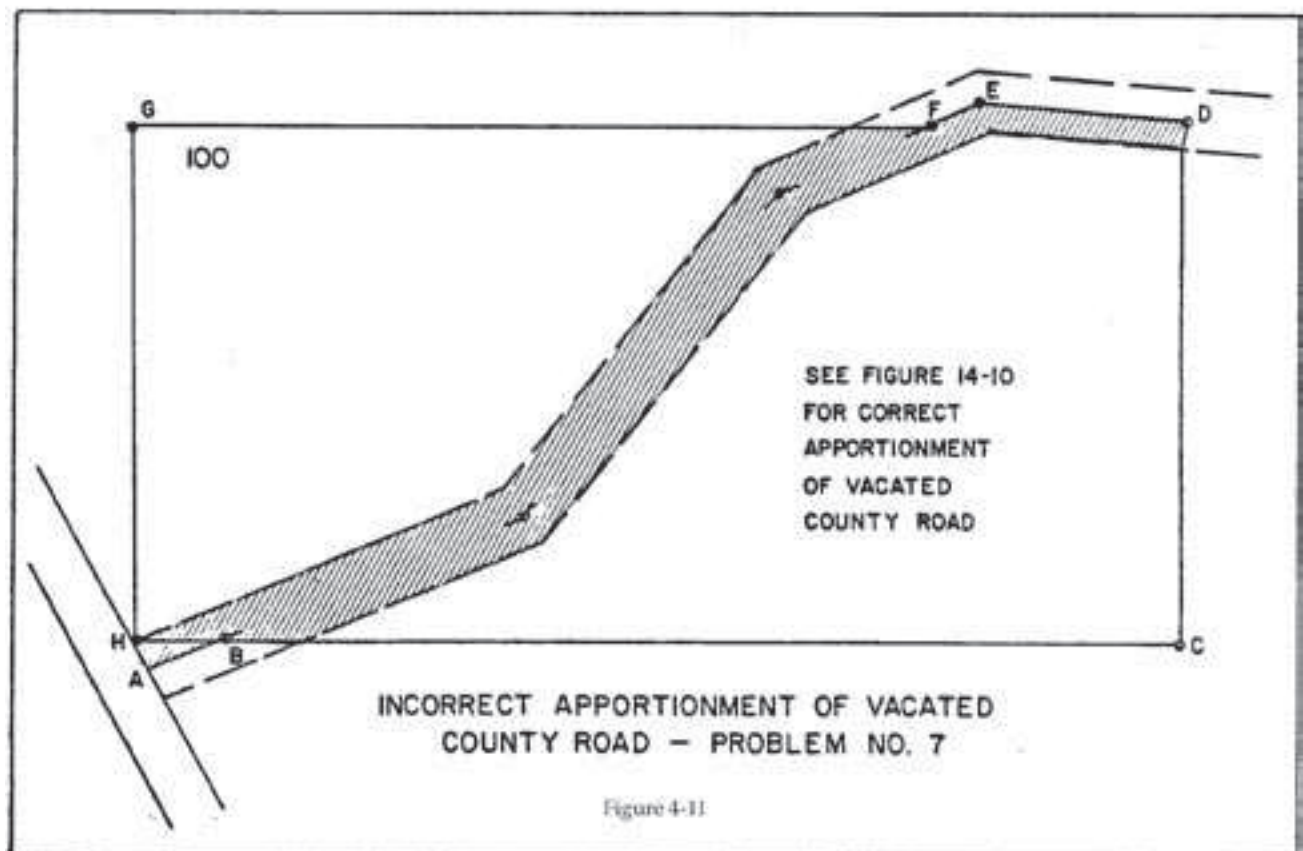
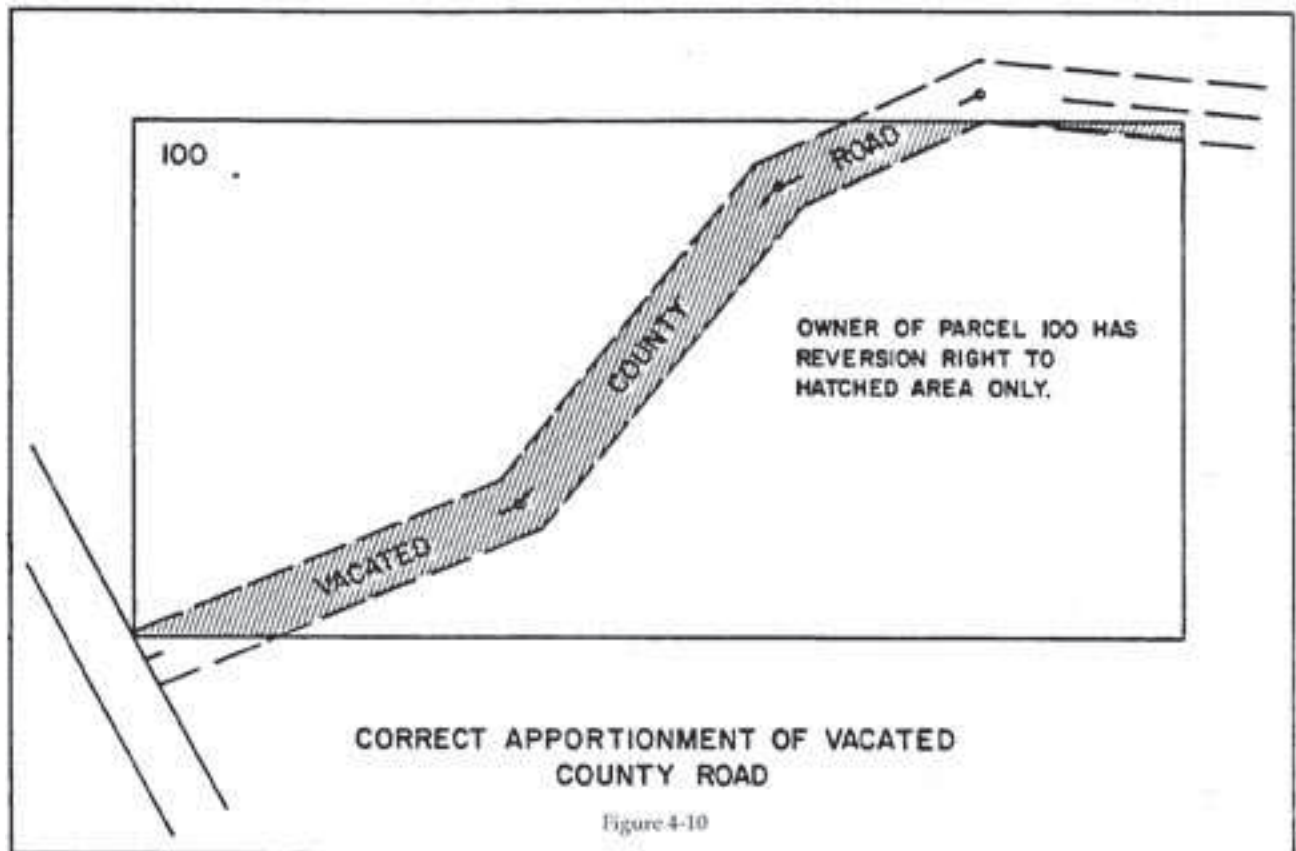
The answer is "no." The grantees in the south 230 feet cannot enlarge their estate as a consequence of a dedication of a public way subsequent to their acquisition of the south 230 feet of Zimmerman's land.

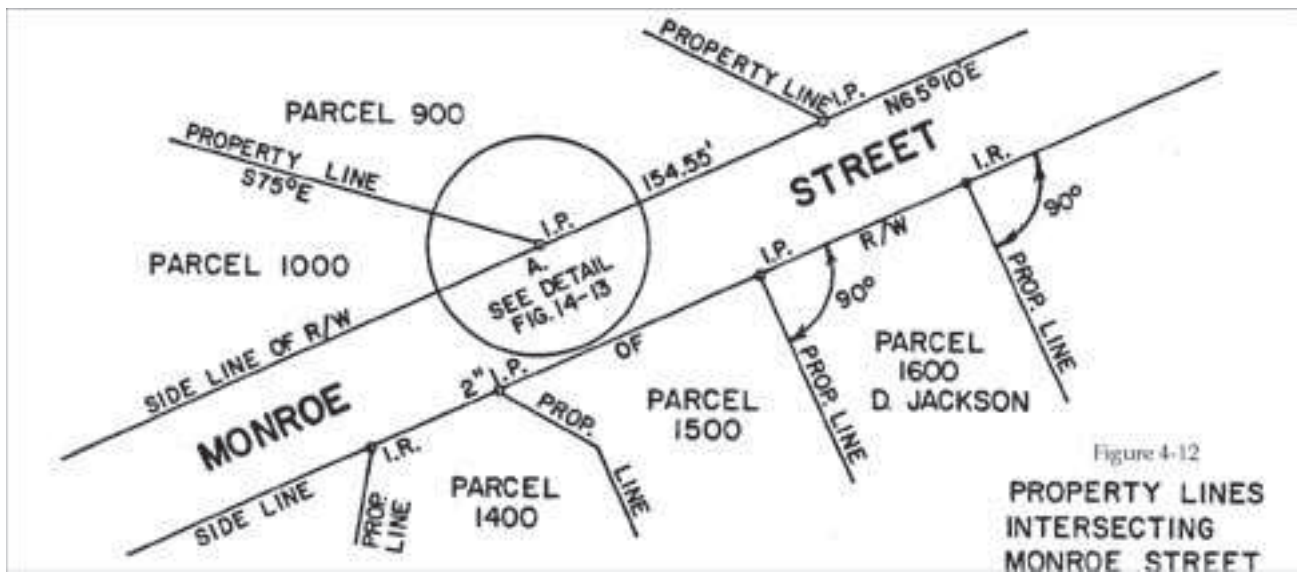
The rule cited as an argument for the grantees to acquire the additional strip of land is based on the principle of law that a grantee of the dedicator acquires the fee in the existing dedicated street *as a consequence of the acquisition of the abutting land*. In other words, the fee in the street is part of the estate purchased from the dedicator, or a grantee of the dedicator. But in the situation of Problem 5, the dedicated street did not exist at the time the grantees acquired the south 230 feet of Zimmerman's unsubdivided land. Consequently, the grantees could not acquire what was not yet created.

In any variation of Problem 4, the sequence of transactions, in relation to the time of dedication, controls. Moreover, as emphasized in Problem 4: "...Regard must be had to the situation of the lots and streets and the state of the title as well as the language of the entire deed."

Problem 6: Apportionment of a Vacated Road²⁸⁸

The land of a vacated county road is returned to the person, or that person's heirs or grantees, contributing the land in the first place, but no more land should be returned than was originally contributed.





Thus, figure 4-10 shows the correct apportionment of the vacated county road.

In this example, the boundaries of parcel 100 are exactly as they were at the time the county acquired the “right of way for the county road purposes.”

Figure 4-11 shows an erroneous apportionment of the county road, based on the rule that the land of a vacated road vests with abutting owners in equal proportions. But this rule was not intended to govern where the owners had not contributed in the msn~ner that the road is incorrectly apportioned.

In situations as we have here, the rule is that the servient estate is freed of the dominant estate (the easement) and the parent parcel of land is exactly as it was prior to the establishment of the county road.

It is justifiable to ask: “Would the apportionment be the same if parcel 100 was established after the county road was created?”

The basis for the question would be grounded on Principle 62:

“Where land described by metes and bounds actually abuts on the highway, the grantee, in absence of intention of the grantor or otherwise to limit the description, takes to the center of the highway, even when the highway is not mentioned as a boundary.”²⁸⁹

There is an argument for the apportionment of the county road, as illustrated in figure 4-11, in a situation where parcel 100 was created after the road was established. However, this would be a situation where the intent of the parties would have to be determined with regard to the situation of the parcel and the road and the state of the title as well as the language of the entire deed.

A clue to the solution of such a problem exists in the configuration of the parcel as it relates to the road.

That is, it is obvious that the boundaries of parcel 100 were not established with regard to the road. Had this been the intent (in this case) the boundaries would probably been from point A, to H by way of A,B,C,D,E,F,G,H,A in figure 4-11. Nevertheless, the location of the property, circumstances, and language of the entire instrument must be considered to determine the intent of the parties to the transaction.

Problem 7: Apportionment of a Vacated Street With Property Lines Intersecting Right of Way Side Lines at an Angle

There are many variations of this situation, but this is the basic problem, as illustrated in figure 4-12, where the metes and bounds descriptions run to the side-lines of the right of way.

Each of the parcels of land abutting the vacated public street are described as running to the:

- “1. ... north line of Monroe Street; th. NE’ly along the street 154.55’ to an iron pipe; th. leaving said street ... (Parcel 900).
- “2. ... southeasterly right of way line of Monroe Street; th. (bearing and distance) along said right of way to a 2” iron rod; th. (bearing & distance) (Parcel 1400).
- “3. ... to a 2-inch iron rod on the south line of Monroe Street; th. (bearing and distance) to the NW cor of a parcel of land conveyed to D. Jackson in (Deed Volume and page, county, state); th. leaving said right of way (bearing and distance) ... (Parcel 1500).
- “4. ... to an iron pipe on the south line of Monroe Street; th. northeasterly (distance) to a 2 inch iron pipe; th. (bearing and distance) at right angles to Monroe Street... (Parcel 1600).”

In each conveyance the grantor of the deed held the fee in Monroe Street.

The primary rule of apportionment in this situation is:

Principle 77

In cases where the deeds to real property abutting a vacated public way merely run to the side lines of the right of way, the land of the vacated way is apportioned by running the boundary line from its point of intersection with the side line of the right of way, at right angles to the center line of the way, to either the center of the way when the owner has the underlying fee in only one-half the way, or to the opposite side line of the right of way when the owner has the underlying fee in the full width of the right of way, when the language of the deed, as well as other pertinent deeds in the chain of title, the situation of the property and the circumstances surrounding the conveyance allow such an apportionment.

A different rule is used for apportioning a vacated public way where the property abuts a right of way simple curve or a spiral curve.

That rule speaks to "other deeds in the chain of title." Past deeds in the chain of title (non-recorded when available, as well as recorded) must be reviewed to arrive at an accurate apportionment of Monroe Street to determine if the boundary of any former owner was described as running to the street centerline or other point in the right of way line. Surveys should be reviewed as well. The following exemplifies that requirement.

A review of surveys (old as well as new) of this area provided a clue that a former owner of land where parcel 900 is located acquired the land by a deed that ran to the center of Monroe Street. A review of former deeds to this area revealed that parcel 900 is

part of a larger parcel formerly owned by D. Swearingen. Swearingen conveyed the land to R. Faith, who conveyed the land to T. Crony, who was the grantor of parcel 900, as well as several other parcels of land abutting Monroe Street.

Swearingen acquired the larger parcel of land by a deed that ran "S 75 degrees E to a point on the centerline of Monroe Street; thence along said centerline N 65 degrees 10"E..."

Consequently, the correct apportionment of the vacated Monroe Street for parcel 900 is as illustrated in figure 4-13. The correct boundary of parcel 900 in the vacated street is the line AC in figure 4-13, rather than line AB. This is because the area A,B,C,A was never held by any of the former owners of the land of parcel 900.

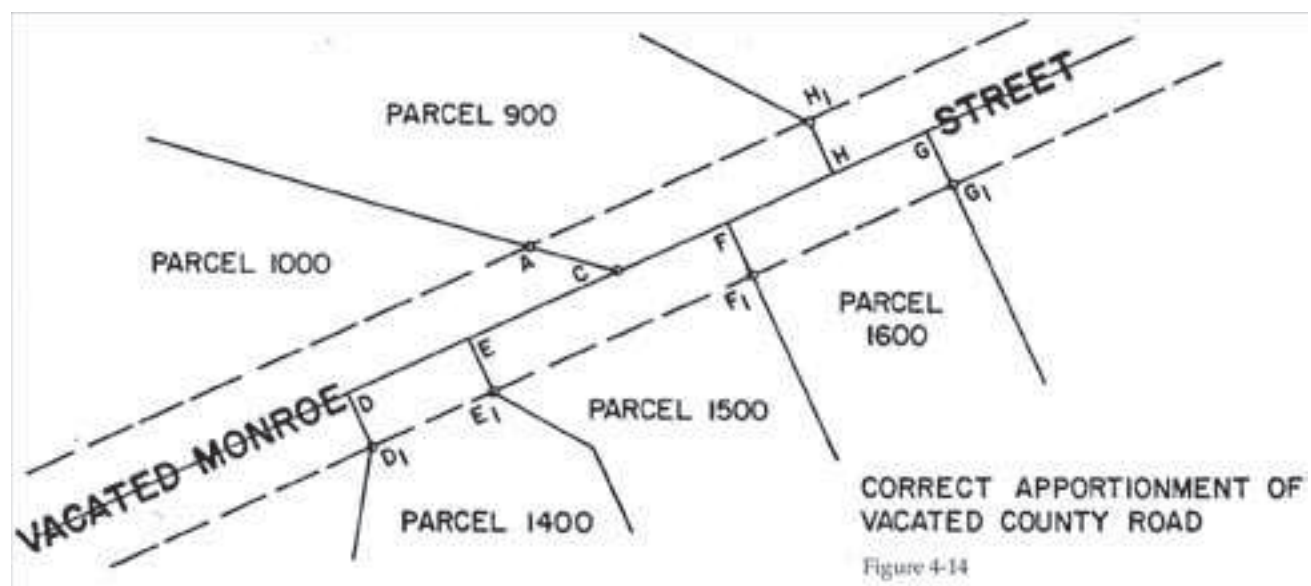
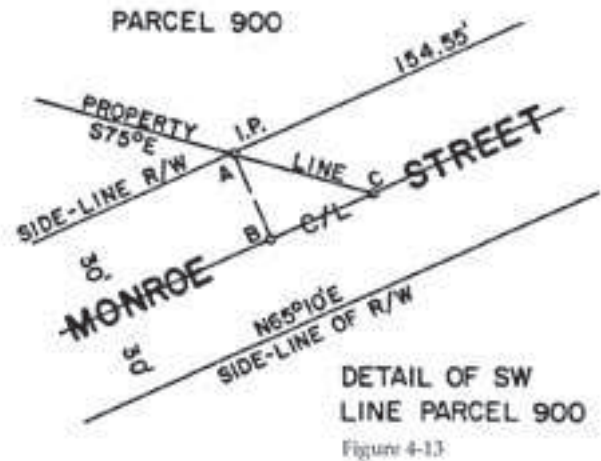
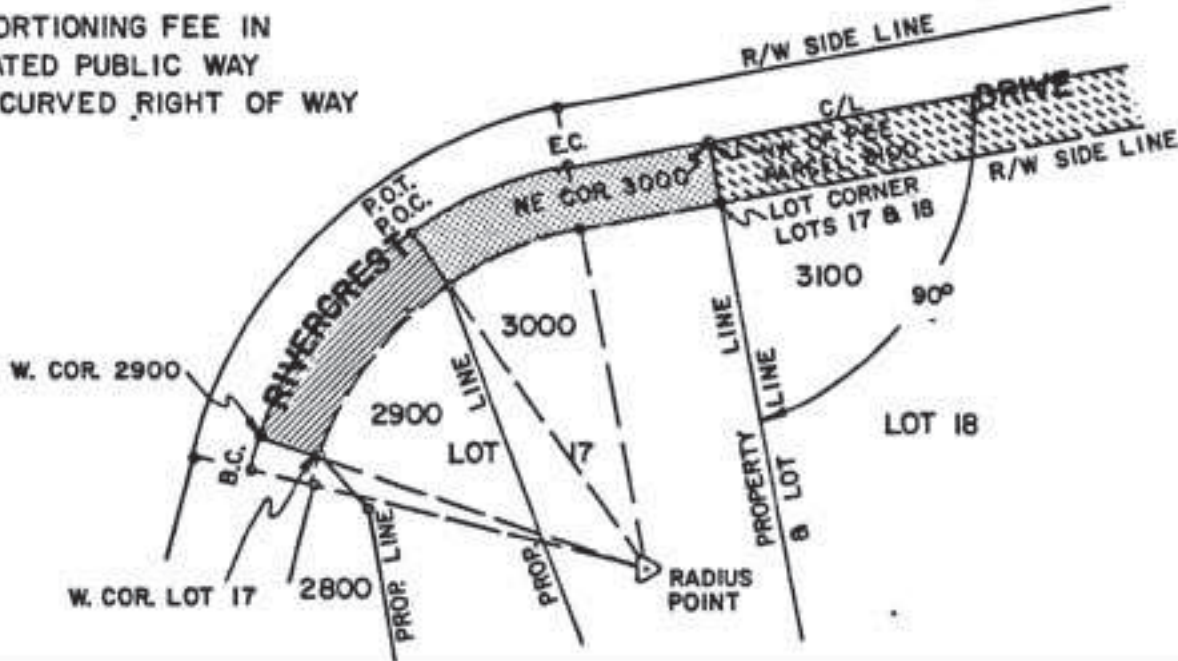


Figure 4-15

**APPORTIONING FEE IN
VACATED PUBLIC WAY
RE: CURVED RIGHT OF WAY**



The line AC of figure 4-13 is the only boundary of apportionment that is not at right angles to the center-line of Monroe Street. The correct apportionment of parcels 900, 1000, 1400, 1500 and 1600, of figure 4-12, is shown in figure 4-14.

The importance of all the pertinent doctrines, principles and rules of common law and statutory law to the solutions provided in this section cannot be over-stressed. For example, rules of construction and interpretation announced in *Cross v. Talbot*, *supra*, and upheld in the 1975 case of *Fossi v. Myers* (discussed in the "review" of cases), *supra*, are important to the solution of Problem 7, i.e.:

"The weight of authority is to the effect that where the land described by metes and bounds actually abuts upon the highway, the grantee, in absence of some clear intention on the part of the grantor to otherwise limit the description, will take to the center of the highway to the same extent that he would had the highway actually mentioned as a boundary."

Or, "The presumption of an intent to convey title to the center of a street or highway is not overcome by the fact that the land conveyed is described by metes and bounds, and that the distances stated in the description of the deed do not extend to the center of the street or highway."²⁹⁰ Principle 62 of this publication advises:

"Where land described by metes and bounds actually abuts (touches) on the highway, the grantee, in absence of intention of the grantor or otherwise to limit the

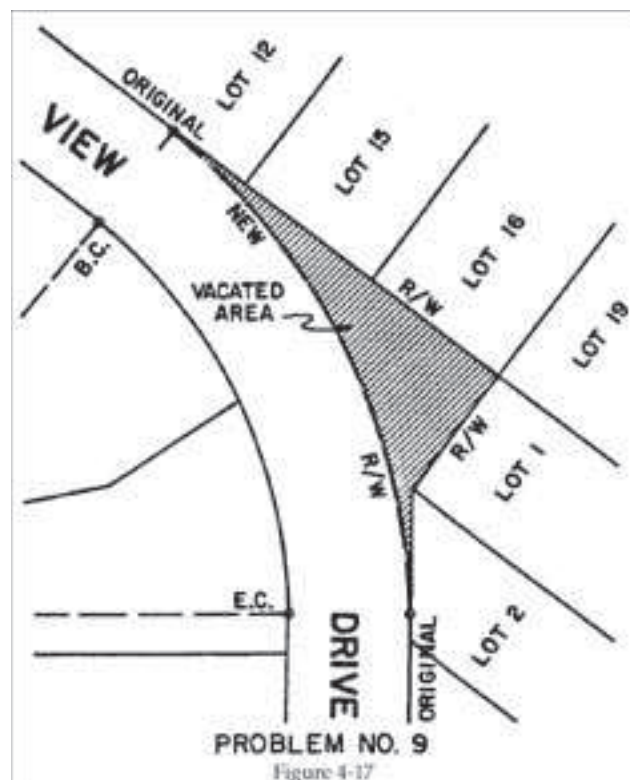


Figure 4-17

description, takes to the center of the highway, even when the highway is not mentioned as a boundary."²⁹¹

Fossi v. Myers, *supra*, cited the principle held in *Cross* and added:

"ORS 93.310 codifies the common law rule of construction relied upon in these cases."

It provides: "The following are the rules for construing the descriptive part of a conveyance of real property, when the construction is doubtful, and there are no other sufficient circumstances to determine it:

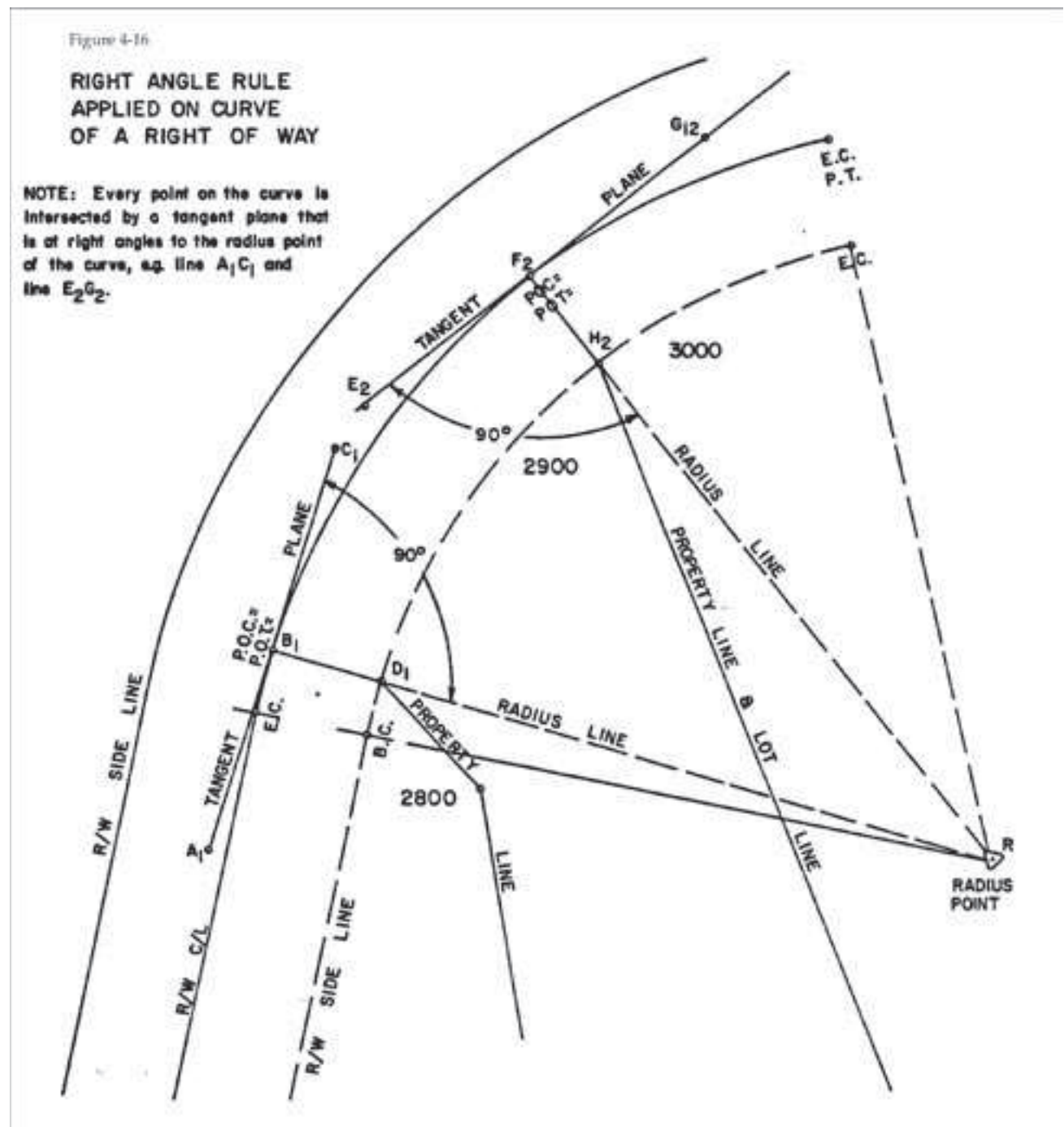
"(4) When a road or stream of water not navigable is the boundary, *the rights of the grantor to the middle of the road, or thread of the stream, are included in the conveyance, except where the road or bed of the stream is held under another title.*"

The court, in *Fossi*, said: "ORS 93.310 and our cases provide and hold *that when a conveyance describes prop-*

erty as bordering on a street, absent an express provision in the conveyance to the contrary, such a conveyance includes the fee to the street."²⁹²

Principle 63 therefore concludes: "It is held that the presumption of intent to convey to the center is not overcome although the land is described by metes and bounds, and the distances stated do not extend to the center of the highway." *Knott v. Jefferson Ferry Co.*²⁹³

Skelton²⁹⁴ explains: "Whenever land is described as bounded by other land or by a building or structure, the name of which, according to its legal or ordinary mean-



ing, includes the title in the land of which it has been made a part, as a house, a mill, a wharf, or the like, the side of the land or structure referred to as a boundary is the limit of the grant; *but when the boundary line is simply by an object, whether natural or artificial, the name of which is used in ordinary speech, as defining a boundary and not as describing title in fee, and which does not in its description or nature include earth as far down as the grantor owns, and yet has width as in the case of a way, a river, a ditch, a wall, a fence, a tree, or a stake and stones, then the center of the thing so running over or standing on the land is the boundary of the (land) granted.*"²⁹⁵

"If the rules and principles are as stated, then how does a grantor reserve the fee in a public way?"

Also: "Why would a grantor want to reserve the fee in a narrow strip of land that would be useless to anyone other than the abutting owner?"²⁹⁶ Presuming, of course, that the grantor has no remaining property that would benefit from the strip of land.

Regardless, the best way for a grantor to reserve the fee in the land of a public way is to make an express reservation in the deed that leaves no question as to the intent of the parties to the deed. Merely "excepting the northwesterly one-half of Monroe Street for public road purposes" will not *cut it* to reserve the fee simple estate in the grantor.

Remember the rule of construction provided in Problem 2: "Everything passes which is necessary to the full enjoyment of the right, title or estate which is included in the words of a grant; but nothing more."

And: "Where there is doubt in the meaning of a deed, or any part thereof, the doubt shall be resolved *in favor of the promise and against the grantor.*"²⁹⁷

With that in mind, there are rules of construction that can be *conservatively* applied. For example, a grantor is conveying a parcel of land that abuts a public way in a *rare situation* where the county has title to the land of the way in fee simple absolute. If the grantor uses the following language, there will be no presumption that the intent was to convey the underlying fee in the way (that is, if the entire language of the deed allows such an interpretation):

"...thence south 157.8 feet to an iron pipe on the north line of Sixth Street; thence along (along and on is better) the north line of said street 85 feet to a 2-inch iron pipe set on said north line; thence north..."²⁹⁸

Application of that rule is advisable where there is reason for confining the boundary of the parcel being conveyed to the sideline of the right of way. But where the grantor has title in the public way prior to a conveyance, the Oregon Supreme Court generally rejects that rule.

Thus, in *Fossi v. Myers, supra*, the Hudson Investment Company conveyed a parcel of land by a metes and bounds description that read:

"... to an iron rod at the point of intersection with the south line of that 80 foot wide parcel of land deeded for street purposes to the City of Portland...; thence South 89 degrees 42' 30" East along the South line of said 80 foot street..."

The Oregon Supreme Court, in 1974, held that the language was insufficient to restrict the estate conveyed to the right of way line of the street, and that the deed operated to convey the estate in fee simple absolute in the bed of the street, subject, of course, to the public easement.

Citing *Hurd v. Byrnes, supra*:

"We have assumed that in absence of an express provision to the contrary *the grantor, in conveying land described as bordering a street or stream, ordinarily intends to also convey his title to the street portion of the lot or to the bed of the (non-navigable) stream.* This rule of construction is also founded on policy considerations, including the prevention of vexatious litigation and the prevention of the existence of strips of land, the title to which would otherwise remain in abeyance for long periods of time..."²⁹⁹

"*Fahey v. City of Bend, supra, and McAdam v. Smith, supra, are in accord.*"³⁰⁰

Problem 8: Apportionment of a Vacated Street with Property Lines Intersecting Curved Right of Way Side Lines ³⁰¹

How should a cartographer determine the boundaries of the underlying fee simple estate in those part of a vacated public way that is circular? Figure 4-15

illustrates the solution to this problem.

Figure 4-15. The boundary of the apportioned area between parcels 3000 and 3100 is by the right angle rule provided in Problem 7.

The solution to the apportionment of the vacated way between parcels 2800 and 2900 and between parcels 2900 and 3000 is by application of the right angle rule. However, in this problem, the boundary of apportionment is the radius line, intersecting the right of way sideline at the terminus of the boundary lines of the abutting real property and the centerline of the right of way. In the solution to apportionment illustrated in figure 4-15 and detailed in figure 4-16, the lines of apportionment are B1, D1 and F2, H2 in figure 4-16. These lines are at right angles to the tan-

gent planes A1, C1 and E2, G2 where the radius lines intersects the centerline at B1 and F2.

Problem 9: The Debatable Solution

How should the area of the vacated part of View Drive be apportioned to the abutting lots 1, 2, 12, 15 and 16 of figure 4-17?

This problem was presented in Chapter 13 of the first two editions of the *Manual of Cadastral Map Standards, Concepts and Cartographic Procedures*. Two solutions were suggested. One was recommended by the Circuit Court of Multnomah County. The other was based on a recommended solution provided in Clark on *Surveying and Boundaries*.³⁰²

The solution recommended by the circuit court is an application of the right angle rule applied in Problem 8; that is, the boundary of the apportioned area is the radius lines of the central curve extended from the corners of lots 1, 2, 12, 15 and 16 to the new right of way side line created by the vacation. The apportionment is as illustrated in figure 4-18.

When a court of equity sets out to discover the boundary of apportionment in a situation like that illustrated in figure 4-17, one of its primary objectives is to provide new street frontage proportionate to the original street frontage. Of course it cannot change known, previously established boundaries, such as line A, C in figures 4-13 and 4-14. But where the boundaries of estates in public ways were not predetermined by the dedicators and subsequent grantors, it must attempt to discover a solution that will be fair and equitable to each *rightful owner of the underlying fee in the public way*.

When the problem was stated in the first and second editions of the manual, it was thought there was a need to provide an alternate solution that would result in each owner of abutting property acquiring new street frontage that would be mathematically proportionate to the original street frontage. This method was adapted from Clark's³⁰³ solution to the apportionment of accretions between a new shoreline and an old shoreline. (*Note: It is standard policy for courts to view the apportionment of vacated public ways exactly as the apportionment of accretions, or the apportionment of the bed of a body of water in private ownership.*)

Thus, the length of the old line is computed or measured (line A, B, C, D in figure 4-19), and the length of the new line is computed or measured. In Problem 9, the length of the old line is 353.41 feet; the length of the new right of way line is 293.33 feet, or .829999 (.83) the length of the old right of way line, or:

$$293.33 - 353.41 = -.829999$$

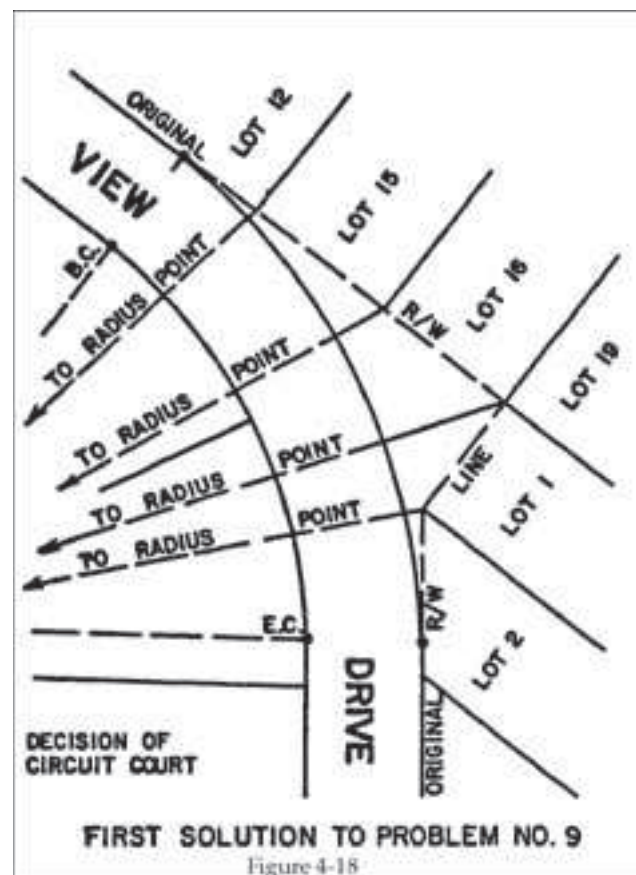


Figure 4-18

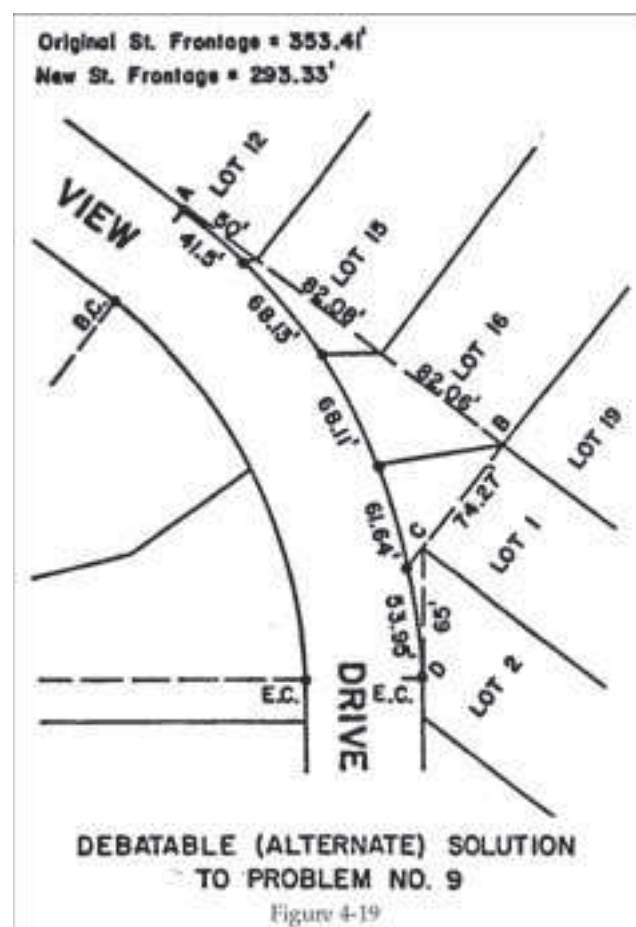


Figure 4-19

The proportionate length of the new street frontage of each owner's real property is calculated by multiplying the original lot width by the factor .829999, or .83, *e.g.*:

$$.83 \times 65 \text{ ft. (lot 2; NE cot to E.C.)} = 53.95 \text{ feet}$$

The solution to apportionment is provided in figure 4-19.

What is wrong with the alternate solution? Nothing, *if the new right of way side line represents the extent of the estate of the owners of the abutting lots.* However, this solution fails to consider the total estate of the abutting owners in the bed of original View Drive. With the principles and rules of law, provided in this chapter, it is obvious that the circuit court's solution probably took into consideration the total underlying fee in View Drive. Consequently, that decision (illustrated in figure 4-18) should be considered the better solution to Problem 9. The lesson here justifies the following principle:

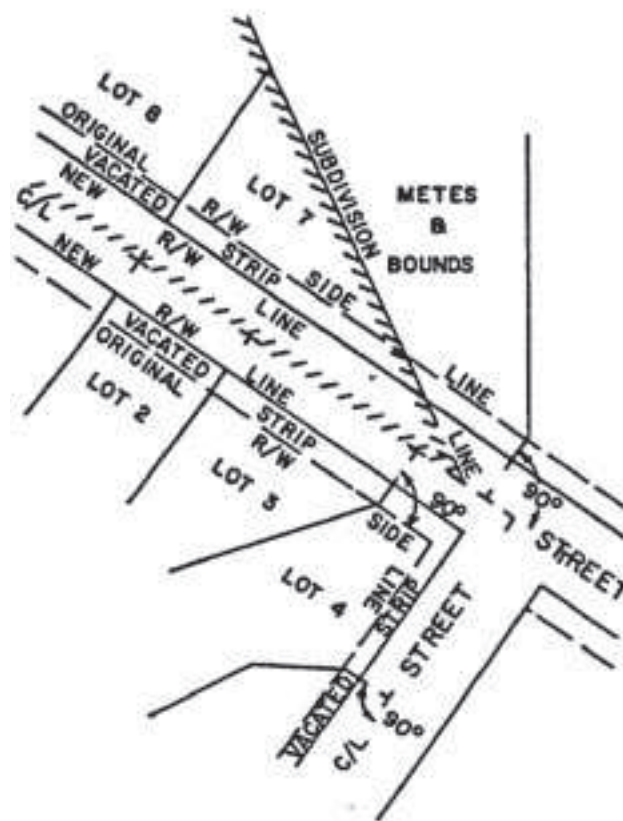
Principle 78

Whenever it is necessary to determine the boundary of apportionment of a public way that has been only partially vacated, the determination must take into consideration the total estate of the abutting owner in the bed of the way. The resulting boundary of apportionment will be a part of the whole boundary of the owner's underlying fee in the way.

Here is a thought on this problem:

"What if the lines of lots 1, 2, 12, 15 and 16 were also the subdivision boundary, and View Drive was dedicated or appropriated from property abutting on the southwest side of the drive?" The lots have all the earmarks of such a situation. Lot 19, for example, must have access to a public way on the northeast, or on the southeast, side of the lot because access to View Drive is not provided that lot. If each of the six lots of figure 4-17 have similar access on the northeast or southeast, it is highly unlikely that the dedicator would have provided additional access by dedicating View Drive as a public way. If this were the case, it would not be the first time a circuit court had overlooked the underlying fee that existed in a public way *prior to vacation of all or part of the way.* After all, many of the principles of law announced by the Oregon Supreme Court, were results of errors of judgment by the circuit courts. If the lot lines were also the subdivision lines, the vacated street would vest in the grantees of the dedicator or grantor of View Drive (and, regardless of the Circuit Court decision, would still *legally* be in the grantees).

Nevertheless, without sufficient evidence to support that possibility, one must support the court's decision and presume it had the facts and necessary knowl-



APPLICATION OF PRINCIPLE
NUMBER SEVENTY-EIGHT

Figure 4-20

edge to rule as it did (and as illustrated in the solution of figure 4-18).

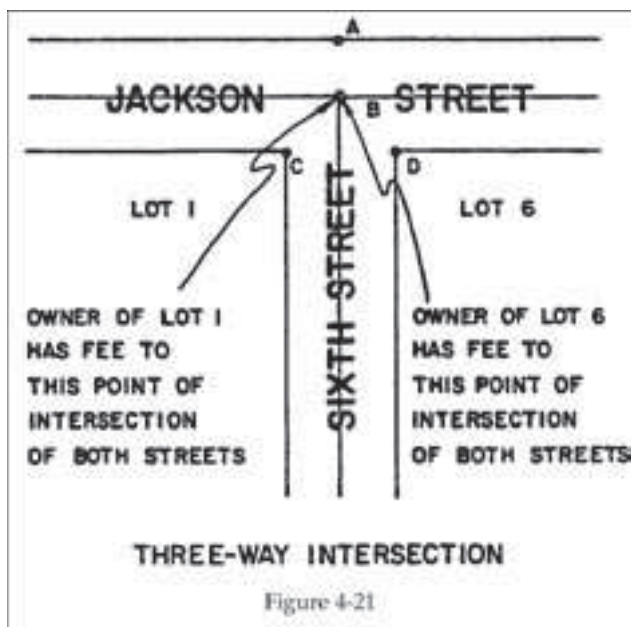
Figure 4-20 provides an example of the application of Principle 78. Although only 10 feet of the public ways have been vacated, correct apportionment requires establishment of the existing boundaries of the entire underlying fee simple estates in the public streets.

Problem 10: Three-Way Intersection

Figure 4-21 illustrates the extent of the estates of the abutting owners in the bed of Sixth Street and Jackson Street.

If the north line of Jackson Street were also the north line of the subdivision, the owners of lots 1 and 6 would possess the underlying fee to point A, rather than point B.

Note: Although the underlying fee of the abutting owners extends to point A (or B, depending on the location of the subdivision line), the official lot corners remain as originally platted. In figure 4-21, point C is the northeast corner of lot 1, and point D is the northwest corner of lot 6. The cor-

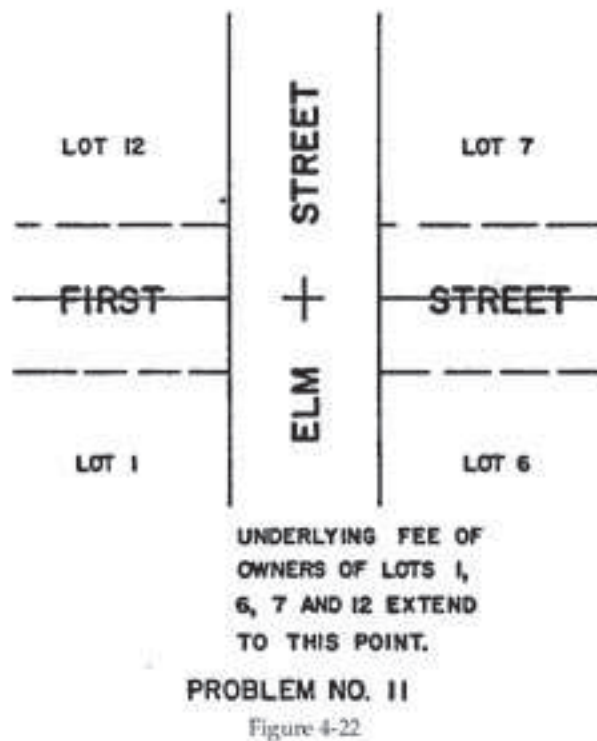


ners as platted do not change as a result of a vacation. This rule will be discussed further under Problem 12.

Problem 11: Vacation of One Intersecting Street

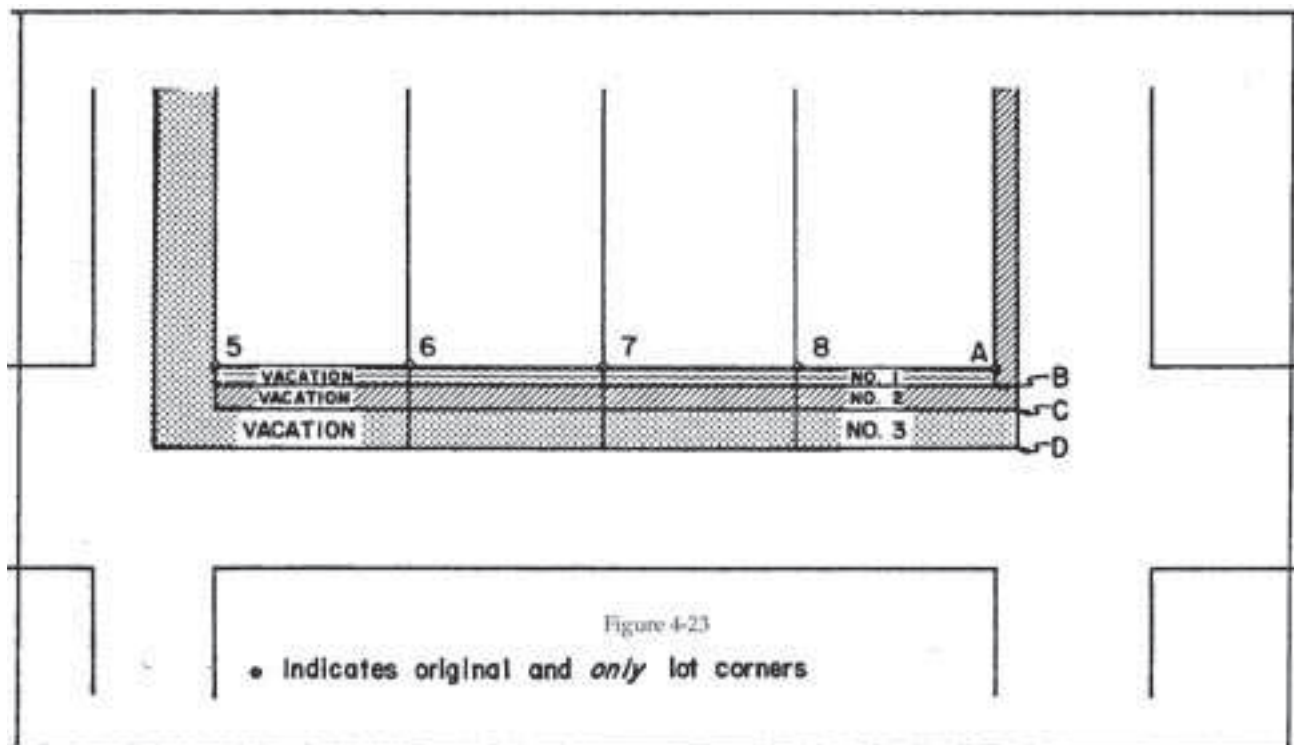
Does the vacation of First Street, in figure 4-22, extinguish the public's easement in intersecting Elm Street?

The answer to Problem 11 is "no." The vacation cannot extinguish the public's easement in Elm Street unless expressly provided in the vacation order, and only if



the vacation does not constitute an additional servitude on the owners of abutting property; that is, inflicting a special injury to the real estate that differs in kind from that sustained by the general public.³⁰⁴

Intersections must be considered as the intersection of separate easements in the public. Thus, in the space occupied by both First Street and Elm Street, two



separate public easements exist, one for First Street, the other for Elm Street. In this case, neither easement dominates (even if one easement is senior to the other). Consequently, the vacation of First Street merely acts to extinguish one of the two easements. The remaining easement for Elm Street suffices to retain the public's right to use the land of the intersection for travel from place to place. This principle has been supported by the courts.

Problem 12: How Are Lots Affected by Street and Alley Vacations?³⁰⁵

Does the vacation of a public way operate to relocate the original lot and block corners as established by the subdivision plat?

The answer is "no." Although the owners of the lots have the underlying fee in all or part of the abutting streets and alleys, the lots do not extend beyond their original location as shown on the recorded subdivision plat. *Nothing other than a replat or resubdivision of the lots can change the original size and shape of the lots.* Thus, in the case of *Earl v. Dutour*³⁰⁶ the court held that:

Principle 79

Street vacations or openings (creating additional right of ways) do not alter the original lot lines.

The court, in *Earl*, indicated that if the lot corners were to be any place other than at the right of way side line, they would be at the center of the street (where the abutting owner's underlying fee went only to the center of the street). Figure 4-23 illustrates the problems that would be effected *if lot lines and corners followed street vacations*.

The circumstances of figure 4-23 is an exaggeration. However, if the vacations number 1, 2, and 3 changed the lot comers, the southeast comer of lot number 8 would be at comer A prior to any vacation, comer B subsequent to the first vacation, comer C subsequent to the second vacation, and comer D subsequent to the third vacation. If this were actually the case, the interpretation of deeds referring to any of the south comers of lots 5 through 8 would be virtually impossible. The grantees, courts, title companies, cartographers, and others would have the problem of deciding *which corner* was the southeast comer of lot 8? The original comer? Comer B? Comer C? Comer D? Or is some other comer in the right of way being referenced?

Fortunately, the courts and authorities are in agreement that "*the lot corners never change.*"

But the fact that the lot lines and comers do not change as a result of a street or alley vacation does not mean the owner of an abutting lot, described by lot number only in that person's deed, is deprived of the underlying fee in the abutting street or alley. Principle 27 controls here:

*'A conveyance of lots abutting a street (or an alley) before or after a vacation carries the fee in the street (or alley), regardless of whether or not the street (or alley) is mentioned in the deed, except where the grantor did not own the street (or alley) or expressly reserved the street (or alley).'*³⁰⁷

Thus in *McAdam v. Srnith*³⁰⁸ the court held:

"Where the description does not mention the street, river or other similar boundary, but the deed describes the parcel so that, in fact, it is adjoining, the title to the bed passes the same as (if mentioned (citing cases))."

The support for the street passing to the purchaser of an abutting lot *subsequent to the vacation of the street* can be found in *Fahey v. City of Bend*, *supra*, and other cases cited in this publication.

The foregoing rules and principles are based on the condition where the street was not separated from the abutting property by a prior conveyance.

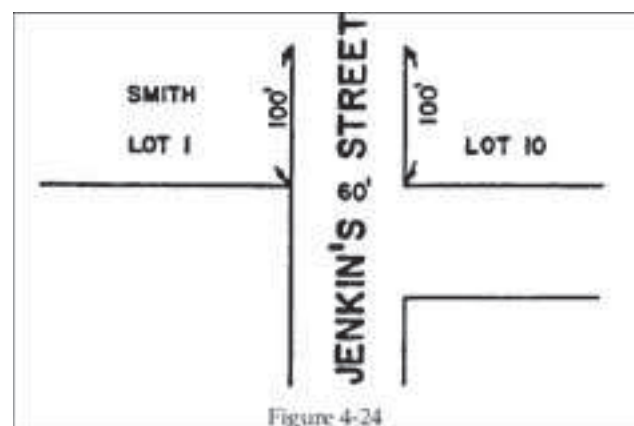
Problem 13: Conveyance of Street Before or After Its Vacation

In figure 4-24, lots 1 and 10 of Sandy Subdivision are separated by Jenkin's Street. The same person owns both lots, and consequently has the underlying fee in all of Jenkin's Street lying between the lots.

If the grantor conveys lot 1 by a deed that merely describes the land as:

"Lot 1, Block 2," of
"Sandy Subdivision."

the conveyance carries the fee to the west one-half of Jenkin's Street, as well as in lot 1.



If the owner of lots 1 and 10 intended to reserve the fee in the west one-half of Jenkin's Street, when he convey lot 1, it was necessary that *he expressly reserved the fee in that part of the street in the deed to lot 1.*

In Problem 13, was it permissible for the owner of lots 1 and 10 to include all of the underlying fee in Jenkin's Street with the conveyance of lot 1, and prior to any vacation of that street?

The answer is "yes." Regardless of the dominant estate in the public, the owner of the servient estate (the underlying fee) in the street can convey that interest, subject to the public easement. But to accomplish this, the grantor's intent must be *expressly worded in the deed to lot 1, e.g.:*

"Lot 1 of Sandy Subdivision. Also all of Jenkin's Street east of, and abutting lot 1, to the west line of lot 10 of said subdivision. Subject to the rights of the public in Jenkin's Street."

Because this kind of conveyance is rare, it would be to the grantee's benefit to request a statement to clarify the intent of the parties to this transaction, *i.e.:*

"It being the intent convey the underlying fee in the full sixty (60) foot by one-hundred (100) foot of Jenkin's Street abutting lot 1 on the East side thereof, subject, however, to the easement for road purposes to the public."

That simple statement *should* suffice to prevent any future misunderstandings about the extent of the estate of the owner of lot 1.

The grantor in the scenario just discussed has to be careful to note in a deed to lot 10, the prior conveyance of the east one-half of Jenkin's Street.

It is important to understand that the conveyance of lot 1 by a description in a deed that reads

"Lot 1, Sandy Subdivision"

carries the abutting west one-half of Jenkin's Street *regardless of whether the street has been vacated.* A review of Problem 12 and *Fossi v. Myers, supra, Hurd v. Byrnes, supra, Fahey v. City of Bend, supra, McAdam v. Smith, supra* and *Cross v. Talbot, supra* will provide support for that rule.

Problem 14: Is Repealed Statute, in Effect After Establishment of Public Way, Self-Executing?³⁰⁹

Re 1860 and 1864 Laws

This problem is pertinent, and remains applicable to unopened county roads created during or before 1899. It is also historically significant, involving a 1968 case and an 1860 Oregon law that read:

*"If any part of any road in this state shall not be opened for two years from the time of its location, the same shall become vacant."*³¹⁰

That statute was amended in 1864 by substituting "four years" for "two years."³¹¹ As a part of the same act, section 55 was adopted, which read:

"The right of counties in this state to public roads, shall not be extinguished by any adverse possession, however long continued, and no title to lands included in such public roads, when such roads are once established, shall be acquired as against such county through the operation of the statute of limitations."

In *Hislop v. County of Lincoln, supra*, the plaintiffs, in 1967, had owned a tract of 27 acres on Alsea Bay since 1951. They made their home and operated a trailer park on that property. In recent years, lands fronting on Alsea Bay and the Pacific Ocean, and lying west of the plaintiffs' property, had been subdivided and platted. This development, known as Bayshore, contained 900 lots.

The controversy, in *Hislop*, arose out of Lincoln County's (the defendant) claim, first asserted in 1965, that a county road, which had never been opened, crossed the plaintiff's property from U.S. Highway 101 on the east to Bayshore on the west. Bayshore was not without access to and from the highway, but apparently the county commissioners thought the road would be desirable and was needed for ingress and egress to Bayshore. The plaintiffs denied existence of the road and took their case to the Circuit Court of Lincoln County. That court ruled in favor of the plaintiffs, and the defendants appealed to the Oregon Supreme Court. The case was argued there October 4, 1967.³¹²

Here is all that was known about the controversial road:

"In 1891 the Benton County Court (the *locus in quo* then being a part of Benton County) established what is referred to in the evidence as 'Nice Road.' The road's point of beginning was several miles east of the plaintiffs' property and its western terminus was the Pacific Ocean. There is no dispute about the correctness of the proceedings establishing the road. Neither is there any dispute about the fact that the road has never been opened at any point west of Highway 101. As far as plaintiffs' property is concerned, it is only a road on a map and by description in the proceedings for its establishment on file in Lincoln County.

"It is the contention of the plaintiffs that the repealed statute (Or L 1860, as amended by the Act of October 22, 1864), which was in effect for twelve years after the establishment of Nice Road, was self-executing and, as the part of that road now in

question was never opened, it must be regarded as *vacated*."

The county contended that the 1864 law was not self-executing, but constituted a direction to the county court to vacate a road which was not opened for four years after the time of its location or establishment.

To support its position, the county argued that the statutes in effect during the relevant years vested supervision of all county roads in the county court of the county in which the roads are located "and no county road shall be hereafter established, nor shall any such road be altered or vacated in any county in this state except by authority of the county court of the proper county."³¹³ That provision, it was said, would conflict with the four-year statute if the latter were construed as self-executing. But if construed in the manner contended for by the county, both sections would be given effect, and the result would be in consonance with the accepted rule that statutes should be interpreted to avoid injurious consequences. These "injurious consequences" were portrayed in the county's brief as:

"Every legally established county road created or established but not opened for travel between the years 1862 and 1903 would be open to question and presumably vacated. There would be imposed upon every county the duty to prove that its present roads created prior to 1903 were actually opened for travel and traveled. Such proof would, in most instances, be beyond the recollection of man and consequently impossible to prove."³¹⁴

The court, in this case, responded:

"We observe in passing that counsel's (the county counsel) assumption as to the burden of proof in the hypothetical cases suggested *is not acceptable*. We think it would be the other way around, for under the presumption that official duty has been regularly performed, it would be presumed that the county officials would recognize that an established road which had not been opened for more than four years had been vacated and would not undertake to improve private property and open it to public travel. Hence, the burden would be upon the one asserting a four-year failure to open a road to prove it.

"Oregon is not the only state which has enacted such laws. For example, an Ohio' statute of 1845 provided: "That any county road, or part thereof, which has heretofore, or may hereafter be authorized, which shall remain unopened for public use for the space of seven years, at any one time, after the order made, or authority granted for opening the same, shall be, and the same is hereby vacated, and the authority granted for erecting the same is

barred by lapse of time ' In 1850 the Supreme Court of Ohio in *Peck v. Clark*³¹⁵ explained the reason for this legislation in this language:

"... Long before the passage of this law, and up to the present time, we had a statute making provisions for vacating a useless or unnecessary road, that has been opened. Any person, at all acquainted with the situation of the country, will at once perceive the object and necessity of this statute. Many roads had been authorized through the country, that from the difficulty and expense that would be attendant on their opening, or in some instances, because they were not necessary, remained unopened. Persons were purchasing and improving lands, over which these roads were to run, without knowing of their existence, other avenues of travel were opened in the neighborhood, that in many instances, supplied their place, and rendered them unnecessary, even if necessary when first authorized. Whenever a road, that had for a long time been in this situation, was attempted to be opened, great difficulty and disquietude were thereby produced; and the legislature to obviate such difficulties, and presuming that a road, that had been authorized, but not opened for so long a time, was unnecessary, passed this statute."³¹⁶

"This court (the Oregon Supreme Court), viewing the matter more than a century after our law was adopted by pioneer legislators, cannot speak of it with the same certainty as did the Ohio court with respect to the reasons behind the statute of that state, but it is not a rash assumption that conditions similar to those in Ohio in 1845 existed in Oregon in 1860, and that the Oregon Legislature in passing our statute had in mind the avoidance of the same sort of mischief's to which the Ohio Court referred.

"On the other hand, it would be wholly speculative to say, as counsel argues, that unless the County's interpretation of the statute is adopted 'the result would work chaos in the entire road system of every county in the state.' There is no evidence, empirical or otherwise, to support that assertion.

"In all cases which have come to our attention construing such statutes it is held either expressly as in *Van Sant v. Seattle*³¹⁷ (where the earlier Washington cases are cited) or, by necessary implication, *that they are self-executing*."³¹⁸

Subsequently, the Oregon Supreme Court held:

"1, 2. We agree with these courts. The statutes of other states are not concisely worded as ours, but all have the common purpose of terminating the legal existence of a road which has not been

opened to public use and travel after the passage of a stated time. Our statute, like those of other states, was ‘essentially a statute recognizing and defining abandonment by nonuser.’³¹⁹ Had the statute read ‘shall be vacated,’ a plausible argument might be made for the county’s position, but the Legislature used the word ‘become,’ which means: ‘To pass from one state to another; to enter into some state or condition by a change from another state, or by assuming or receiving new properties or qualities, additional matter or a new character.’³²⁰ So, we think it was clearly intended that when the statutory time has run and the road has not been opened it shall pass from the state of legal existence to non-existence (emphasis supplied).

“There is no necessary conflict between the section of the road laws vesting in the county courts exclusive authority to vacate county roads and the four-year statute. They relate to different things, or at least, to different methods of accomplishing the same thing: The former to the exercise of the power of vacation by an official body in the manner prescribed by statute, the latter to vacation by lapse of time, and then only in the case of roads which had never been opened. Had the intention of the 1860 Act been to direct the county courts to vacate a road which had not been opened for two years, the natural place for the provision would have been in section 1, where the authority to vacate is given to the county court. Instead the provision became section 37 of that Act.

“Counsel for the defendants invokes the rule that subsequent legislation may be looked to for the purpose of discovering the intent of the original act, and argues that the 1903 Act, by which, among other things, the four-year statute was repealed, aids their contention because that Act makes changes in the procedure for vacating county roads. We are not told, and we are unable to discern, in what way these provisions throw light on the question. It may be added, however, that if any evidence of legislative intent can be found in the 1903 Act, it is contained in section 55 (quoted at the beginning of this discussion), which, in part, provides that the right of counties ‘to open public roads shall not be extinguished by any adverse possession, however long continued.’ It would seem that this provision conflicts with the theory of the four-year statute and that the repeal of the latter became necessary in order to remove the inconsistency. There would, of course, be no conflict if the four-year statute was not intended to provide for the vacation of an unopened road by the passage of time.

“Furthermore, amendments of section 55 of the 1903 act are pertinent. By 1905 Oregon Laws, Ch. 224, it was provided:

“... that the county court of the proper county may order the vacation of any road or part thereof in such county upon the application of any person over whose lands such road may have been located, when it shall be made to appear from such application that such road has not been used for vehicles for a period of five years.’

“This provision, as subsequently amended, is now found in ORS 368.620.304 It’s significance lies in the fact that when the Legislature intended to vest in the county court the authority to vacate a road which had remained unopened for a stated period it expressly so provided and prescribed the procedure to be followed.”

The court, passing judgment on the circuit court decision, affirmed the decree of the trial court, concluding:

“... that part of Nice Road which passes over plaintiffs’ property has been vacated and that plaintiffs are entitled to a declaration that they hold their property free from the claim of the defendants or anyone else arising out of the establishment of such road.”³²²

Principle 80

An 1860 statute, amended in 1864 and repealed in 1903, providing that if any road in the state shall not be opened for two years (prior to 1864), amended to four years in 1864, the same shall become vacant, was self-executing. Consequently, any unopened public road of record subject to the two year or four year law automatically passed from the state of legal existence to non-existence. The Oregon Supreme Court has held that the 1860 and 1864 law is not in conflict with vacation laws providing counties with authority to vacate county roads.³²³

Problem 15: Can City or County Annex a Condition Subsequent of Ordinance Vacating Street? If Such Condition Void, Is Vacation Invalidated?

Although assessors have asked these questions of the Department of Revenue, they are not matters of mapping, assessment and taxation. The discussion and related case law is provided merely to satisfy any curiosity regarding the questions. Moreover, our explanation of highway law and the law of dedication would be incomplete if the discussion were omitted.

*Portland Baseball Club v. Portland*³²⁴ was an appeal from the Circuit Court of Multnomah County regarding a

suit by the Portland Baseball Club against the City of Portland and others. The baseball club claimed the City of Portland had no power to annex a condition to a vacation order. Chief Justice Rand explains:

"On January 25, 1928, on petition of the plaintiff corporation, the council of the City of Portland passed an ordinance which, so far as material to this controversy, provided as follows:

"Section 2. That all that portion of Wilson street lying between the west line of 24th street and the east line of 25th street, now within the corporate limits of (city, county, state), be and the same is hereby vacated and said vacation of said portion of said street is hereby made a matter of record, *but it is hereby expressly provided that the petitioner shall, within ten days after the taking effect of this ordinance, pay into the city treasury the cost of obtaining the necessary changes and the public records so as to indicate as required by law such vacation; and it is hereby provided that the city auditor shall file with the county clerk of (county), a certified copy of this ordinance, and shall obtain from the county surveyor a proper entry on the plat records as provided by law. Nothing contained herein shall cause or require the removal of abandonment of any sewer, water main, conduit of any kind, wires, poles, or any other thing used or intended to be used for any public service, and the right is hereby reserved to maintain, continue, repair, reconstruct, renew, replace, rebuild and/or enlarge any and all such things.*

"Section 3. *The foregoing vacation shall not be valid unless The Portland Baseball Club shall on or before May 1, 1931, fully construct, equip and open to the public a new grandstand, bleachers and clubhouse on the property owned by said club and devoted to the immediate use of said club, the total cost of all to be not less than \$250,000, and which shall be constructed in accordance with the building and fire ordinances of the city of Portland. The failure of said (club) to construct such (improvements) within said time shall ipso facto void this vacation ordinance without any further action or notice upon the part of the council and shall ipso facto³²⁵ constitute a rededication of the area vacated by this ordinance as a street, and all rights secured undersaid vacation ordinance shall ipso facto become null and void. If the (club), its successors and assigns, shall cease to use for baseball purposes the street area herein vacated, then and in that event, said vacated area shall revert and be restored to public use for street purposes and all rights, title and interest of the (club) acquired by this ordinance to said vacated area shall become null and void and the city shall have the right to open up, improve and use said vacated area for street purposes.'*

"After the passage of the ordinance, no attempt was made by (the) plaintiff to perform the condition contained in section 3 thereof, and, after the expi-

ration of the time limited therein, plaintiff refused to perform, claiming that the council had no power to annex a condition which, if not complied with, would render void its act in vacating the street and, therefore, the vacation was effective and the condition null and void. After said refusal by the club to perform, the city proceeded to open up that part of the street vacated and to remove therefrom certain fences and other structures belonging to plaintiff and thereupon plaintiff brought this suit to restrain the city from interfering with its use and enjoyment of that part of Wilson Street."

The trial court had dismissed the baseball club's suit, and the club appealed. The Oregon Supreme Court, in affirming the lower court's decision, held:

"1. In this state the rule is that where land has been dedicated or appropriated for a public street the fee in the street remains in the original owner subject only to the public easement and, upon the vacation of the street, it reverts to the owner of the abutting premises freed from the easement.³²² Under the undisputed testimony, plaintiff is the sole owner of the abutting premises on both sides of that portion of the street conditionally vacated, and if the condition annexed to this ordinance was void, as contended for by plaintiff, the fee in the street became immediately vested in plaintiff freed of the public easement and the public easement thus lost could be restored only by condemnation, purchase or some contract entered into with the owner.

"2, 3. We think it has generally been held that in absence of statutory or charter authority, the city council is not authorized to impose restrictions or conditions to an ordinance vacating a public street. Our statute seems to confirm that authority. Section 56-714, Oregon Code 1930, authorizes the county court to vacate public highways outside of incorporated cities, and provides that, if there is no opposition thereto, the county court 'may vacate a highway with such restrictions as they may deem reasonable and for the public good,' and section 56-715 provides that if there is opposition to such vacation, the other requirements of that section having been complied with, the county court 'may, if in their opinion justice require it, grant the prayer of the petitioner, in whole or in part.' The powers thus conferred upon the county court are conferred upon the common council of an incorporated city by section 56-718, which provides that the council may vacate a public street 'under the same restrictions and limitations as are contained in the foregoing provisions of this act.' These provisions, we think, confer the authority upon the council of the city of Portland to impose reasonable restrictions

and limitations upon the act of vacating a public street within the city. The charter of the city also provides that the council shall have the power to vacate a public street 'in whole or in part.'³²⁷ While the powers thus conferred by the charter are not as broad as those conferred by the statutes referred to, yet the council is not bound to look to the charter alone for its authority, for it may also exercise such additional powers as are conferred upon it by a general statute applicable alike to all incorporated cities within the state.³²⁸

"4, 5. In passing ordinances, a city council is acting in a legislative and not a judicial capacity.³²⁹ As there said: 'The release of the public right in a highway, involved in its discontinuance, is in nature a legislative and not a judicial function, which may be directly performed by the legislative agents of the state.' The vacation of a street or other public highway is the exercise of a power properly within the domain of the legislature and both by statute and by its charter, the City of Portland is authorized to exercise that power. In the exercise of its legislative power, when duly authorized thereto, and in respect to matters properly within its control, the council is limited only by some constitutional, statutory or charter provision, or some positive rule of law, and, in the absence of such provision or some positive rule of law prohibiting it, the legislative power of the city in respect to such matters is the same as that of any other legislative body.

"6. Plaintiff contends that the council had no authority to annex a condition subsequent to the ordinance and, therefore, the vacation was effective but the condition was void. 'The effect of a condition subsequent,' said Shaw, C.J., in *Harrington v. Harrington*³³⁰ 'is not to prevent the act to which it is annexed from taking present effect; but it may defeat it afterwards, or be attended with other legal consequence.' It is obvious that the passage of this ordinance was to give immediate effect to the vacation of the street and, if the condition was contrary to the law, then the condi-

tion alone was void and the vacation would stand as if it were absolute and unconditional.

"7, 8. The evidence shows that plaintiff had entered into an agreement with the city to charge itself with the duty, on or before May 1, 1931, 'to fully construct, equip and open to the public a new grandstand, bleachers and club house on the property owned by said club, the total cost of all to be not less than \$250,000.' Such agreement was not contrary to public policy and the annexation of the condition was to recognize and accede to that agreement. Such an agreement is not contrary to law nor against public policy, and therefore, the incorporation of it in the ordinance as a condition was not void since it affected no one but the contracting parties and was not unreasonable or contrary to public policy. It was a condition which the council had a right to annex to the ordinance and, since it was not complied with, the city had the right to restore the status quo by opening up the street, and it would seem the plaintiff is, and of right ought to be estopped to deny the validity of the annexed condition."

Other Vacation Problems

For solutions to problems of apportionment not discussed here, refer to Curtis M. Brown's *Boundary Control & Legal Principles*, *supra*, i.e. "Lots at an Angle in a Street,"³³¹ a right angle change in street replaced by curved right of way. This is similar to Problem 9).³³²

Note: Additional problems and solutions to vacation problems, as well as case material that comes to the Cartographic Unit's attention after this is published, will be provided in annotations to be periodically added to this volume subsequent to its publication.

Anyone making decisions based on the material contained here must be alert to legislative acts and future decisions of the state Supreme Court and Court of Appeals that could have a bearing on the solutions discussed here.

A person who induces the public to believe his or her land a gift, or knowingly permits them to use and treat it as their own, until they have so accustomed themselves and accommodated their business to it, that they cannot without detriment be dispossessed, confers a right which that person can no more resume without wrong than he or she can rightfully seize what was acquired otherwise than by his or her gift.

*Parrish V. Stephens
20r. 59, 69*

17

SUB-CHAPTER

PUBLIC WAYS
BY PRESCRIPTION

Previously, this publication has discussed the establishment of public ways by: (1) dedication--common law and statutory, (2) grant--by purchase or donation, and (3) statutory proceedings, including eminent domain. All of these methods are more common than that of establishing public way by *prescription*: the right of the public to continue to use the land of an owner for travel, acquired by the public's continued, uninterrupted use of the owner's land for a period of time set by law (Oregon statutory period is 10 years, Code 1930 subsec 1-202).

Prescription is not only the rarest of the methods for establishing public highways, it is the method least favored by the courts (in the decision in *Shumate v. Robinson*¹ the court said, "Easements by prescription are not favored by the law").² This does not mean the doctrine of prescription is not recognized in Oregon, nor does it mean that claims of easement by prescription are not upheld. But it does mean the courts will be conservative and technical in recognizing such claims. They will reserve approval of the claims only in cases where the party gives notice in its pleadings that it is specifically asserting such a claim,³ and where that party can prove open, notorious, hostile (that is, the use is not by license), continuous and uninterrupted user for the statutory period of 10 years.⁴ The recognition by the courts is because the doctrine of prescription is founded on the idea that it is in the best interest of the public that title to property should not long remain uncertain and in dispute. It also promotes private justice by putting an end to and fixing a limit to contention and strife.⁵

Prescription has nearly all the characteristics of adverse possession, but is distinguished from the latter doctrine in that prescription is a means of acquiring incorporeal hereditaments (in our discussion, easements), whereas, adverse possession is a means of acquiring corporeal hereditaments (land). The court, in *Raab v. Casper*,⁶ explains the distinction better,

*"There is a difference between a prescriptive use of land culminating in an easement (i.e. an incorporeal interest) and adverse possession which creates a change in title or ownership (i.e. corporeal interest); the former deals with the use of land, the other with possession; although the elements of each are similar, the requirements of proof are materially different."*⁷

The acquisition of a public easement by user by the public, that is, by *prescription*, is similar to such an acquisition by *custom*. The latter is the result of a local usage, not connected to any particular person, but belonging to the community rather than its individuals. The major distinction between a prescriptive public easement and one established by custom is that the latter requires user for *time immemorial*; the former requires only continued, uninterrupted use for 10 years.

How is the doctrine of prescription relevant to the cadastral cartographer's task and the assessment and taxation of real property in Oregon?

Before that question is answered, consider the road or street, often encountered in the cadastral mapping process, that has all of the characteristics of a public way under jurisdiction of a city (or county), but there is no record of the way being dedicated, donated, granted, acquired by eminent domain, or established by any statutory means. Many such ways have been encountered during remapping programs. Typically, the circumstances will be:

1. The way is being used for public travel. In the majority of situations there is evidence of public use of the way for over 20 years.
2. The city (or county) has assumed maintenance of the way (but in many situations these ways are not maintained in as good condition as other streets in the area).
3. Other evidence that the city (or county) has assumed authority over the way includes:
 - a. Traffic signs are posted on the way.
 - b. Stop signs are placed at certain intersections with the way.
 - c. The way is patrolled by law enforcement agencies.
 - d. Curbside public parking is permitted. In many cases parking is regulated by city signs, yellow curbs and, in some situations, parking meters.
 - e. The city (or county) has painted a dividing line, separating traffic lanes, down the center of the way.
 - f. The city (or county) has installed a drainage system in the right of way.
 - g. City (or county) maps show the way in the same manner as public ways of record.
 - h. The city (or county) has passed ordinances relating to the way.
 - i. In some cases, city streetlights have been installed.
4. Appraisal records reveal that improvements (residential or commercial) have existed along the way for many years, and the occupants have apparently relied on the way for ingress to and egress from the abutting realty.
5. There is no record that the public use is by license.
6. The deeds to the land abutting the way are written in the same manner as deeds are written

for most metes and bounds parcels abutting a public way of record. In some deeds, the way is mentioned by name; in others, it is referred to as a public road, street or right of way. Two deeds make no mention of the way. All deeds, however, are described by running to a line that is coincident to the center of the way.

7. The status of this way has never been debated in a court of law. Moreover, there is no known claim that the public use of this way is unlawful.

Obviously, the deck is stacked in favor of a public way. But the purpose here is to show circumstances that are signals of a presumed public right to the use of such ways. The majority of the evidence, or clues, are not necessary for the operation of prescription, but it is not unusual to find most present in such situations.

This leads to the problem relevant to mapping, assessment and taxation, i.e.: *Is the privately owned land in the public way taxable? or exempt from taxation?*

If the way is public, the land of the bed of the way is exempt from taxation. If it is only used by the public, but is not a public way, the bed of the way is taxable real property.

It would be convenient if the status of the way (public or private) were resolved before being encountered in the mapping process. However, this is seldom the case. Of course, it would be unreasonable to ignore the problem under the presumption it would some day (in the near future, or far future) be resolved by the courts. In the scenario presented as exemplary of a road established by prescription, it is unlikely that its status will ever be debated in the courts. Moreover, it is important to remain aware that it is not the responsibility of the courts to legalize such roads as public. The court's only duty here is to settle disputes over the rights, title and interests of the ways, and to interpret the laws governing the ways when such an interpretation is essential to resolve the problem before it.

An understanding of the doctrine of prescription will aid you in making a determination (for mapping, assessment and taxation purposes) about the taxability of the land in the type of ways under discussion here. At least the knowledge will be helpful for presenting the problem to legal counsel for advice. But be advised! Regardless of who makes the determination (outside of the courts or legalization statutes), the decision regarding the way being public or not is not binding on the public or any person or governmental body. It is for the purposes of assessment and taxation only. However, this is not to say that the determination could not end up as part of a defendant's or appellant's case for, or against, a claim that a certain road is or is not a prescriptive public easement. If this

happens, you will at least have the opportunity to see how well you understand prescription.

The following case of *Bayard v. Standard Oil Co.*⁸ is one of the earliest Oregon cases dealing with prescription. It is instructive on how the court resolves problems regarding such claims.

Bayard v. Standard Oil Co.⁹

This action, by C.E. Bayard and Frank Watkins, administrators of the estate of Perry Watkins was against the Standard Oil Company to recover damages for injuries resulting in the death of Mr. Watkins. The plaintiffs alleged the injuries were caused because an unlawful obstruction (an oil tank) was placed in a public highway. The gist of the action was that the oil tank was in a county road, and if it was not in the limits of such county road, it was conceded that no action would lie.

Circumstances of the case were:

"Prior to 6-27-1896, the defendant had constructed a foundation of brick, by the side of or near the beaten track of a publicly traveled highway, and on that day was engaged in placing an oil tank thereon 10 1/2 feet in diameter, and 30 feet in length, cylindrical in form, and of a red or light brown color. When the tank was nearly in place, one Julian was driving by, and as he came opposite, his team became frightened, and ran upon the deceased (Perry Watkins), who was in a hack, driving ahead, causing his death. The theory of the plaintiffs is that the highway was a public county road; that the tank constituted an obstruction and a public nuisance within such road; and that the frightening of Julian's team thereat was the proximate cause of the injuries complained of. To sustain their contention, they introduced in evidence the records of the attempted establishment by the County Court of Wasco County, Oregon, in 1867, of a county road from The Dalles to the Lower Deschutes bridge, consisting of the original papers on file and record proceedings relating to the matter. These were not offered for the purpose of showing a valid establishment of the highway, *but to show color of title merely*, to be followed by proof that it had been opened up *and used by the public for about 28 years, regularly and continuously*, prior to the accident. Other evidence was produced, tending to show that between the years 1867 and 1880 there was a road leading from The Dalles to the Lower Deschutes bridge, commonly known as 'The Dalles and Deschutes Road,' which was regularly traveled by the public; that it was worked by the road supervisor from time to time; and that the thread or beaten track thereof passed over the ground where the oil tank was being placed. 'The defendant (oil company) produced evidence tending to show that one Mary

Laughlin was the donee from the general government of the *locus in quo*; that on July 12, 1881, she deeded to the Oregon Railway & Navigation Company a strip of land, comprising the premises, upon which the oil tank was placed; that the Oregon Railway & Navigation Company, sometime about the year 1882, constructed an ice house near the west end thereof, and a few feet to the east of where the oil tank was substantially erected; that since said time the traveled track turned to the south, but in close proximity to the ice house, after passing which it gradually bears back, until it connects with the old way, several rods further west. The tank extends south, even with the ice house, but not upon the beaten track of the road as now used, and the defendant claims to have the authority of the (O.R. & N. Co.) for erecting it at that point..."

Mr. Justice Wolverton, after stating the facts, delivered the following opinion of the Supreme Court:

"The plaintiffs' cause of action depends upon whether the oil tank was being placed within and upon a public county road. If it was, the right of recovery was clear, the other conditions being that it must have been the proximate cause of the injury, which must have been special and peculiar, other and greater than that sustained by the public generally.¹⁰

"1. The first question of material moment arises upon the motion for a judgment of nonsuit, and has relation to the competency of the ineffectual road proceedings, as showing color of title in the public. The only way in which the record could serve the plaintiffs is to extend possession constructively on the whole, if there has been occupancy of any part within prescribed boundaries. User by the general public, under a claim of right, adversely, and not be mere permission of the owner, for the period prescribed by the statute as a limitation beyond which actions for the recovery of real property cannot be maintained, will establish an easement in the public. But the use must be continuous and uninterrupted, and substantially by way of a certain and well-defined line of travel for the entire period.¹¹

"2. It is not material to the present inquiry whether such an easement is acquired by prescription, which presupposes an establishment by competent authority, or by dedication which implies a grant (of an easement); for it is clear that such an easement may be acquired by adverse user, by whatsoever name the process of establishment may be called. As a general rule, when the highway depends solely for its establishment upon adverse and continuous user by the general public, its width and extent of servitude are measured and determined by the character and extent of the user, for the easement cannot, upon principle or authority, be broader than user.¹²

"Other conditions, however, may be effective to extend the exterior limits beyond the thread or course

of actual travel, as where inclosures may have been permanently maintained by persons affected with reference to the highway, or the use is referable to a survey and plat recognized and adopted by owners of lands over which the way extends, or was under color of ineffectual proceedings to establish a legal road under the statute.¹³

"Even where the highway is founded solely upon user, its width or extent of servitude is usually a question of fact for the jury. It would seem that it ought not, where the topography of the locality will permit, to be confined exclusively to the beaten track or thread of actual travel, because of the exigency that experience has shown for the passing and repassing of those in use of it. And circumstances such as that the use has been with reference to natural objects or artificial obstructions, or the character of the way requires improvement, necessitating to the wayside, are pertinent for the consideration of the jury in determining the question.¹⁴

"3. It may be conceded, for the purposes of this case, that the irregular and ineffectual proceedings of the county court constituted color of title, so that a claim of right and continuous possession and user for the statutory period would give establishment to the highway for the full width designated in the supposed proceedings.¹⁵ Ordinarily, there must be an entry under, and a claim of right with reference to, the colorable title, in order to set the statute of limitations running. In such a case, actual possession need not be of the whole, but may be of a part only, and it will be extended constructively to the whole, by reason of the definite description contained in the defective or ineffectual muniment. The rule must have like application to public highways, if it has any at all; that is to say, user by the public must have been begun and continued with reference to the supposedly valid proceedings. In such a case, if there was user of a part, within defined limits, as shown by the proceedings, it would amount constructively to an occupation of the whole, and the width of the road, when thus established, would correspond with that designated by the authorities or by the law. From the very nature of things, there must be an entry and a user with reference to the color of title, as otherwise it could not be available for any purpose.

Principle 81

"Colorable title forms the basis upon which a prescriptive right to the full width of the defined limits is founded.¹⁶

"The next step in logical course of establishment is an entry and a user with reference to it, and, when this has been continuous and uninterrupted and adverse for the statutory period, then has the right ripened into a valid title in the public. It would be fallacious

reasoning, therefore, to indulge a presumption that a road as actually worked and used by the public was within and upon the way as attempted to be located, and thence to conclude that its width must be measured by that designated in the void proceedings. *It must be proven that the road as used falls within the colorable title, and, when this is done, the other condition follows; that is, the possession is extended constructively to the entire designated width, or occupancy of a part is then equivalent to an occupancy of the whole.* Where the highway as used runs without the exterior lines of that as surveyed and attempted to be located and established by lawful authority, the width must then be determined by the rules herein before ascertained, and the ineffectual proceedings can have no bearing whatever upon the subject. *Marchand v. Town of Maple Grove*¹⁷ was a case where a highway, four rods wide, had been lawfully established by competent authority, but at one point along its course, by reason of the marshy character of the soil, the travel had been diverted wholly without the limits of the road as laid, and so continued for a sufficient time to establish an easement by user, and it was held that the width of the road thus acquired *should be measured by the use*. If such is the rule, where there is a diversion from a road laid by valid proceedings, it must be so by a much stronger reason where the proceedings are invalid, and constitute color of title merely. So that...

Principle 82

"In order to make the easement or title available for the designated width, the road as used at the point in question must be shown to fall within the limits of the one attempted to be laid, otherwise the easement cannot be broader than the use."¹⁸

"4. In this view of the law, the record and files of the county court were not competent, under the evidence subsequently developed. Mr. C. Schultz, the plaintiffs' witness, who was a surveyor, attempted to relocate the road survey, but found it utterly impossible to do so. He says, in effect, that it was not possible to locate the ground where the line would run from the field notes, and that all of his efforts put the ice house and oil tank *outside of the road*, according to his survey. Nor does the evidence of the defendant help the plaintiffs' case. So that there was no testimony before the jury tending to show that the road as used, and which traversed the immediate ground occupied by the ice house and oil tank, was within the exterior limits of the road as attempted to be laid at that point; hence the ineffectual record was not pertinent or competent, and should not have been allowed to go to the jury" (of the trial court).

"The plaintiffs, however, produced evidence tending to show that there had been an adverse and continu-

ous user by the public, under, claim of right, of a way passing over the ground occupied by the oil tank for a period of time extending from 1867 to 1880, and insist that it was competent for the jury to determine from the nature of the user whether the highway had been established thereby. If so established in 1880, the title thus acquired must be presumed to have continued up to the time of the accident, unless the contrary is shown. There was evidence, upon the other hand, from which it may reasonably be inferred that the road, as established up to 1880, had subsequently been abandoned at the point referred to by nonuser, caused, perhaps, by the encroachment of the (O.R. & N. Co.) in constructing the ice house within and upon the way. It was held, in *Grady v. Dundon*¹⁹ that uninterrupted obstruction of a county road for more than ten years bars the right of the public by adverse possession. But the way at this point, so far as the evidence tends to show, was established, if at all, by prescription, that is, *by user under claim of right*. As a way may be obtained and established by user, it may also be lost to the public by nonuser. Highways may be wholly, and there is no reason to hold that they may be partially, discontinued by nonuser.²⁰ And in a later case, the court said: It has been settled in this state that a highway can be partially discontinued by nonuser, and that it stands, as against long possession, no better than any other property."²¹ So it was held in *City of Peoria v. Johnston*.²² That the public loses its right to a highway where it has abandoned it, and has accepted another instead, for such a length of time, and under such circumstances, as to give it a title to the substituted road. 'But,' said the court, 'independently of this principle, conceding this highway was laid out as claimed by appellant, and conceding there was an intention to dedicate the premises on the southeast of section 4, we are of opinion that the adverse possession of the appellee, open and exclusive as it has been, and the complete nonuser of the easement by the public for more than twenty years, are a sufficient answer to the claim now made by the city.' It is said in 3 Kent,²³ 'That mere nonuser for twenty years affords a presumption of extinguishment, *though not a very strong one*, in a case unaided by circumstances; but if there has been, in the meantime, some act done by the owner of the land charged with the easement in consistent with, or adverse to, the right, and extinguishment will be presumed.'²⁴

Note: In Oregon, it was later held that the public easement is not extinguished by nonuse (see Principle 43), nor do the statutes allow for extinguishment by adverse possession (see ORS 221.750 and 275.027, and Principles 38 and 39).

"It would seem that by reason of the construction of the ice house, which was about the year 1882 and which has probably been maintained in the same

position ever since, the thread of travel was diverted from the old highway before reaching the building from the east, and, after passing close by on the south, it again approaches the old way, and comes into it a few rods west; that this obstruction had existed, and this new way had been used, for more than ten years, and at the same time and during all the while there has been a complete nonuser of the old way between the points of divergence. Now, if these facts are established by the proof, the jury would be warranted in finding that there was or had been an abandonment of the old way by nonuser, and in acquirement of a new way, which should be measured, as respects its width, by the rules herein previously ascertained. If, therefore, the construction of the oil tank was without the exterior limits of the newly acquired highway, then the defendant was not liable, *and no recovery of damages could be had*. The instructions of the court below (speaking of 'the lower court--or trial court'), as we understand them do not proceed under this view of the law, but rather, upon the space covered by the ice house, and that the construction of the tank within the limits of the old way, although not within those of the new would constitute an obstruction for which it would be liable if injury ensued on account of it. *These considerations render it necessary that the judgment of the (lower) court should be reversed, and a new trial ordered.*

*"Reversed."*²⁵

Wallowa County v. Wade²⁶

The establishment of a public easement by prescription is not the only legal effect of public user for the statutory period. The use is also evidence of acceptance of an easement granted prior to the time the statute of limitations was set running.

In Oregon, public land cannot be acquired by adverse possession. However, the acquisition of an easement across public lands, by public user for the statutory period, has been held to be one of the ways recognized by the laws of this state for establishing a public highway. This principle was announced in *Wallowa County v. Wade, supra*. This was a decision of the post-pioneer era, and one that was based on a special set of circumstances. Consequently, it is probably irrelevant to most modern problems regarding prescription. But this case has historical significance to the development of the common law doctrine of prescription in Oregon. And it is instructive on how some public ways came into existence in this state.

The case was a suit to enjoin Wade, the defendant, from obstructing a public highway running through sections 24, 25, and 36 in T.1S. R.44E, W.M. in Wallowa County.

All of sections 24 and 25, except one 40-acre tract, was unoccupied public land of the U.S. until 1901, when it was settled upon under the homestead law. The 40-acre tract was taken as a homestead in 1896. Section 36 was school land belonging to the state until January 1901, when the defendant contracted for its purchase. The road in question is a part of a highway from the Town of Joseph, in the southern part of the county, leading north a distance of about 24 miles by and near the Town of Enterprise. It was traveled by the public as early as 1880.

"In 1888, upon a petition of the requisite number of householders, and after notice thereof, the county court appointed viewers²⁷ and a surveyor to lay out and locate a county road along the same route, who thereupon proceeded to lay out, survey, and locate the road, from the Town of Joseph north, following as near as they could the then traveled road. Upon the coming of their report, it was approved by the county court, and the road established and ordered opened. From that time the use by the public of that part of the road now in controversy was *continuous and uninterrupted until 1901*, when the defendant (Wade), by permission of the homestead claimants, built a fence across it near the south line of section 24, and another through the center of section 36." The trial court ruled in favor of the plaintiff in the suit to enjoin the maintenance of the fences. Subsequently, the defendant appealed that decision to the Supreme Court of Oregon.

Here was the kind of testimony that showed the road had been used continuously by the public for more than 10 years:

- A. S.A. Hart, who had lived near the north end of the road since 1883, was one of the "chain carriers" at the time the road was surveyed in 1888. He testified that the road was in use by the public as road "when he first knew it," and he said the road had been "continuously used ever since" (to 1903, the year of the trial); "that he and the settlers in that portion of the county have used it since 1888, supposing it to be a public highway by reason of the action of the county court; that over sections 24, 25, and 36 the travel has held to the old, original track, although there has been some slight variation; that during all this time it has been a plain, open, well beaten track, and has been traveled by all the people that live in that section of the county; that it is the only road used by them in going to and returning from the county seat; that through section 24, 25 and 36 the road passes through a can(y)on or gulch, and there is practically but one track."
- B. George S. Craig had lived in the county for 20 years, and knew of the road all of that time. He testified that it had been traveled by the public continuously as a highway, and he supposed it was a county road

since 1888; “that through sections 24, 25, and 36 the road runs through a can(y)on, and there has been but one track or roadbed used by the public,” and he never noticed that it had been changed.

- C. J. B. Olmsted (as well as others) who had known and used the road since 1883 and prior to that time, testified substantially to the same state of facts. The court said, “Indeed, upon this question there is practically no controversy in the testimony.”
- D. The testimony of the defendant was directed mainly to showing that the road over the land enclosed by him had never been worked or improved by the county authorities, or under their direction, and that it had been obstructed or changed from the original survey at other places along the route.
- E. The county held the position that at the time the road was obstructed by the defendant, it was a public highway, becoming such by:
 - 1. establishment under the statutory proceedings;
 - 2. dedication and acceptance; and
 - 3. *prescription and user*.

The objection of the defendant to the statutory proceedings was that the petition upon which they were based was insufficient to give the court jurisdiction, because it did not sufficiently describe the beginning, intermediate, or terminal points of the highway. The Supreme Court felt that that particular argument was not worth examination in this case. It further held:

“1. The county court, acting upon such petition and notice given as required by law, caused the road to be surveyed and marked upon the ground, and this was followed by continuous user by the public for more than thirteen years prior to the construction of the fence by the defendant. *This is sufficient to amount to an acceptance of the grant made by Congress, and for the establishment of a highway over state land, either by dedication or prescription.*”²⁸

“Congress passed an act²⁹ providing that ‘the right of way for the construction of highways over public lands not reserved for public use is hereby granted.’³⁰ While the language of this act is somewhat indefinite and uncertain, it has usually been construed as a present grant of an easement over public lands for highways, but is applicable to railways and toll roads.³¹ ‘The object of the grant,’ says the Supreme Court of South Dakota, ‘was to enable the citizens and residents of the states and territories, where public lands belonging to the United States were situated, to build and construct such highways across the public domain as the exigencies of their localities might require, without making themselves liable as trespassers. *And when*

the location of the highways and roads was made by competent authority or by public use, the dedication took effect by relation as of the date of the act; the act having the same operation upon the lines of the road as if specifically described in it.”³² The act of Congress is more than a mere general offer to the public, being in effect a dedication of the land, which becomes operative and relates back to the date of the act whenever the public, either by user or by some appropriate act of the highway authorities, affirmatively manifests an intention to use a certain definite portion of the public land as a highway. The right is necessarily definite, and, in a sense, floating and liable to be extinguished by a sale or disposition of the land until the highway is surveyed and marked on the ground, or in some other way identified or designated; *but when the public authorities lay out and locate a road over public land of the United States by surveying and marking it on the ground, or by some legislative act, or when it is shown by user, the right becomes complete, and an intention to accept the dedication is manifested, and subsequent settlers on the land take (the land) subject to the easement.* The next year after the act of Congress referred to, the Legislature of Kansas passed an act declaring all section lines in a certain county to be highways; and it was held that it amounted to an acceptance of the dedication by Congress, and when the land passed into private ownership, was taken subject to the easement.”³³

“2. In *Streeter v. Stalnaker*³⁴ it was held that *long-continued user by the public, together with a survey, marking out, platting, and improvement by public authorities was sufficient to show an acceptance of the dedication.* In that case it said: ‘By this act the government consented that any of its lands not reserved for a public purpose might be taken and used for public roads. The statute was a standing offer of a free right of way over the public domain, and as soon as it was accepted in an appropriate manner by the agents of the public, or the public itself, a highway was established.’

In *McRose v. Bottyer*³⁵ there was no action whatever by the public authorities, and nothing shown but user by the public. The Court held that sufficient, saying: ‘The fact that the land was public land of the United States at the time the right to use it as a public way was acquired, and also at the time the use of it ceased, makes no difference. The act of Congress of 1866³⁶ granted the right of way for the construction of highways over public land not reserved for public use. By the acceptance of the dedication thus made, the public acquired subject to the laws of this state; and the easement not having been extinguished by the operation of such laws, when the defendant acquired the title to the land, she took it *subject to the easement.*’

*"In Smith v. Mitchell*³⁷ the same doctrine is announced; the Court holding that *a highway may be established over public land in any of the ways recognized by the laws of the state*. In deciding the case, Mr. Chief Justice Gordon, speaking for the court, said: 'It is a well known fact that many of the public highways in this state had their inception in adverse user, which ripened into prescription. The act of Congress already referred to does not make any distinction as to the methods recognized by law for the establishment of a highway. It is an unequivocal grant of right of way for highways over public lands, without any limitation as to the method for their establishment, and hence a highway may be established across or upon such public lands in any of the ways recognized by the law of the state in which such lands are located; and in this state, as already observed, such highways may be established by: *prescription, dedication, user, or proceedings under the statute*. Any other conclusion would occasion serious public inconvenience.'" The Supreme Court of Oregon, therefore, held: "...The long-continued user by the public shown by the testimony in this case, together with the action of the county authorities in surveying and locating a road over and through sections 24 and 25, was, under the construction thus given to the act of Congress, and acceptance of the dedication, and sufficient proof of a public highway.

"3. Section 36 was school land, and belonged to the state until 1901. Prior to the act of February 10, 1903³⁸ the statute of limitations ran against the state the same as against a private individual, and its title to school land could be extinguished by adverse possession.³⁹ The proof shows abundantly that the road had been used continuously through this section for more than twenty years by the public as a highway, under a claim of right, prior to the acquisition of the land by the defendant; and this was sufficient to establish the highway, as against the state, by prescription or adverse user,⁴⁰ even if the surveying, locating, and filing the plat thereof was not of itself a dedication of the land to the public for a highway, if followed by user by the public for that purpose.⁴¹ The county is an agency of the state in the location of highways, and there is reason for the position that the act is binding on its principle, even if not valid as against a private individual because of irregularities or imperfections. But a decision of the question is not necessary at the present time."⁴² The Court affirmed the decision of the trial court (in favor of Wallowa County).

Parrott v. Stewart⁴³

"O.J. Parrott brought this suit against John M. Stewart and R. L. Stewart, heirs of Barbara Stewart, deceased, and the Standard Oil Co., a corporation of California, and the Sumpter Valley Railway

Company, a corporation in which the City of Baker intervened, to foreclose a certificate of delinquency issued to the plaintiff for the nonpayment of certain taxes assessed against the property described in the complaint, which is situated within the corporate limits of the city of Baker, and consists of a strip of land lying at the west end of Court Avenue. If Court Avenue, which is one of the principal thoroughfares of the city, were extended westerly to the right of way of the O.W.R. & N. Company, it would include the strip of contested land and also a strip lying immediately to the south, fourteen feet in width. The premises in controversy have been uninclosed, and, together with the adjoining tracts belonging to other parties, have been accessible for public travel. This suit involves the question of *whether or not the tract in dispute is a part of Court Avenue*."

The City of Baker intervened in the suit and pleaded three separate defenses:

1. A dedication of the property by John Stewart and wife (the former owners), as a part of Court Avenue;
2. Conduct on the part of John Stewart and his grantees by reason of which they are estopped from claiming that the land in question is not a street; and,
3. A conveyance to the Standard Oil Company, dated November 1, 1896, of a right of way over the land, and a conveyance of the same by it to the city on the 24th day of April 1912, the latter being made after the commencement of this suit.

Other facts surrounding this litigation were:

"The record title to the real estate described in the complaint is in John M. and R. L. Stewart. The state, county, and city taxes for the year 1908 were regularly levied and assessed upon the property. John Stewart originally owned a body of land including this tract, and land immediately on the north and south. In 1882, Stewart platted the tract on the north as 'Stewart's Addition,' with the south line of the addition even with the north line of Court Avenue, and adjacent to the land in dispute, which was not shown on the plat as a street.

"In 1889, Stewart sold and conveyed the land on the south to Geo. Cates, describing the same by metes and bounds, without reference to Court Avenue. Stewart never conveyed any part of his land by describing the same with reference to the above street. Of late years a warehouse abutting on the south of the tract near the railroad and a residence have stood upon the Cates lot. The depot grounds are located on the north side of the strip. After the O. W. R. & N. Company's railroad was built at this

place in 1884, a warehouse was maintained for several years on the west side of the railroad, and freight from the interior was hauled over a crossing of the railway track and strip of land. This warehouse was burned some 20 years ago and the railroad crossing was abandoned. Immediately across the track lies private property. Later, other streets in the vicinity were opened across the railroad right of way, and tracks were laid by the Sumpter Valley Railway Company by the side of those of the O. W. R. & N. Company, making ten in all. The tract in dispute has been open from the west end of Court Avenue to the railroad right of way since 1884, so that anyone desiring could cross the same, as is the custom to use any vacant lot in the outskirts of such a city.

"It is evidence on behalf of defendant that there has been more or less public travel over the land involved, since the eighties; the line of travel not following exactly the strip of land claimed as a street, but verging to the north and passing over a portion of Stewart's

Addition and the depot grounds. There is no means of ingress to or egress from the warehouse and dwelling on the south, except over the 14-foot strip mentioned. The city widened Court Avenue 14 feet on the south side, making the street that much more in width than the tract in suit, and paved the same to this lot, but not beyond. The plat of, Stewart's Addition shows the lots and blocks thereon and also the alleys dedicated to the public. The lots face upon an alley and not the strip claimed as a street. For many years the premises were regularly assessed and levied upon for taxes, the same being paid by Stewart during his lifetime and by Mrs. Stewart after his death. The city assessed the property for storm sewer assessment, *but constructed no sewer, made no improvements thereon, and assumed no authority or dominion over the same.*

"The pleadings and record show that on November 1, 1896, John Stewart sold and conveyed to the Standard Oil Company a tract of land across the railroad tracks and west of the premises in controversy, and at that time *granted an easement to the company across the contested land*, in connection with the premises conveyed, to be used by the company as a means of ingress to and egress from the property across the railroad; that the Standard Oil Company conveyed the premises to J.W. Stuchell, but in so doing failed to specially mention any right of way or easement, although it did convey the appurtenances; that Stuchell later conveyed the premises to the Sumpter Valley Railway Company in the same manner and form as they had been conveyed to him, omitting any mention of the right of way

or easement over the Stewart land in controversy herein. All the defendants except the city of Baker defaulted. The circuit court found that the city had no right to the land for use as a street."

Mr. Justice Bean, delivering the opinion of the Oregon Supreme Court, said:

*"1. In determining as to a dedication, the intention of the owner is the controlling factor; but the law does not seek for his (or her) undisclosed intention. It acts upon his (or her) intention as evidenced by his acts and the circumstances which he (or she) permits or encourages."*⁴⁴

2. Principle 83, as follows:

Principle 83

"Where the situation of land is such as to indicate that it does not form part of the highway, although it may be alongside of the way and be used by the public, no dedication can be presumed without strong evidence of an intent on the part of the owner to devote the land to the use of the public."⁴⁵

*"3. In order to constitute dedication by parol there must be some act proved evincing a clear intention to dedicate the land to the public use."*⁴⁶

*"4. The owner's acts and declarations should be deliberate, unequivocal, and decisive, manifesting a positive and unmistakable intention to permanently abandon his (or her) property to the specific public use. If they be equivocal and do not clearly and plainly indicate his intention to permanently abandon the property to public use, they are insufficient to establish a dedication."*⁴⁷

"5. The evidence does not disclose that John Stewart ever made any dedication of the land to the public use. His acts, such as granting a right of way to the Standard Oil Company (which indicates the reason why he did not sell the land with the Cates tract), and the payment of taxes (negated) an intention to abandon the real property. There is no evidence tending to show that the strip was intended by anyone as a permanent street, or that the property was accepted by the public as a street. The contention of defendant that there has been a dedication cannot be upheld."

*"6. The defendant city next claims the right to the use of the land as a street by prescription or adverse use by the public continuously for the statutory period of limitation. To establish a highway by prescription there must be an actual adverse public use, general, uninterrupted, continued for the period of the statute of limitations under a claim of right, where this is established for the statutory period, the right is deemed perfected and a permanent one."*⁴⁸

"It was held in *Smith v. Gardner*:⁴⁹

Principle 84

"Mere user of a highway, however long-continued and uninterrupted by the public, is not sufficient to give a right in the public; but such user must be accompanied by acts, such as working the road, keeping it up by the public, repairing it or removing obstructions, etc., showing the use to have been made under a claim of right, and not merely by permission of the land owner."⁵⁰

Principle 85

"A permissive use of a way by certain portions of the community constitute a **license**, and not a dedication; and is something that may be revoked." See Principle 87.⁵¹

And it was held in *Bayard v. Standard Oil Co.*⁵² that user by the general public, under a claim of right, adversely, and not by mere permission of the owner, for the period prescribed by the statute as a limitation which actions for the recovery of real property cannot be maintained, will establish an easement in the public."

Principle 86

"The adverse use which will give title by prescription to an easement is substantially the same in quality and characteristics as the adverse possession which will give title to real estate. As in the case of adverse possession, it must be continued for a long period; it must be adverse, under a claim of right, exclusive, continuous, uninterrupted and with the knowledge and acquiescence of the owner of the estate out of which the easement is claimed."⁵³

Principle 87

"Where the use is merely permissive (constituting license), and not adverse, there is no basis on which a right of way by prescription may rest."⁵⁴

"7. The use made of the property in question by those travelling over it does not appear from the evidence to have been at any time either adverse to the owner or under a claim of right. It does not appear that an action could have been maintained at any time Stewart or his successors in interest for any act of the city, or of anyone else, relating to the land. *But, rather, the use appears as a neighborly concession.* Anyone was allowed to travel over the tract for convenience, as is often the case with a vacant lot, as it did no harm, and the use was apparently permissive in its very nature, and would not set the statute running."⁵⁵

"8. The receipt by the city of taxes paid by the owner is inconsistent with the claim of the city to have

held the same land, on which the taxes were paid, by prescription during the same years it received taxes thereon."⁵⁶

"All that would have been necessary for Stewart or subsequent owners to have done to have changed the condition as to travel would have been to inclose the land. This would not have conflicted with any authority exercised or claimed by the municipal authorities. The city has not made out a case coming within the well-defined rules governing a prescriptive easement as announced and adhered to by this court. This disposes of the second contention of defendant.

"9. As to the conveyance by Stewart and wife to the Standard Oil Company of a tract of land west of the railroad together with a right of way over the land in dispute to be used in connection therewith, when the Standard Oil Co. conveyed the lot west of the railroad, together with its appurtenances, to Stuchell on July 12, 1909, which deed was duly recorded, this right of way, being appurtenant to the tract described in the conveyance, passed to the grantee without specific mention.⁵⁷ Therefore, the deed executed by the Standard Oil Co. to the City of Baker on April 24, 1912, describing the right of way over the land in controversy, conveyed no right thereto, as that company then had nothing to convey, and the city obtained no benefit by virtue of such deed.

*"The decree of the lower court was right, and it is affirmed."*⁵⁸

City of Clatskanie v. McDonald⁵⁹

This was a suit brought by the City of Clatskanie, a municipal corporation, to determine an adverse claim asserted by defendants to certain property which plaintiff claimed to be part of Bridge Street. The only dispute related to a strip of land 47 feet long; its width varied from 3.13 feet at the southeast to 2.68 feet at the northeast. It was conceded that the record title to the property was in the defendants (McDonald), but the city claimed "title" (sic) by prescription,⁶⁰ parol dedication and estoppel. The Columbia County Circuit Court had upheld McDonald's contentions. Subsequently, the city appealed that ruling in the Oregon Supreme Court.

Mr. Justice McCamant delivered the opinion of the court.

"In 1885 a county road thirty feet in width was laid out on the site of what is now Bridge Street in Clatskanie. The land included in and abutting on

this road was platted in April 1902, but the road does not appear on the plat. It is established by testimony that the road extended fifteen feet on each side of the line dividing Lot 26 from Lot 27 in the subdivision. On June 7, 1912, the owners conveyed Lot 26 to the defendant J.W. McDonald and in the following month he commenced the construction of a building which has since been continuously used for hotel purposes. This defendant set the front of the building back twenty feet from some stakes which, as he supposed, marked the center line of the road. In front of the building he laid flooring five feet in width and roofed it over. The roof was supported by six wooden pillars which stood out five feet from the front of the building. A door and two windows on the second floor of the hotel opened out on this roof, which was on the same level as the second floor of the hotel. In 1908 the pillars were removed and thereafter the roof was supported by braces; at the same time this defendant extended the flooring or sidewalk in front of the hotel to a width of eight feet. Prior to this time some planks had been placed lengthwise the street in front of the defendants' property.

"Defendants' hotel was the first building constructed on this part of the street, but in 1904 Barbara H. McKiel constructed a building about fifty feet northerly from that of the defendants; and the same year Ben Berkenfeld built on property which adjoined the defendants on the south. The front of the McKiel building was in line with the front of the defendants' hotel. Berkenfeld had intended to extend his house five feet farther into the street than the defendants' property, but in consideration of some privileges granted to him by the defendants in the use of their hotel for twenty-five years he more nearly conformed to their building line; his building juts out two feet beyond the hotel.

"Berkenfeld and McKiel laid sidewalks in front of their property. In 1905 the street was filled and graded and shortly thereafter the sidewalks on the street were connected up with planking. From the time when the defendants' hotel was constructed in 1902 down to the bringing of this suit in October, 1915, the public has used the sidewalk in front of the defendants' hotel more or less and it is admitted that subsequent to 1906 most of the foot travel on the street has passed over this sidewalk. For a short time the defendants boarded up the northerly end of the sidewalk on their property because of a hole in the dock on the adjoining property into which they feared someone might fall. When this hole was covered, the board was removed. *The defendants have continuously paid taxes on the property in dispute.*"

The Supreme Court held:

"1. In *Parrott v. Stewart*, (*supra*), Mr. Justice Bean says:

"To establish a highway by prescription there must be an actual adverse public use, general, uninterrupted, continued for the period of the statute of limitations under a claim of right...

"A permissive use of a way by certain portions of the community constitutes a *license* and not a dedication, and is ordinarily something that may be revoked.

"Where the use is merely permissive, and not adverse, *there is no basis on which a right of way by prescription may rest.*"

"To the same effect see *Peters v. Robertson*.⁶¹ Plaintiff has failed to establish that the use of the premises was *hostile or adverse to the title asserted by the defendants*. The sidewalk was constructed originally for the use of defendants and those doing business at their hotel. *The use of the sidewalk was permissive in its origin and it could not become adverse without some unequivocal assertion of the rights of the public as inconsistent with the title on which the defendants rely.*⁶² The evidence tends to show that no such claim was asserted by the plaintiff until 1915, shortly before the bringing of this suit.

"2-4. The plaintiff contends that there has been a dedication of these premises by acts *in pais*. *Such a dedication will not be assumed without clear evidence, manifesting an unmistakable intention on the part of the owner to abandon his property to the public use.*⁶³ The plaintiff's evidence fails to satisfy this requirement. The evidence shows circumstances indicating that the defendants had no intention of abandoning their dominion over this property. For a short time they boarded it up and the evidence fails to show that anyone protested. They continuously paid the taxes. *It is held that the levy of taxes on property does not estop the public from claiming it as a highway.*⁶⁴ But the continuous payment of taxes is evidence rebutting the **presumption** of dedication."⁶⁵

Note: The previous statement must not be taken out of context. The word "*presumption*" is important here. The court is saying that, in cases where a dedication is *presumed*, as in a claim of prescriptive rights to an easement, the payment of taxes is better evidence of an intent to retain dominion over the land than if the taxes were not being paid (being important evidence tending to refute a claim that the owner intended to retain dominion over the land), or if the land were exempt from taxation (evinced a presumption that the easement was public, the public was exercising its rights, and consequently the land was exempt

from taxation). But where the intent to dedicate has sufficed to operate as a statutory dedication, or common law dedication, the levy of taxes on the land of the way will **not** estop the public from claiming it as a highway.

“The maintenance by the defendants of the roof over the sidewalk is some evidence that they continued to claim the property in dispute. The roof was also a porch used in connection with the second story of the hotel. These circumstances are each of slight evidentiary value, but taken in connection with the inadequacy of the plaintiff’s proof on the main issue, they satisfy us that there was no dedication.

“5-6. Plaintiff’s final claim is that the defendants are estopped to set up title to the property in question. In *Parrish v. Stephens*⁶⁶ it is said:

‘He (or she) who induces the public to believe his (or her) land a gift, or knowingly permits them to use and treat it as their own, until they have so accustomed themselves, and adjusted their property and accommodated their business to it, that they cannot without detriment be dispossessed, confers a right which he (or she) can no more resume without wrong than he (or she) can rightfully seize what was acquired otherwise than by his gift.’

“The plaintiff contends that by constructing their hotel as above indicated and permitting the public to travel in front of it have induced other property owners to build on substantially the same line and that injustice would be done them if the defendants were now permitted to claim as their own the property in dispute. On this issue the case is not free from doubt, but the burden of proof rests on the plaintiff.

Principle 88

“The title to real property cannot be divested by estoppel without clear and satisfactory evidence.”⁶⁷

“There is evidence that the defendant J.W. McDonald requested McKiel and Berkenfeld to conform to his building line in constructing their buildings, but there is no evidence that this defendant made any representations with reference to the use of the sidewalk. Berkenfeld received a valuable consideration from McDonald for constructing on the line selected.

“In order to sustain the estoppel contended for, the city should have proved that other property owners were induced to construct their buildings substantially in line with defendants’ hotel by a belief induced by defendants that the strip of land in front of these buildings could be used as a sidewalk without claim thereto by defendants. The evidence fails to establish

these facts. There is no evidence that other property owners constructed their buildings on the line selected because of their belief that they could use the sidewalk in front of the defendants’ hotel.

“Plaintiff’s claim of estoppel is predicated in part on the contribution by defendant J.W. McDonald of \$40 to a fund to pay the expense of widening the street. The street was widened by moving back the houses on the opposite side from that with which we are concerned in this case. The defendants’ part in the matter does not estop them from claiming title to the property in dispute.

*“The decree of the lower court is affirmed.”*⁶⁸

Macleay Estate Co. v. Curry County⁶⁹

This was a suit to quiet title to a tract of land. The appeal before the Supreme Court centered on an alleged existence of three public roads on the controversial tract of land: Bagnell Ferry Road, Port Orford-Ellensburg Road, and the Witness Rock-Salthouse Road. It was conceded that the Bagnell Ferry Road legally existed, but the estate company denied the existence of the other two roads.

In the trial court the estate company admitted that the Port Orford-Ellensburg Road had been legally established, but contended that it was subsequently abandoned, and that therefore its title as owner of the fee had been freed from the road easement. The county made no claim that the Witness Rock-Salthouse Road had an origin in dedication, or had been established pursuant to action by any public body. However, it did claim a right in behalf of the public to its continued use by prescription. The Supreme Court held:

“1,2. The parties agree upon the principles of law applicable to this controversy but differ as to what facts are established by the evidence... The Witness Rock-Salthouse Road is approximately 350 feet in length and 30 feet in width; it runs from the edge of the Rogue River to the Roosevelt Highway in the town of Gold Beach. We are satisfied that it was not until the spring of 1916 that a use was made of this land which informed the plaintiff that a road was being established; at that time the present road was graded. This suit was begun April 10, 1926. The aforementioned work was neither done nor supervised by the county; in fact, the county had no connection of any nature with this improvement; its cost was borne by the plaintiff and two others. The completion of the work was followed immediately by the posting of notices by the plaintiff which bore the information that the road was a private

one, and that permission to use it was revocable; at three different times such notices were posted. In 1925 the roadway was obstructed by a fence erected by the plaintiff. It is true that someone tore down the notices as time went on, and that the fence was demolished shortly after it was built, but, nevertheless, the erection of the fence served the purpose, as is suggested by Elliott on *Roads and Streets*⁷⁰ of informing the public that the *use was a permissive one*. Indeed, there is reliable evidence to the effect that the public understood that those who used the road enjoyed that privilege, not as a right, but as a permission from the plaintiff. Both Mr. W. A. Wood, County Judge from 1912 to 1924, and Mr. Chas. H. Bailey, his successor, testified that the county had never asserted any claim to the road. Upon the other hand the county had negotiated for some time with the plaintiff for the purpose of acquiring it as a public highway. We have read the testimony with care and fail to find any substantial evidence to the effect that anyone ever claimed a right to pass over this road as a matter of right.

"In *Stotts v. Dichdel*⁷¹ this court said:

"To establish a highway by prescription, the land impressed with the use must have been used by the public with the actual or implied knowledge of the land owner, adversely under claim or color of right, and not merely by the owner's permission, and uninterruptedly and substantially by way of a defined road for the period required to bar an action for the recovery of possession of land."

"And in *Curtis v. La Grande Water Co.*,⁷² this court said:

Principle 89

"To acquire a right of prescription in the lands of another upon the presumption of a grant, the possession must be adverse, continuous, uninterrupted, and by the acquiescence of the owner of the land upon which the easement is claimed. If this inception is permissive or under a license from the owner, it cannot avail to work an ouster. To effect that result, the possession taken must be open, hostile, and continuous; "he must unfurl his flag on the land, and keep it flying, so that the owner may see, if he will, that an enemy has invaded his domains, and planted the standard of conquest." Under this rule, an adverse possession cannot grow out of a permissive enjoyment; and so speak the decisions without a dissentient voice, including this court.

"In *Chapman v. Dean*⁷³ Mr. Justice Burnett, in pointing out succinctly the elements of a prescriptive right, stated as the first:

"The possession must be hostile and under a claim of right."

"Since we conclude that the public never asserted any hostile claim in the land which constitutes the roadbed of the Witness Rock-Salthouse Road, but upon the other hand availed itself of a permissive right, our findings are that the defendant (county) has no right in this road."⁷⁴

The remainder of this report dealt with abandonment of the Port Orford-Ellensburg road (discussed under "Abandonment").

Sweet et al v. Irrigation Canal Co.⁷⁵ (Reference only)

This case was a suit by the abutting owner to obtain a decree enjoining the maintenance by the Irrigation Canal Company of a ditch, in a county road, which interfered with the plaintiffs' right of ingress to, and egress from their land. The width of the road was an issue in this case, and the details of the case and decision of the Supreme Court, pertinent to the width and margin (right-of-way line) of the road, is included in the section of this publication on "The Widths of Public Ways." Noted in that section are the principles of law on the width of highways established by prescription, or where the highway depends solely for its establishment upon adverse and continuous user by the general public.

Huggett et ux v. Moran et ux⁷⁶

This suit was commenced by the plaintiffs to rescind a contract for the purchase of real property from the defendants (W.G.) Moran and (E.F.) Moran, husband and wife; however, his wife being deceased, the cause was continued against W.G. Moran, who was the sole owner of the property. The plaintiffs alleged that the defendant, himself or through his agents, represented that the roadway leading from what had been called the "Rocky Point" county road to the property purchased by the plaintiffs was a county road, that the statement was material and false, and that they would not have purchased the property except for their reliance upon the false representations of the defendant.

Moran, by answer, alleged that the roadway *was not a private roadway*, but that it was a *public road maintained by Washington County and used by the general public without restrictions for a period of over 40 years*. He ad-

mitted it was not a *county road*, and denied that he ever represented it to be a county road.

The defendant's principal contention was that the uncontradicted evidence showed that the road in question was used and traveled by the public as a county road, and was improved, worked upon, and maintained by the county since 1938. The defendant added that for all legal purposes the roadway has become a "county road by *prescription*, and, therefore, the representation, if made, was not false. The Supreme Court said:

"The principle question, therefore, before this court is whether or not the evidence disclosed that for the purpose of this cause there was a county road leading from the 'Rocky Point' county road to the farm purchased by plaintiffs.

"In this state there are two systems of highways, those designated as state highways, and those designated as county roads.

"State highways were first so designated by the legislative assembly of the state by Chapter 237, 1917 Or. Laws.

"In Postal Telegraph Co. v. State Highway Commission,"⁷⁷ it is stated:

"Prior to the authorization for the construction of this class of highways, there were no such roads in the state. Whatever roads existed were known as county roads, except that, earlier in the history of the country, there were certain highways known as toll roads, and certain others known as territorial roads. By statute, however, all territorial roads were declared to be county roads.⁷⁸ By the same title⁷⁹ it was declared that all county roads shall be under the supervision of the county court of the county wherein the road is located, and that none such shall be altered or vacated except by authority of such court of the proper county.

"This same section⁸⁰ was later revised as subsection 100-1202, OCLA (ORS 368.205), and insofar as is material to this issue reads as follows:

"All county roads shall be under the supervision of the county court wherein said road is located. Each county court within this state shall have the authority, and it shall be its duty, to supervise control and direct the laying out, opening, establishment, locating, relocating, changing, alteration, straightening, working, grading, maintenance and keeping in repair, improvement and vacation of all county roads within its county, and to prescribe the methods and manner of working, improving and repairing the same, and to legalize old roads and to restore monuments thereon; and except as shall be expressly provided, no county road shall be hereaf-

ter established, nor shall any such road be altered or vacated in any county in this state, except by authority of the county court of the proper county.'

"Section 100-1203, OCLA (ORS 368.405), provides for the establishment of county roads in the following manner:

"(1) By petition of freeholders,

"(2) By resolution of the county court,

"(3) By grant of owners of necessary rights of way (which includes dedication),

"(4) By condemnation proceedings,

"and then provides:

"This provision shall not preclude the acquirement of public ways by adverse user.'

"So that there has been expressly provided by statute the right of counties to obtain public roads by prescription.

"1,2. While strictly speaking way is not synonymous with road (the word 'way' being more generic than the word 'road,' and referring to many things besides roads),⁸¹ as used in the statute authorizing the establishment of county roads it must be construed as including therein county roads. The statute does not in anywise change what we have said in the past regarding the ultimate fact that *'In this state a highway may be established by adverse user, and "where length of time of such use by the public has been greater than the period prescribed by the statute of limitations for the recovery of real property, that will be regarded as sufficient evidence of the existence of a highway independently of any supposed dedication."*⁸² And generally it is unimportant whether the right arising by prescription is based on the presumption of an antecedent regular and lawful exercise of established authority or by prior dedication, the result is the same.

"3. With relation to prior dedication of roadways, the rule is that, regardless of the easement of use acquired by the public, property owners for their own benefit, or convenience, cannot impose a street or highway upon a municipality against its will and compel it to improve or repair the street or highway.⁸³

"4. By enactment of a law a county cannot be compelled by *formal dedication or gift* to accept a highway and thus be impress with the burden of improvement and repair without the formal sanction of the county court.⁸⁴ (Note: Do not misinterpret this as barring common law dedication. But it is true that a county does not have to improve or repair a road created by common law dedication

unless it accepts the road.) However, if the roadway is duly accepted by the county, the duty to establish and maintain the way arises.

"Each of the above methods of establishing a county road with its attendant liability requires formality of offer and formality of acceptance, and refers solely to the statutory methods of 'laying out, opening, establishment, alteration, straightening, locating, and relocating county roads.'⁸⁵

"5. The rights to the use of a way arising by prescription, *arise not out of the formality of conveyance, but by informality; not by formal gift, grant or dedication, but by open, notorious, hostile, adverse use, based upon the assumption of a prior dedication or action by **duly constituted authority***. Thus a roadway so established is not controlled by the statutory requirement of formal acceptance, and unless required by statute, *no formality is necessary to a valid acceptance*."⁸⁶

"6. An offer of dedication may be impliedly accepted by some act or acts showing that the municipality has assumed control and possession of the land dedicated as a public way, but the acts relied on must be unequivocal and not equivocal or isolated."⁸⁷

"7. Whenever a statute prescribes the minimum width of public roads to be established in the future, and a public road is established by prescription, the width thereof is the minimum necessary to the establishment of a legal road in the absence of evidence of the taking of a greater amount."⁸⁸

"With these rules of law before us we shall now consider whether or not the evidence is sufficient to establish a county road by prescription for the purposes of the instant case.

"Mr. Carl R. Tannock, called as a witness by the defendant, testified that the road in question had been open for use by the general public since about 1916, and that it has never been shut off or closed since that time; that the county did work thereon in the year 1938, and the road has been maintained by the county since that date.

"Mr. Clarence D. Nelson, called as a witness by the defendant, testified that he had lived in the vicinity nearly 60 years; that he thought the road had been open for public use since 'about 1910 or '11'; that the road has been open to the use of the public and not restricted since that date.

"Mrs. Nellie R. Grant, called as a witness by the defendant, testified that to her knowledge the road had been open since 1918 to the use of the public and had never been closed.

"Mr. L.L. McIntyre... testified that he was employed by Washington county as a county engineer and roadmaster and had charge of the maintenance and construction of county roads (testifying to continued improvement and maintenance of the road, from 1938)."

"Mr. Herman H. Reese... testified that he had been formerly employed by the (county) road department... "June, 1943 to October, 1950 (testifying to continued county maintenance)."

"8,9. It is quite clear from the evidence set forth above (uncontradicted) that (the county had maintained the road for 10 years).... this case discloses that a county road, in fact, existed... "

Hay v. Stephens⁸⁹ (1972)

This case involves a claim of a private easement across a pathway instead of a roadway. Although a private claim is involved, rather than a claim on behalf of the public, the decision here would be relevant to that of a public claim of a right to the use of a pathway. And since such rights are often presumed, this case would be of some value to the subject of establishing public easements by prescription.

This suit by the plaintiffs was to establish a prescriptive easement in the form of several pathways across the defendants' land. The trial court, Clatsop County, had held in favor of the plaintiffs, and the defendant appealed that decision to the Supreme Court.

The facts presented were:

"Defendants own a parcel of land at Cannon Beach, Oregon, between plaintiffs' land and the beach. The plaintiffs purchases one parcel of their property (Lot 4) from Mrs. Morrison and an adjoining parcel (Lot 5) from a Mr. & Mrs. Wolff. Plaintiffs and their predecessors in title to both parcels used the pathways above to get to the public part of the beach.

"The only question on appeal is the sufficiency of the evidence to sustain plaintiffs' claim to a prescriptive easement.

"In 1933 the Wolffs began crossing defendant's parcel to get from their house on Lot 5 to the beach. The house sat close to the edge of a steep decline described as a 'cliff' by some witnesses. Paths from each of two sides of the house converged into a single path down the 'cliff' so steep that steps were cut into it for footholds. Three pathways led from the house on Lot 4 to the beach; each followed a steep gradient similar to that of the paths on Lot 5. Since the houses on both lots were used principally during summers and week-ends, use of the paths were intermittent."

The court held:

"1. Defendants contend that there was not adequate proof to establish a prescriptive right. They first argue that plaintiffs failed to prove the element of continuity of use. There was evidence that the paths were used regularly during the periods when the homes on Lots 4 and 5, were occupied. Although, as indicated above, these periods were intermittent, we are of the opinion that the evidence demonstrates the necessary continuity of use.

"As pointed out in Restatement of Property (Servitudes):⁹⁰

Principle 90

"To satisfy the requirement that the use be continuous it is not necessary that it be constant. A use may be continuous though there are periods of time more or less extended between the specific acts of use. Many easements, such as rights of way and rights of hunting or fishing, which are periodical or only occasional in use, may be acquired by prescription. The requirement means that there be **no break in the essential attitude of mind** required for adverse use rather than that the use be constant.'

"In cases in which title was claimed by adverse possession we have acknowledged continuity of use *despite considerable periods of time during which there was no use of the property*. Thus in *Springer v. Durette et ux*⁹¹ we held that the fact that the land was used for grazing only from April to November did not preclude the claim for lack of continuity. There we pointed out:

Principle 91

"An important consideration in testing continuity is the character of the property and the manner which the average owner would use it."⁹²

"In the present case the pathways were used in a normal manner for owners of beach property and therefore the use was sufficiently continuous.

"2,3. It is further contended that the plaintiffs failed to establish the element of adverseness in the use of the pathways. Defendants rely upon admissions, on cross examination, made by plaintiff William Hay and his predecessors in title that they did not intend to acquire *ownership* of the pathways and that they would have discontinued using the pathways if the defendants had made them stop. These admissions do not negate adverseness of use; however, they amount to no more than disavowal by plaintiffs of any claim to ownership in the land and recognition by them of the legal authority of

defendants to have prevented the use which was being made of their land.

Principle 92

"A use 'is adverse though made in recognition of the wrongfulness of the use and, also, of the legal authority of another to prevent it.'⁹³ A use is adverse if 'not made in subordination' to the person against whom it is claimed to be adverse.⁹⁴

"The evidence establishes that the use made by plaintiffs was 'not in subordination' to defendants. We conclude, therefore, *that plaintiffs acquired a prescriptive right to use the pathways over defendants' land*.

"There is evidence that the strip of land owned by defendants is so steep and narrow that it is not practicable for the defendants to build upon it or put it to any other useful purpose...."⁹⁵

City of Ashland v. Hardesty⁹⁶ (1975)

1. This was a suit for declaratory judgment in which the plaintiff, the City of Ashland, sought a ruling that, in addition to certain deeded rights of way it possessed, it acquired by prescription and easement giving it a right of way across the defendants' properties from the public street to the city's sewage treatment plant. The trial court of Jackson County found that the city had acquired such an easement and one of the defendant property owners appealed that decision to the Oregon Court of Appeals. Since it was in the nature of a suit in equity, the Court of Appeals review was *de novo*.⁹⁷

"The issues raised by the assignments of error are the following: (1) whether there was a material variance between the complaint and the proof at trial, (2) whether a municipal corporation can acquire an easement by prescription, and (3) whether the City of Ashland acquired a prescriptive easement across defendants properties.

"2. The defendant contends that the description in the complaint of one defendant's property leaves out a portion of the property across which the claimed prescriptive easement actually runs. The legal description of the prescriptive easement contained in the complaint is not alleged to be faulty or incomplete. ORS 16.630 provides that: 'no variance between the allegation in a pleading and the proof shall be deemed material, unless it has actually misled the adverse party to his prejudice in maintaining his action or defense upon the merits....'

“Defendant does not claim that he or any other defendant was misled or prejudiced in any way by this omission. The variance is immaterial and was properly disregarded by the trial court.

“3. Defendant also argues that a municipal corporation is prevented from acquiring a property interest by prescription or adverse possession by Or. Const. Art. I, subsec. 18, which prohibits the taking of private property for public use without just compensation. We are not here dealing with the question whether the right of eminent domain may be exercised, but with whether a state or municipal corporation may acquire property by adverse possession. The federal government is subject to a similar eminent domain provision in Amendment V to the Constitution of the United States, but in *Stanley v. Schwalby*⁹⁸ the United States Supreme Court held:

Principle 93

“‘The federal government (can) acquire property by adverse possession in the same manner as a private individual.’

“In *Stephenson v. Van Bloklund*⁹⁹ the Oregon Supreme Court said:

Principle 94

“‘Even though the statute does not run against the State, adverse possession by the State for the statutory period will give title by prescription.’¹⁰⁰

“The rule that states and municipal corporations may acquire interests in property by adverse possession or prescription is **widely recognized**.¹⁰¹

“We find that:

Principle 95

“Or. Const. Art. 1, subsec. 18, does not prevent the state or a municipality from acquiring property interest by adverse possession or prescription.”

“4. For the City of Ashland to establish its claimed easement by prescription it must prove ‘an open and notorious use of defendants’ land adverse to the right of defendants for a continuous and uninterrupted period of ten years.’¹⁰² It must establish these elements by clear and convincing evidence.¹⁰³

“In 1936 the City of Ashland bought a piece of property on which it built a sewage treatment plant. The parties stipulated that about that time the city had acquired the right by deeded easements to cross

the two pieces of property between the plant and the public street about one-quarter mile away. Surveyors’ testimony and diagram established that the right of way claimed by the city did not wholly correspond with the deeded easements, although they intersected and overlapped in some places. For example, one of the deeded easements contained an extremely sharp angle, while the easement here claimed by the city made a gradual curve, cutting off that acute angle entirely.

“5,6. In relation to the issues raised by appellants, Restatement of Property¹⁰⁴ defines adverse use as follows:

“‘A use of land is adverse to the owner of an interest in land which is or may become possessory when it is:

“‘(a) not made in subordination to him, and

“‘(b) wrongful, or may be made by him wrongful, as to him, and

“‘(c) open and notorious.’

“City officials and employees testified that they believed that their usual route to the sewage treatment plant followed the deeded easements claimed by the city. The city, in fact, paved this now claimed right of way in 1961. The city’s belief and actions establish that its use of the route was not subordinate to the property owners whose land they crossed, but adverse thereto.”¹⁰⁵

Principle 96

“An intent to claim land occupied under a mistaken belief of ownership is sufficient to prove hostile intent.”¹⁰⁶

“7. Although the city believed it had an easement to use the right of way it followed, it did not have that right under deeded easements and its occupation and regular use of the portions wholly or partially outside the deeded easements, was without consent of the property owners, *but with their full knowledge*, and had been continuous since 1949. The property owners neither protested nor made any effort to require the city to confine its use to the deeded easements until about the time this suit was filed.

“See *Arrien v. Levanger*¹⁰⁷ where it is held that to establish adverse use *it is not required that the use be continuous, but merely the normal use a claimant would have made of the property for his (or her) purpose if he actually owned the property*. Here the city’s employees used the claimed right of way whenever they needed to work at the sewage treatment plant.

"8. The last element that the city must establish is whether the right of way that it used was *sufficiently clear and definite so that what it utilized can be identified*. There is conflicting testimony. The defendant claims that the city had no definite route or that the route shifted. City employees testified that they followed essentially the same route. The surveyor for the city testified that when, following a 1974 flood in the area, he surveyed the route for reconstruction, he found remains of the asphalt from 1961 paving along the straight sections of the route, and around the curve, where the route was covered by sand and gravel from that January 1974 flood of Ashland Creek. Air photos taken in 1961, 1962 and 1969 all indicate a clearly defined roadway.

"We conclude, as did the trial court, *that the City of Ashland did acquire an easement by prescription giving it a right of way across the described real property of defendants.*"¹⁰⁸

*It is important to understand that a public way cannot be established by prescription where the adverse use is by a limited number of persons, such as in the Oregon case of Hay v. Stephens, supra, discussed here. In that case even though the plaintiffs were part of the public, they could not have acquired the right to use the land if they had claimed that right to be public, instead of private, because the use was limited to the plaintiffs and their guests. But the test of user is not so much the number of persons actually using the road or path, but the character of its use; that is, whether the public has had a free and unrestricted right of use of road or path.*¹⁰⁹

Also noteworthy is that the *only* right the public can acquire by prescription is *the right of passage*.¹¹⁰ Such a right can never ripen into ownership of the land by the public.

Endnotes

1. Shumate v. Robinson, 52 Or. App. 199 (1981), 627 P.2d 1295.
2. Id. Op. cit.: Wood v. Woodcock, 276 Or. 49, 56, 554 P.2d 151 (1976); Boyer v. Abston, 274 Or. 161, 163, 544 P.2d 1031 (1976); Thompson v. Scott, 270 Or. 542, 528 P.2d 509 (1974); Woods v. Hart, 254 Or. 434, 458 P.2d 945 (1969). See: Wemmer v. Young, 167 Neb. 495.
3. Shumate v. Robinson, supra, at pp. 204-205.
4. Code 1930, subsec 1-202; ORS 368.201.
5. Lehigh Valley R. Co. v. McFarlan, 43 N.J.L. 605 cited in: 2 Thompson on Real Property, 1961 ed., subsec 335, n. 18, pp. 156-157. See: State ex rel McNutt v. Orcutt, 221 Ind. 523, 199 N.E. 595; Buss v. Dyer, 125 Mass. 287.
6. Raab v. Casper, 51 Cal. App. 3d 866, 876, 124 Cal. Rep. 590, 596 (1975), cited in Shumate v. Robinson, supra.
7. Id. op. cit.: Glatts v. Henson, 31 Cal.2d 368, 371-372, 188 P.2d 745; Cleary v. Trinble, 229 Cal. App. 2d 1,6.
8. Bayard v. Standard Oil Co., 38 Or. 438, 63 P. 614, But, Milarkey v. Foster, 6 Or. 378, 25 Am. Rep. 531, was earlier.
9. Id.
10. Milarkey v. Foster, 6 Or. 378, 25 Am. Rep. 531; Wakeman v. Wilburn, 147 N.Y. 657, 42 N.E. 341.
11. Elliotts' Roads & Streets, 2d ed., supra, subsec 175, 176; Jones, Easmts, subsec 458; State v. Auchard, 22 Mont. 14, 55 P. 361; Shellhouse v. State, 110 Ind. 509, 11 N.E. 484; Manrose v. Parker, 90 Ill. 581; State v. Keokuk, etc., R.R. Co., 45 Iowa 139.
12. Marchland v. Town of Maple Grove, 48 Minn. 271, 51 N.W. 606; Valley Pulp & Paper Co. v. West, 58 Wis. 599, 17 N.W. 554; Bartlett & Beardmore, 77 Wis. 356, 46 N.W. 494; Scheimer v. Price, 65 Mich. 638, 32 N.W. 873; Western Ry. v. Alabama G.T.R. Co., 96 Ala. 272; Wayne Co. Say. Bank v. Stockwell, 84 Mich. 586, 22 Am. St. Rep. 708.
13. Whiteside v. Green, 13 Utah 34, 57 Am. St. Rep. 740, See: note of 25 pages, High-ways by User, 44 P. 1032; Pillsbury v. Brown, 82 Me. 450, 19 A. 858, 9 L.R.A. 94, see: note, "Right of Public to Use Entire Width of Highway," Sprague v. Waite, 17 'Pick. 309; Bartlett v. Beardmore, 77 Wis. 356, 46 N.W. 494.
14. Davis v. City of Clinton, 58 Iowa 389, 10 N.W. 768; Marchland v. Town of Maple Grove, 48 Minn. 271, 51 N.W. 606.
15. This is in reference to an argument by counsel for the respondent that the record of the proceedings attempting to establish a county road, though invalid, was admissible as color of title, 38 Or. 438, pp. 443,444, op. cit on p. 444.
16. Bayard v. Standard Oil Co., 38 Or. 438, at page 447, 63 P. 614.
17. Marchand v. Town of Maple Grove, 48 Minn. 271, 51 N.W. 606.
18. Bayard v. Standard Oil Co., supra, cit.: State v. Auchard, 22 Mont. 14, 55 P. 361.
19. Grady v. Dundon, 30 Or. 333, 47 P. 915. But see: City of Molalla v. Coover et ux, 192 Or. 233, 235 P.2d 142. Public ease cannot be defeated by adverse use, or by nonuser.
20. Gregory v. Knight, 50 Mich. 61, 64, 14 N.W. 700.
21. Coleman v. Flint & P.M.R. R. Co., 64 Mich. 160, 163, 31 N.W. 47.
22. City of Peoria v. Johnston, 56 Ill. 45.
23. 3 Kent 11th ed., marg., p. 448.
24. Beardslee v. French, 7 Conn. 125; Holt v. Sargent, 15 Gray 97; Amsbey v. Hinds, 46 Barb. 622; Hamilton v. State, 106 Ind. 361, 7 N.W. 9; Simplot v. City of Dubu-que, 49 Iowa 630; State v. Culver, 65 Mo. 607, 27 Am. Rep. 295; Wayne County Say. Bank v. Stockwell, 64 Mich. 586, 48 N.W. 174, 22 Am. St. Rep. 708, See: "Note on Highway by User and Discontin- uance by Nonuser."
25. See: Three extensive notes, "Abandonment of a Highway by Non-user of Otherwise than by Act of Public Authorities," 26 L.R.A. 449-469; "Discontinuance or Vacation of a Highway by the Acts of Public Authorities," 26 L.R.A. 821-840; and "Effect of Abandonment of a Highway," 26 L.R.A. 659-665; and a further note, "Rights Acquired as against the Public by Adverse Possession or City Street," 18 L.R.A. 146-150. Reporter. But see: City of Molalla v. Coover et ux, 192 Or.; Lowell et al v. Pendleton Auto Co., 123 Or. 383; ORS 221.750 and 275.027; Prin-ciples 42 and 43, and footnotes.
26. Wallowa Co. v. Wade, 43 Or. 253, 72 P. 703 (1903).
27. Black's Law Dictionary, supra, defines viewers as persons appointed by a court to make an investigation of certain matters, or to examine a particular locality (as the proposed site of a new road), and to report to the court the result of their inspection, with their opinion on the same. Rev. 4th ed., page 1740, "Viewers."
28. Bayard v. Standard Oil Co., 38 Or. 438, 63 P. 614; Nosler v. Coos Bay R. Co., 39 Or. 331, 64 P. 644, 22 Am. & Eng. R. Cas. 720.
29. Act of July 26, 1866, ch. 262, subsec 8, Stat. U.S. 253.
30. Rev. Stat. U.S. subsec 2477 (U.S. Comp. St. 1901, p. 1567).
31. Flint & P.M. Ry. Co. v. Gordon, 41 Mich. 420, 2 N.W. 648; Wason Toll Road Co. v. Townsite of Creede, 21 Land Dec. Dep. Int. 349, 351; Pasa- dena Toll Road Co. v. Schneider, 31 Land Dec. Dept. Int. 405.
32. Wells v. Pennington County, 2 S.D. 1, 48 N.W. 305, 39 Am. St. Rep. 758.
33. Tholl v. Koles, 65 Kan. 802, 70 P. 881. To the same effect is Wells v. Penning- ton County, supra.
34. Streeter v. Stalnaker, 61 Neb. 205, 85 N.W. 47.
35. McRose v. Botttyer, 81 Cal. 122, 22 P. 393.
36. Sec 2477, Rev. Stat. U.S., U.S. Comp. St. 1901, p. 1567.
37. Smith v. Mitchell, 21 Wash. 537, 58 P. 668, 75 Am. St. Rep. 658.
38. 1903 Or. Laws, p. 18.
39. B. & C. Comp. subsec 4, 13; Ambrose v. Huntington, 34 Or. 484, 56 P. 513; Schneider v. Hutchinson, 35 Or. 253, 57 P. 324, 76 Am. St. Rep. 474.
40. Elliotts' Roads and Streets, 2d ed., subsec 175.
41. Hanlin v. Chicago & Al. W Ry. Co., 61 Wis. 515, 526, 21 N.W. 623.
42. Wallowa County v. Wade, 43 Or. 253, 72 P. 793; See: Note 57 Am. St. Rep. 744.
43. Parrott v. Stewart, 65 Or. 254, 132 P. 523.
44. 3 Dillon, Mun., Corp., 5th ed. subsec 1079; Kuck v. Wakefield, 58 Or. 549,

- 115 P. 428; *Hogue v. City of Albina*, 20 Or. 182, 25 P. 386, 10 L.R.A. 673.
45. *Parrott v. Stewart*, supra, op. cit.: *Elliotts' Roads & Streets* 2d ed., subsec 167.
46. *Lownsdale v. City of Portland*, 1 Or. 381, 405, F. Cas. 8578; *Lewis v. City of Portland*, 25 Or. 133, 155, 35 P. 256, 22 L.R.A. 736, 42 Am. St. Rep. 772
47. *Hogue v. City of Albina*, 20 Or. 186, 187, 25 P. 386, 10 L.R.A. 673.
48. *Parrott v. Stewart*, supra, cit.: *Wood v. Hurd*, 34 N.J.L. 87; *Marion v. Skillman*, 127 Ind. 130, 26 N.E. 676, 11 L.R.A. 55.
49. *Smith v. Gardner*, 12 Or. 226, 6 P. 771, 53 Am. Rep. 342.
50. *Id.*
51. *Id.*
52. *Parrott v. Stewart*, supra, cit.: *Bayard v. Standard Oil Co.*, 38 Or. 438, 445, 63 P. 614. See: *Doyle Milling v. Georgia Pacific*, 256 Or. 271, 473 P.2d.
53. 22 Am. & Eng. Ency. of Law, 2ded. 1192; *Coburn v. San Mateo County (c.c.)*, 75 F. 520; *Shellhouse v. State*, 110 Ind. 509, 11 N.E. 484; *City of Topeka v. Cowee*, 48 Kan. 345, 29 P. 560, 563. And review *Doyle Milling v. Georgia Pacific*, 256 Or. 271, 473 P.2d 135; 39 Am. Jur. 2d, Highways, Streets & Bridges, subsec 25 et seq.
54. *Elliott*, 2d, supra, subsec 175; *Engle v. Hunt*, 50 Neb. 358, 69 N.W. 970-972; *Town of Brushy Mound v. McClintock*, 150 Ill. 129, 36 N.E. 976, 977.
55. *Altschul v. O'Neill*, 35 Or. 202, 211, 58 P. 95; *Trump v. McDonnell*, 120 Ala. 200, 24 So. 353.
56. *Elliotts' 2d ed.*, supra, subsec 167; *Illinois Cent. R. Co. v. City of Bloomington*, 167 Ill. 9, 47 N.E. 318; *Niles v. City of Los Angeles*, 125 Cal. 572, 58 P. 190; *Hesse v. Strode*, 10 Idaho 250, 77 P. 634.
57. *George v. Cox*, 114 Mass. 382, 387; *Spaulding v. Abbott*, 55 N.H. 423; *Brown v. Thissell*, G Mass. (6 Cush.) 254, 258.
58. *Parrott v. Stewart*, 65 Or. 254, 132 P. 523.
59. *City of Clatskanie v. McDonald*, 85 Or. 670, 167 P. 560.
60. The city must have meant title in an easement because title in the land can-not be acquired by ""prescription.""
61. *Peters v. Robertson*, 73 Or. 263, 266, 144 P. 568.
62. 1 R.C.L. 704; 2 C.J. 124; 130
63. *Hogue v. Albina*, 20 Or. 182, 187, 25 P. 386, 10 L.R.A. 673; *Lewis v. Portland*, 25 Or. 133, 155, 35 P. 256, 42 Am. St. Rep. 772, 22 L.R.A. 736; *Parrott v. Stewart*, supra, *Harris v. Ss. Helens*, 72 Or. 377, 386, 143 P. 941, Ann. Cas. 1916 D. 1073.
64. *Campau v. Detroit*, 104 Mich. 560, 562, 62 N.W. 718; *San Leandro v. LeBreton*, 72 Cal. 170, 177, 13 P. 405; *Rhodes v. Brightwood*, 145 Ind. 21, 30, 43 N.E. 942; *Gilleau v. City of Frost*, 25 Tex. Civ. App. 371, 377, 61 S.W. 345; *Johnson v. Knott*, 13 Or. 308, 315, 316, 10 P. 418.
65. 1 *Elliotts' Roads and Streets*, 3d ed. 185; *Parrott v. Stewart*, supra; *Bauman v. Boeckler*, 119 Mo. 189, 199, 202, 24 S.W. 207; *Lockey v. Bozeman*, 42 Mont. 387, 113 P. 286, 290.
66. *Parrish v. Stephens*, 1 Or. 59, 69, supra.
67. *Urguhart v. Belloni*, 57 Or. 314, 321, 322, 111 P. 692.
68. *City of Clatskanie v. McDonald*, 85 Or. 670, 167 P. 560.
69. *MacLeay Estate Co. v. Curry County*, 127 Or. 356, 272 P. 263.
70. *Supra*, 4th ed., sec 198.
71. *Stotts v. Dichdel*, 70 Or. 86, 139 P. 932.
72. *Curtis v. La Grande Water Co.*, 20 Or. 34, 23 P. 808. 10 L.R.A. 484.
73. *Chapman v. Dean*, 58 Or. 475, 115 P. 154.
74. *Macleay Estate Co. v. Curry Co.*, 127 Or. 356, 272 P. 263.
75. *Supra*.
76. *Huggett et ux v. Moran et ux*, 201 Or. 105, 266 P.2d 692.
77. *Postal Telegraph Co. v. State Highway Commission*, 276 F. 958, 961.
78. Sec 38, title 1, ch. 47, General Laws of Oregon 1645-1864.
79. *Id.*, sec 1.
80. Oregon Laws, 1645-1864, subsec 1, title 1, ch. 47.
81. *Kister v. Reeser*, 98 Pa. 1, 4, 42 Am. Rep. 608.
82. *Douglas County Road Co. v. Abraham*, 5 Or. 318; to the same effect is: *Bayard v. Standard Oil Co.*, supra; *Ridings v. Marion County*, 50 Or. 30, 33, 91 P. 22.
83. *Moore v. Fowler*, 58 Or. 292, 114 P. 472.
84. Subsec 100-1225, OCLA, as amended (ORS 368.550); and as to the conveyances by individuals rights of way see: subsec 100-1224, OCLA (ORS 368.545).
85. Subsec 100-1203, OCLA (ORS 368.405).
86. *Hendrickson v. City of Astoria*, 127 Or. 1, 270 P. 924; *Christian v. Eugene*, 49 Or. 170, 89 P. 419; *Carter v. City of Portland*, 4 Or. 339.
87. *Hendrickson v. City of Astoria*, supra, p. 8; 18 C.J. 82, Dedication, subsec 80; 26 C.J.S. 104, Dedication, subsec 40A.
88. *Pillsbury v. Brown*, 82 Me. 450, 19 A. 858, 9 L.R.A. 94; *Kritzberger v. Traill County*, 62 N.D. 208, 242 N.W. 913; *City of Seattle v. Abrahamson*, 109 Wash. 116, 186 P. 644; 25 Am. Jur. 360, Highways, subsec 36; 39 C.J.S. 939, Highways, subsec 20.
89. *Hay v. Stephens*, 262 Or. 193 497 P.2d 362 (May, 1972).
90. Restatement of Property, Servitudes, subsec 459, comment b, p. 2936 (1944).
91. *Springer v. Durette et ux*, 217 Or. 196, 352 P.2d 132 (1959).
92. This factor is discussed in 3 American Law of Property subsec 15.3 p. 767 (1952) where it is stated that ""possession may exist in a person who uses the land in the way in which an average owner of the particular type of property would use it though he does not reside on it and his use involves considerable intervals in which the land is not actually used at all."" See also: *Norgard et al v. Busher et ux*, 220 Or. 297, 349 P.2d 490, 80 A.L.R. 2d (1960); *Knecht v. Spake et al*, 218 Or. 601, 346 P.2d 98 (1959).
93. 5 Restatement of Property, Servitudes, subsec 458, comment c, p. 2926 (1944).
94. *Id.* p. 2924.
95. *Hay v. Stevens*, 262 Or. 193, 497 P.2d 362, See: adverse use prerequisite to acquisition of easement by prescription. 25 Am. Jur. 2d, Easements and Licenses, subsec 51-55; C-I.S., Easements subsec 13.
96. *City of Ashland v. Hardesty*, 23 Or. App. 523, 543 P.2d 41.
97. *Black's Law Dictionary*, rev. 4th ed. p. 483 defines de novo as: ""Anew; afresh; a second time; op. cit. A writ for summoning a jury for the second trial of a case which has been sent back from above for a new trial; cit., *Slaughter v. Martin*, 9 Ala. App. 285. The court in *City of Ashland v. Hardesty*, cit.: *Port of Portland v. Maxwell*, 9 Or. App. 105, 110, 496 P.2d 23 (1972).

98. *Stanley v. Schwalby*, 147 U.S. 508, 13 S. Ct 418, 37 L. Ed. 259 (1893).
99. *Stephenson v. Van Blokland*, 60 Or. 247, 118 P. 1026 (1911).
100. Citation omitted, 60 Or. at 255.
101. 10 McQuillin, *Municipal Corporations* 41-42, subsec 28. 15, 3d rev. ed. (1966); 7 Powell, *Real Property* 751-52, subsec 1020, (1974); 5 Thompson, *Real Property* 586, subsec 2555, (1957); Annotation, 18 A.L.R. 3D, 678, 689, (1968).
102. *Thompson v. Scott*, 270 Or. 542, 528 P.2d 509 (1974).
103. *Id.* at page 546.
104. 5 Restatement of Property, *Servitudes*, 2924, subsec 458.
105. *Id.* comment d; *Port of Portland v. Maxwell*, 9 Or. App. 105, 110, 496 P.2d 23 (1972).
106. *Rider v. Pottratz*, 246 Or. 454, 456 425 P.2d 766 (1967); *Port of Portland v. Maxwell*, *supra*, at 110.
107. *Arrien v. Levanger*, 263 Or. 363, 369, 502 P.2d 573 (1972).
108. *City of Ashland v. Hardesty*, *supra*. See: right of municipality to acquire easement in private property by adverse possession; 25 Am. Jur. 2d, *Easements and Licenses*, subsec 40; 18 A.L.R. 3d 678; C.J.S., *Easements*, sub-sec 70.
109. 2 Thompson, *Real Property*, 226, subsec 342, 1961, cit: *Swinford v. Roper*, 389 Ill. 340, 59 N.E.2d 863; *Verb v. Morris*, 410 Ill. 206, 101 N.E.2d 566; *Discher v. Klapp*, 124 Ind. App. 563, 117 N.E.2d 753.
110. 2 Thompson, *supra*, 229, subsec 342, (1961) cit: *Stengl v. Starr Bros.*, 370 Ill., 118. 18 N.E.2nd 179.

Strict compliance should always be made with the statute in road matters. It should ever be kept in mind that the laying out of a road over private property is taking that property against the will of the owner and that it cannot be taken even by the state, except by strictly pursuing the procedure prescribed by statute for that purpose.

*Latourette V. County Court
121 Or. 323*

CHAPTER 10

MISCELLANY

The Widths of Public Ways

Principle 97

The “width” of a public way or highway is the distance between the right-of-way side lines that mark the limits of the public easement created by: dedication, grant, statutory process or prescription.

The following is a brief history of Oregon laws and decisions regarding the widths of county roads.

The Bush Codes. These codes were in effect under the Provisional government of the Oregon Territory. Under the codes, all county roads were to be **60 feet** in width, unless the county commissioners, upon the prayer of the petitioners, determined a lesser number of feet.

Bush Codes incorporated into state laws. Effective in 1861, the Bush Codes were incorporated into Oregon law except that *county court* was substituted for *county commissioners*.

1889 Amendment, County Road Law. The Oregon law regarding the widths of county roads was amended in 1889. The amended law required that all roads were to be **60 feet** in width, unless the county court, upon the prayer of the petitioners, determined a different width which was not to be less than **40 feet** nor more than **80 feet**.

The 1915 amendment. In 1915, the Oregon Legislature amended the law to require that all county roads were to be **60 feet** in width, unless the county court, upon the prayer of the petitioners, determined a different width, which was not to be less than **30 feet** nor more than **80 feet**.

The 1917 amendment. In 1917, the Legislature amended the law to omit the phrase *upon the prayer of the petitioners* and, for the first time, giving the county courts the right to establish roads by resolution as an alternate to the petition system.

1927 decision of the Oregon Supreme Court. Prior to 1931 there was no requirement in Oregon law for specifying the road width in the road documents. Consequently, most documents prior to 1931 failed to note the specified or intended road width. But in April 1927, the Oregon Supreme Court announced, in *Latourette v. County Court* (of Clackamas County), that the prescribed width must be considered as an important part of a resolution establishing a county road. (This case will be discussed in detail in this publication.) Consequently, the 1931 Legislative Assembly added the requirement that such widths be specifically noted in official road documents, i.e.:

1931 law-recording road widths in records. Oregon Laws, 1931 ch. 326 required that, effective June 6, 1931, the proposed width of a county road was to be stated in all petitions, notices, orders or resolutions. *From this date to the date of this writing it has been required that the road width be stated in all documents relating to roads.*

The 1931 Legislature also provided that the county court determine the width of county roads, subject only to a minimum width, not to be less than **30 feet**.

1947 legislative amendment. Oregon Laws, Chapter 498, amended the 1931 law, i.e.: “All county roads established after the effective date of this Act shall be of such width as the county court shall determine, which width shall not be less than 50 feet; provided that the county court shall have the authority to accept any dedicated circular road or street less than **30 feet** in width not exceeding one mile in length, and maintain such road or street as a county road for one-way traffic. The proposed width to be stated on all documents.”

The 1951 amendment. Oregon Laws, Chapter 132, amended the 1947 law, i.e.: “All county roads established after the effective date of this act shall be of a width as the county court shall determine, which width shall not be less than **50 feet**; provided that the county court shall have authority to accept any circular road or street of not less than 30 feet in width and not exceeding one mile in length and to maintain such road or street as a county road for one-way traffic *only*. The proposed width shall be stated in all documents.”

1953 Oregon laws. ORS Chapter 229 required:

“(1) Subject to subsection (2) of this section, all county roads established after August 2, 1951, shall be of such width as the county court shall determine, which width shall not be less than **50 feet**. The proposed widths shall be stated in all petitions, notices, orders, or resolutions relating to any county road.

“(2) The county court, by majority vote, may accept as a county road any highway, road, or street, irrespective of its actual platted width, if such highway, road or street was dedicated to the public as a highway, road or street before January 1, 1948. After acceptance, the county shall maintain such highway, road, or street as a county road.”

1978 Oregon Laws. ORS Chapter 368 provided:

ORS 368.415. “(1) subject to subsections (2) and (3) of this section, all county roads shall be of such a width as the county court shall determine. Such width shall not be less than 50 feet unless the court finds compliance with the standards adopted pursuant to subsection (3) of this

section. The proposed width shall be stated in all petitions, notices, orders or resolutions relating to any county road.

“(2) The county court by majority vote, may accept as a county road any highway, road, or street, if it is found to comply with the standards adopted pursuant to subsection (3) of this section. After acceptance the county shall maintain such highway, road, or street as a county road.

“(3) The county court may, by resolution, adopt standards for county roads less than 50 feet in width. Such standards may include, among other things, width, length, design and construction, limitations on access, and restrictions of onstreet parking.”²

1981 change. ORS 368.415 was renumbered by 1981 legislative act, ch. 153, subsec 45, as ORS 368.041.

1985. *Widths of county roads as published in the ORS and in effect on Sept. 27, 1987.*

ORS 368.041. “(1) Unless otherwise provided under ORS 368.036, a public road that is designated as a county road after August 2, 1951, shall be 50 feet or any greater width the county governing body establishes. The proposed width shall be stated in all petitions or notices that initiate consideration of the designation of a road as a county road. The width established for a road shall be stated in orders or resolutions accepting the road as a county road under ORS 368.016.”³

“(2) After a resolution or order designating a public road as a county road is final, the county shall maintain the public road as a county road.”

ORS 368.036 relates to “standards for county roads and road work,” and mentions *widths* in subsection (1), i.e.: “(1) County roads and work performed on county roads shall comply with specifications and standards, including standards for width, adopted by the county governing body....”

ORS Chapter 368 also provides for the legalization of county roads’ where, through omission or defect, doubt exists as to the legal establishment or evidence of establishment of a public road,⁵ where the location of the road cannot be accurately determined because of numerous alterations to the roads there was a defective survey of the road or adjacent property; or the original survey of the road was lost or destroyed.”

ORS 368.206 (Proceedings for legalization of roads; report; notice) provides: “(1) If proceedings for legalization of a road are initiated under ORS 368.201, the county governing body shall:

“(a) Cause the road to be surveyed to determine the location of the road and the *width* of the road according to:

“(A) The laws governing the width of roads at the time the road was originally established; or

“(B) If the original width of the road cannot be determined, to the width for roads of the same class established by the standards under ORS 368.036;

“(b) (cause filing of report.)

“(c) (cause notice of proceedings).”

ORS 368.221 provides: “Notwithstanding ORS 368.036, a county governing body may legalize a road at any width that is **less** than the width of the road described in ORS 368.206 if the county governing body determines that:

“(1) The legalization of the road at the lesser width is in the public interest; or

“(2) An encroachment on the road may not be practically removed under ORS 368.211.”⁹

With the foregoing laws in mind, consider the following scenario that is typical of road and mapping problems encountered in the statewide cadastral mapping program.

1. In the process of mapping a rural area of a county, the cartographer has assembled all of the available records, surveys, maps and plats of sections 4, 5 and 6 of a township.
2. A gravel, graded and drained county road runs through the sections. The records indicate this road has existed since 1925.
3. Part of the cartographer’s job is to draw this road on each map as accurately as possible, being careful to show the side lines, or right-of-way lines of the road at the width as established by the county court, or as subsequently revised by authorized action of the county court. Showing the precise location of the side lines of the public’s easement is important because:
 - a. The space between the side lines, that is, the bed of the easement, is exempt from taxation. The accuracy of the acreage exempt from taxation is dependent on the accuracy of the determination of the width of the county road.
 - b. The side lines, in some situations, will also be the boundary of abutting realty. Consequently, the accuracy of the side lines of the county road will affect the accuracy of the common boundaries of some parcels of land.
 - c. Although designed and prepared primarily for assessment and taxation purposes where the locations of boundaries are more “physical” (according to the best information avail-

able) than “legal,” the cadastral maps will be used by agencies of various political bodies for other purposes. When used for other than assessment and taxation, the maps are erroneously presumed to represent “legal” elements, rather than physical elements established by record. Road locations and widths take on the “official” image and the conclusions usually drawn are that the roads and road information is *legal and final*.

4. In analyzing surveys of land including or abutting the road, the cartographer has discovered that there is a conflict between the surveys as to the width of the road. Some surveys show the road to be 40 feet wide, and some show it to be 60 feet wide. There is no continuity in these conflicts that can be attributed to dates. That is, often surveys executed in the same year, differ on the width of the road.
5. The county roadmaster “thinks this is a 60-foot road,” but can find nothing to substantiate the claim. The resolution for establishing the road does not include the proposed road width. The road viewers’ report does not mention the width. The field notes of the road does not contain the proposed width.
6. The law in 1925, the 1889 Oregon law governing road widths (as amended in 1915 and 1917) required 60-foot county roads. However, the county court was allowed to determine a different width -anywhere between 30 feet and 80 feet- on the prayer of the petitioners. Consequently, the county road through sections 4, 5 and 6 could be 60 feet or 40 feet.
7. If the road was legally established as 40 feet, the county cannot change the width to 60 feet unless it compensates the abutting owners for the taking of the additional land. Failure to do so would amount to an unlawful taking of private property. However, making the “assumption” that it is 60 feet is not, in itself, unlawful. It would only be unlawful when the public or governing body began to exercise the right where the abutting owners had not been compensated for the taking of the additional land.

At what width does the cartographer draw the road on the cadastral map? This problem is so common it is nearly predictable. It is the justification for concern over the subject of the widths of public ways. The majority of road-width problems concern county roads. However, they are not confined to county roads. Some of the more serious, complex problems are associated with public way created by the operation of prescription. A few problems over road widths have

their roots in the dedicated streets of townsite and subdivision plats.

Latourette v. County Court¹⁰

This was an appeal from a judgment of the Circuit Court of Clackamas County, dismissing the plaintiffs petition for writ of review. The plaintiff appealed, claiming numerous errors in the proceedings of the County Court (not the Circuit Court) for Clackamas County for the purpose of altering a certain road in said county. The proceedings were initiated by resolution of the county court as prescribed in Section 4556, Oregon Laws. The resolution was adopted by the county court Sept. 2, 1925, and designated Resolution No. 1224. The plaintiffs premises were affected by the proposed alterations of said county road for which he claimed damages of \$2,500. The viewers allowed him only \$300. The order approving the report of the viewers and the establishing of the road as altered was adopted by the county court by order dated Jan. 6, 1926. The Supreme Court said:

“1, 2. The resolution provided for in Section 4556, Or. L., must contain substantially the same statement of facts as a petition of freeholders for the same purpose, excepting the particulars noted in Section 4556. *The resolution, therefore, must contain a description of the particular manner in which said road is to be altered, widened, straightened or relocated as the case may be, and the public necessity therefore.*”) The petition under investigation, so far as material to the determination of the instant case is as follows:

“In the matter of altering, widening and *straightening* the present traveled road, known as the Oregon City Viola Road Nos. 304 and 289, to make it conform to the established survey of Market Road No. 20.

“RESOLUTION NO. 1224.

“Whereas the County Court of Clackamas County has heretofore by appropriate order established Market Road No. 20 and is now deemed proper to alter, straighten, widen and re-establish said road to make it conform to the established survey of Market Road No. 20, Oregon City-Viola Road.

“Whereas the altering, widening and re-establishment of said road, is a public necessity for the reason that large sums of money are being expended on the same, and the exact location and status of said road should be on file for all time to come; that the County (county, state), hereby declare its intention to widen, alter, straighten and re-establish what is usually known as the Oregon City-Viola Road, to make the same in all respects to conform to the accepted survey of said Oregon City-Viola Road, Market Road No. 20 as follows.’

"Then follows a description of the road by describing the terminals, the general course and the names of the land owners to be affected. The resolution also directs the county surveyor-to post notices as required by law and that said resolution come on for hearing on the seventh day of October, 1925. This resolution is duly signed, and the affidavit of D.T. Meldrum, county surveyor of Clackamas County, shows that four notices were posted: Three in the vicinity of the road to be changed and one on the courthouse bulletin board. Attached to the proof of notice is a copy of the resolution which was posted. The copy shows that the names of the county judge and county commissioners appear at the foot of the resolution. The copy of the resolution was duly certified by the county clerk. The resolution came on for hearing on (10-7-1925), and is entitled, 'In the Matter of the Resolution of Market Road No. 20.' At this time the court by order appointed D.T. Meldrum, county surveyor, and A.H. Knight and R.A. Schuebel, disinterested free holders of Clackamas County, viewers, and directed them to meet at the courthouse (10-15-1925), at (9 AM), to view, survey if necessary, lay out, relocate or change said road to be located, and to assess and determine how much less valuable the premises through which the said road is located and set forth the same in their report, and to file said report in the office of the county clerk on or before (10-24-25). The road viewers duly reported in conformity with said order. Their report is dated October 14, 1925. The only reason for making the alterations and locating a road embodied in their report is in the following language:

" 'We, the undersigned Board of County Road Viewers, having been heretofore directed by an order of this court, at its last regular term, to view, survey if necessary, locate, relocate, alter or change said road and report upon the practicability of a road in (T. 2 & 3 S. R. 2 & 3 E. W.M.), and to assess the damages sustained by the lands through which said road passes, would respectfully report that we met at the place of beginning of said road on (10-14-1925), and to proceed to view, survey and locate the road as described in the petition heretofore filed herein.

" 'We find such route practicable for a good wagon road, and that such road is of public necessity in that large sums of money are to be spent in the improvement of said road and the exact location and status of the same should be definitely known. We therefore do recommend that said road be established as a County Road.

" 'We find there will be damages to the premises through which said road is to be located; that said premises will be redered less valuable by reason of said location, and we assess the damages as follows:

" 'D.C. Latourette. \$300

" 'Ed Leek. \$50'

"A description of the road as contained in the resolution is contained in the directions issued by the county clerk to said road viewers. the report of said county viewers is not entitled in any road matter and contains no description, except as set out above. there is contained in the return to the writ of review a document not entitled in any matter but headed as follows:

" 'Field Notes of Market Road No. 20'

" 'The same being the field notes of the survey of Resolution No. 1224, Clackamas County, Oregon. Located by the Board of County Road Viewers on the 14th day of October, 1925.'

"Then follows the field notes to which is added the following certificate:

" 'I hereby certify that the foregoing is a true and correct copy of the original field notes of Market Road No. 20, Clackamas County, Oregon, located by the Board of County Road Viewers on the 12th day of October, 1925.

" '(Sgd.) D.T. Meldrum,

" 'County Surveyor.'

"By reference to the excerpts from the resolution it will be seen that the description does not contain the particular manner in which the road is to be altered, *widened*, straightened or relocated, unless it is found in the first paragraph thereof, which reads as follows:

" 'Whereas the County Court of Clackamas County has heretofore by appropriate order established Market Road No. 20 and it is now deemed proper to alter, straighten, widen and re-establish said road to make it conform to the established survey of Market Road No. 20, Oregon City-Viola Road.'

"The record discloses, however, that on (9-2-1925), the survey of Market Road No. 20 had not been established. As shown above by the report of the viewers, that survey was not made until (10-12-1925), a month and ten days after the adoption of the resolution by the County Court. This information appears not only from the body of the field notes but also from the certificate of the surveyor appearing at the foot of the field notes. There was then at the time said resolution was adopted no established survey of Market Road No. 20. How, then, could a property owner along the road mentioned in the title to said Resolution No. 1224 inform himself of the manner in which the road was to be altered or changed, or how his property was likely to be affected by such alteration? The only notice given to property owners is a copy of said resolution posted in four public places in the county. The purpose of requiring copies of the resolution to be posted is to give

the land owners along the route of the proposed road or road to be altered notice of the manner in which such road or alteration will affect his premises. It is idle to refer to an established survey for information when no such survey has been made. The Resolution would have been indefinite even if it had referred to a survey mentioning the place where the description contained in the survey could be seen and read. The writer is inclined to the opinion that the description of the proposed alteration of an established road should be embodied in the resolution so that information would be given directly to land owners in a way to convey to them a clear idea of the nature of the alterations which would be likely to affect their land. But in any event such information should be on file or on record in a public office to which the land owner has free access.

"The only statement of the public necessity for the alterations and relocation is contained in the following language:

"Whereas the altering, widening and re-establishing of said road, is a public necessity for the reason that large sums of money are being-expended on the same, and exact location and status of said road should be on file for all time to come."

"This description is hardly a description of a public necessity. If the alignment of the road is sufficient, if the grades of the road are practicable, if the ground occupied by the road is capable of becoming a firm roadbed, the fact that large sums of money are to be expended would not describe a public necessity for alterations. The petition should have stated what constitutes a public necessity for alterations and relocation. . . . (The court elaborated here on the insufficiency of 'expenditure of large sums of money' as describing a public necessity for alterations.) Large expenditure of money-is not a public necessity for changing location of a road.

"3. Other alleged errors are assigned in plaintiff's brief, many of which are well taken but we believe are not jurisdictional. One of the other assigned errors was that the directions to the viewers required them to meet at the courthouse at 9 o'clock on a certain day. Instead of following the directions, their report shows that they met at the beginning of the road to be altered which was not at the courthouse. While we adhere to the former decisions of this court requiring strict compliance with the statute in road matters, yet where jurisdiction has attached by proper petitions or the adoption of the proper resolution and the required notice is given, *mere irregularities will not be sufficient to reverse the order of the County Court establishing a road, unless it clearly appears from the record that grave injustice has been done to an interested party.* 12

"4. Another assigned error is that the resolution does not prescribe the width of the road when widened as proposed by the resolution. The law prescribes that all roads shall be sixty feet wide, unless otherwise ordered by the County Court." *This provision must be considered a part of the resolution unless a different width is specified therein.* It would not confer jurisdiction on the County Court to alter the road so as to establish any different width:

"The other errors are of a similar nature and from the conclusions we have reached it is not necessary to further discuss them.

Principle 98

"Strict compliance should always be made with the statute in road matters. It should ever be kept in mind that the laying out of a road over private property is taking that property against the will of the owner and that it cannot be taken even by the state, except by strictly pursuing the procedure prescribed by statute for that purpose."

"Because the resolution does not describe the proposed alterations of the road mentioned therein, nor refer to any record where a correct description could be examined by any persons interested, and fails to state any public necessity for the proposed alterations the County Court *never acquired jurisdiction to make the alterations proposed.* . . . "

The Supreme Court reversed the judgment of the circuit court, and the case was remanded, with directions to sustain the writ and annul the proceedings of the circuit court.

Sweet et al v. Irrigation Canal Co.'s

The central issue in this case was an open irrigation ditch which interfered with the plaintiffs' right of ingress to and egress from their land which abutted a county road. The ditch was found to be within the right of way, and consequently constituted misuser. That element of the case was discussed in the section of this publication on "Lawful and Unlawful Uses of Public Ways."

The *width* of the road was considered by the Supreme Court, and the court's remarks concerning that element will be discussed here.

The plaintiffs acquired their land by warranty deed dated June 13, 1945, executed by Bernard W. Wise and wife containing the following description of the premises conveyed:

"Beginning at the (SE) corner of Lot 1 of Block 73 in Riverside Addition to La Grande, (county, state), and running thence (N. 88 degrees 49' W) along the north line of the alley in said block a distance of 200

feet to the north line of the old county road; (th) following the north line of said old county road (N 68 degrees 23'W) 189.45 feet to a point 592.42 feet north and 1320.0 feet west of the (SE) corner of (SW 1/4) of section 31, in (T2S, R38E. W.M.); (th) continuing along the north line of said county road (N 70 degrees 43'W), 333 feet; (th) (N. 30 degrees 34'W) 150.2 feet; (th) (N. 1 degree 11' W) 47.24 feet to the center of the channel of Grande Ronde River (th) (N. 70 degrees 54'E) along said river channel, 475.0 feet; (th) (S 1 degree 11' E) 163.00 feet; (th) (S 89 degrees 22' E) 138.2 feet; (th) (S 45 degrees 21' E) 87.7 feet; (th) (S 79 degrees 59'E) 111.0 feet; (th) (S 1 degree 11' E) 270.5 feet to the place of beginning.

"Containing 5.30 acres, more or less, and situated in the SE 1/4 of SW 1/4 and in the SW 1/4 of SW 1/4 of section 31, (T2S, R38E, W.M.)

"Being the same premises conveyed by L.J. Walls and Millie Walls, his wife, to Bernard W. Wise and Nancy G. Wise, his wife, by deed dated October 22nd, 1942."

In addition to that deed, there were in the record the following instruments: Deed from Grande Ronde Meat Company to Elizabeth Bushnell dated Dec. 2, 1935; deed from E.N. Bushnell to L.J. Walls, et ux, dated April 23, 1941; deed from L.J. Walls and wife to Bernard W. Wise and wife dated Oct. 22, 1942. All these are warranty deeds. There was also in evidence a quitclaim deed from F.A. Epling and wife to W.H. Sweet and wife dated June 13, 1946, the date of the deed executed by Bernard W. Wise and wife to the plaintiffs. These deeds were in the chain of title of the premises in question, *and all describe the land as bounded on the south by the old county road*, with the exception of the quitclaim deed from the Eplings to the plaintiffs, which contains as a part of the description the following:

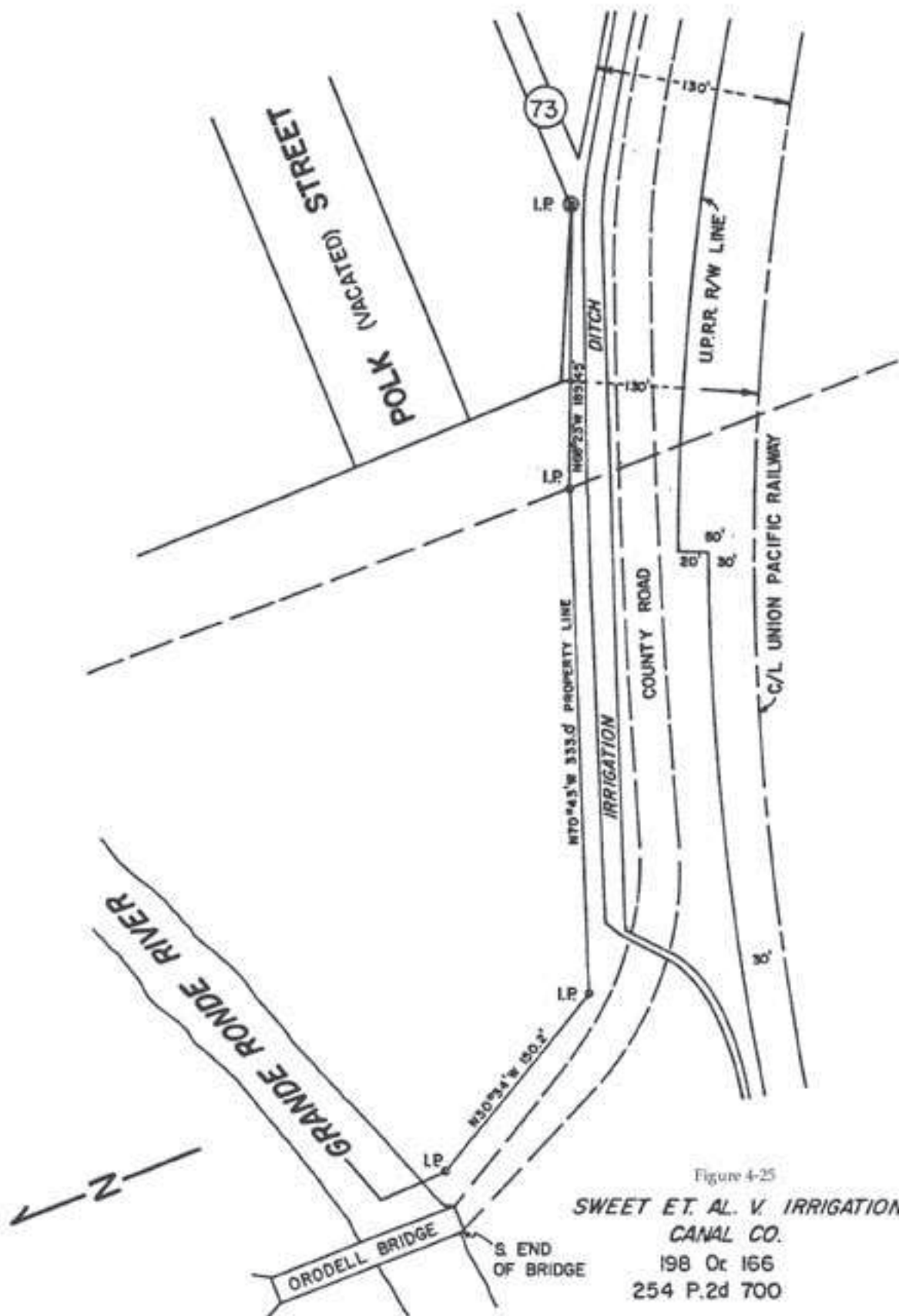
"Beginning at a point on the North line of the old county road 592.42 feet north of the (SE) corner of (SW 1/4 SW 1/4) of section 31, in (T2S, R38E., W.M.); thence along the north line of said old county road (N. 70 degrees 43'W) a distance of 333 feet."

By reference to the description in the deed from Wise and wife to the plaintiffs it could be seen that, beginning at the southeast corner of block 73 in Riverside Addition to La Grande, the southerly line of the tract runs west 200 feet to the north line of the old county road. Then it followed the line of the old county road in a general northeasterly direction a distance of 672.25 feet, then north 47.24 feet to the center of the Grande Ronde River. A bridge known as the Orodell Bridge spanned the river near the west line of the plaintiffs' property. The distance from the middle of the bridge to the plaintiffs' line was 30 feet.

Figure 4-25, from the court report," illustrates the *locus in quo* except it does not show the beginning point in the plaintiffs' deed description, and shows only a part of the first course. The small circle marked I.P. near the circled 73 at the right-hand side of the map indicates an iron pipe placed there by S.B. Morgan, county engineer, roadmaster and Union County surveyor, in April 1946, when he surveyed the premises. This pipe marks the change from the first course to the second one, to wit, "thence following the north line of said old county road (N 68 degrees 23'W) 189.45 feet," etc.

Southwesterly from the plaintiff's land, and roughly paralleling it for a distance of 500 feet or more, is the right of way of the Union Pacific Railway. The right of way widens as it approaches the city of La Grande to the east, bringing its northeasterly line 20 feet nearer to the plaintiffs' southwesterly property line. Distances between the parallel lines of plaintiffs' property and right of way vary from about 65 to 100 feet.

In 1894, proceedings were started to establish a county road from the south end of the Orodell Bridge running southeasterly along the north side of the right of way of the Oregon Railway and Navigation Company (now the UPRR) to La Grande's west city limits at a definitely located point. The road was about one-half mile long. It would have run between the railroad right of way and the plaintiffs' land. It was practically conceded that the proceedings were ineffectual to establish a road because of defects. But the plaintiffs claimed that the road was established by prescription under color of title of the void proceedings and to the full statutory width of 60 feet, and that the exterior northeasterly line was the southwesterly line of the plaintiffs' land. The defendant did not deny the existence of the road. The evidence showed, without contradiction, that for many years in excess of the prescriptive period (noted by the court as 10 years in Oregon by subsection 1-202, OCLA), the road, leading from the Orodell Bridge and passing between the plaintiffs' property and the railroad right of way, had been used by the general public and improved and kept up by the county. The court noted that "the width of the highway so used and improved—the graveled portion—is approximately 25 feet. It is designated 'County Road' on the map, between the broken lines which indicate the exterior boundaries of the improved highway. The northeasterly boundary of the graveled portion at no place touches the southwesterly line of plaintiffs' land, but is south of it, the distance varying from 25 to 30 feet. Defendant's irrigation ditch, which was constructed in 1937 under circumstances to be later detailed, is located in this strip between the plaintiffs' land and the road as improved and used." It was the defendant's



position that *such user determined the width of the road*. The Supreme Court held:

"1. The contention that its width may be determined by reference to ineffectual proceedings for the location of a road may be at once laid out of view."

Principle 99

It is true that "ineffectual proceedings" are "evidence of color of title, and that a subsequent user by the public of the road attempted to be located, for the statutory period, if begun and continued with reference to the proceedings of the county court, is proof of a legal highway, the full width designated in such proceedings."¹⁸

But as stated in *Bayard v. Standard Oil Co*, *supra*:

"... Colorable title forms the basis upon which a prescriptive right to the full width of the defined limits is founded. The next step in logical course of establishment is an entry and a user with reference to it, and, when this has been continuous and uninterrupted and adverse for the statutory period, then has the right ripened into a valid title in the public. It would be fallacious reasoning, therefore, to indulge a presumption that a road as actually worked and used by the public was within and upon the way as attempted to be located, and thence to conclude that its width must be measured by that designated in the void proceedings. It must be proven that the road as used falls within the colorable title, and, when this is done, the other condition follows; that is, *the possession is extended constructively to the entire designated width, or occupancy of a part is then equivalent to an occupancy of the whole*."

Principle 100

"Where the highway as used runs without the exterior lines of that as surveyed and attempted to be located and established by lawful authority, the width must then be determined by the rule that possession is extended constructively to the entire designated width, or occupancy of a part is then equivalent to an occupancy of the whole; and the ineffectual proceedings can have no bearing whatever upon the subject. Of course possession must meet the requirements for prescription to operate."

"2. As the evidence in the Bayard case failed to show that the road, as used at the particular point involved, was within the exterior limits of the road as attempted to be laid out at that point, it was held that the ineffectual record was not pertinent or competent and should not have been allowed to go to the jury. In the present case the record of the proceedings for the location of a road consists only of the petition and the order of the county court setting forth a copy of

the report of the viewers and surveyor, and directing that the report be approved and adopted by the court, that the proposed road be declared a public highway of Union County, Oregon, and ordered opened up and placed in repair for travel according to law. It was further ordered that the report of the viewers be placed on record, and that the surveyor's plat of the proposed road and his field notes of the survey thereof be placed on record. If these things were ever done, the evidence does not so disclose, and there is no way to determine the exterior limits of the road attempted to be established. Hence, under the decision in the Bayard case, the proceedings do not evidence of color of title and are no basis for application of the rule invoked by the plaintiffs.

"3. The question, however, is one of fact,¹⁹ and there is additional evidence bearing upon it which must now be considered.

"As already stated, five deeds conveying all or a part of the plaintiffs' land indicate that its southwesterly boundary is the county road. The evidence shows that for more than 25 years a fence has been maintained along the southwesterly line in approximately the same position as the present fence, which is on the southwesterly line as surveyed by the witness Morgan. It is a fair inference from the evidence that both the county officials and the officers of the defendant company considered that the land on which the irrigation ditch is located is a part of the county road. Before April, 1937, the defendant's irrigation ditch extended from the Grande Ronde River about a quarter of a mile easterly from the Orodell Bridge, and thence through the city of La Grande to the lands to which the company supplied irrigation.

"Lowering of the river made it necessary to move the point of intake to its present location slightly west of the Orodell Bridge. Certain arrangements with the city, not material here, were made for moving the ditch, and a permit was obtained from the county court..."

The permit, in part, was quoted in the court report.²⁰ It was not disputed that the location of the ditch, described in the permit, was somewhere between the UPRR right of way and the plaintiffs' southwesterly line. The defendant pleaded the permit was consent given by the county for the maintenance of its ditch in the county road "if any part of said road is inside of defendant's right of way." But the court said:

"We think that the evidence shows that defendant relied on the permit as its authority for locating the ditch where it is. In reading the testimony to which we shall refer, it should be borne in mind that the witnesses, in using such expressions as 'alongside the

road' and 'between the road and the fence' *were obviously referring to the improved portion of the road.*

"Royal Frank Tyler, a director of the defendant company, who represented it in the negotiations with the county court respecting the relocation of the ditch, gave a pretrial deposition in which, while he would not admit that he intended to put the ditch in the county road, he did testify as follows: (In the following, 'Q' denotes questions, 'A' denotes the answer of response to the questions.)

"Q: You talked to the County Commissioners with reference to permission to put your ditch along the road?

"A: Yes, sir.

"Q: You did get permission to put the ditch along the road, did you not?

"A: Well, we got permission to cross the road, and as Mr. Cochran states, there was a contract drawn up with the County, that we should put a permanent crossing across the road.

"Q: You didn't intend to go on anybody's land without permission, did you, Frank?

"A: Sir?

"Q: You didn't intend to put the ditch on anybody's land without permission, did you?

"A: Well, a bunch of us went up and looked the ground over, there, and said it seemed to be an extra wide road, and we could put it on the side next to Bushnell's land (referring to the then owner of plaintiffs' land).

"Q: There was plenty of room for it alongside the road?

"A: Yes.

"Q: And that would avoid the necessity of going upon private land, wouldn't it?

"A: Yes, sir.

"Q: It was your intention to avoid going on private land down there, wasn't it, along the road?

"A: The only private land we knew we was going on was what we bought from Mr. Carter. (The last answer refers to a right of way for its ditch which the defendant purchased from Carter, who owned land which lies west of the county road and extends from the river south to the railroad.)

"Q: (Mr. Cater) Does the Irrigation Canal Company claim to own that land where the ditch is, alongside the road there, Frank?

"A: Do they claim to own it? "

Q: Yes.

"A: Well, to my mind there is no question but what they owned it at the time Mr. Sweet bought it.

"Q: You didn't claim any right of ownership when you first put the ditch there, did you? You just claimed permission from the County, which you had? Isn't that correct?

"A: Well, that, I suppose; and the arrangements we made with Mr. Bushnell to fill a hole up.

"Q: But you didn't have any arrangements with Mr. Bushnell that any part of that ditch was to be on his land, did you?

"A: As I say, there was nothing at the time said about it. The stakes was there, and he knew where we was running it.

"Q: When you put that ditch along the road there, you relied on permission from the County for your right to put it there, didn't you?

"A: Not entirely, because we asked Mr. Bushnell about it.

"Q: What did you ask Mr. Bushnell?

"A: We talked it over with him, the three directors, and, I think, Si Perkins was up there, and several others; and he said it was perfectly satisfactory if we would put the dirt in that hole and fill the hole up for him.'

"On the trial Mr. Tyler gave the following testimony:

"Q: Now then, did you take up the matter with the County Court relative to crossing the road?

"A: Yes, sir.

"Q: And in accordance with your interviews with them, did the County Court view the premises out there?

"A: Yes, sir.

"Q: And with reference to the part of the ditch that crossed the road, was the County Surveyor, Mr. Morgan, also present?

"A: No; it wasn't Mr. Morgan. It was Mr. McLean for the County? Yes.

"Q: Mr. McLean made the survey? "A: Yes.

"Q: Now then, was there anything said by the County Court as to the location of the ditch after it crossed the road?

"A: Well the sticks were all set when they were out looking it over, and the agreement was that we was to tile it across the county road, and the sticks *were down*

the side of the county road, and they said that was O.K. with them.

“Q: Now then, after crossing the road, and on the east side of the road, did you learn who owned that property in there?

“A: We didn’t learn definitely no. I know I spoke about it, that the property was off of the graveled road, or the road that was used, and looked more like a lawn than anything else and I didn’t see why the ditch should bother the road.

“Q: Whose property was that there?

“A: There was nothing said by anyone at any time about whose property it was.

“Q: Before getting the ditch finished, did you consult someone with regard to that property?

“A: I talked with Mr. and Mrs. Bushnell.

“Q: E.N. Bushnell?

“A: Yes.

“Q: The father and mother of Alfred J. Bushnell, who was just on the stand?

“A: Yes. And as a courtesy, more than anything else I believe, and asked them if they objected to this ditch running along their property there; and they immediately replied no, “If you will fill this hole up on our ground, we are perfectly pleased with it.” We was anxious to have a place to dump the dirt, and so we immediately told them we would be glad to do that, because we wanted a place to put the dirt.

“Q: (Mr. Cater) When the ditch was placed there, and you were making the arrangements you have mentioned, Mr. Tyler, you supposed that the fence which was there, and still in the same place, you supposed that the fence was the boundary of Mr. Bushnell’s land, didn’t you?

“A: As I said before, I remember very definitely telling the County Court this road was extra wide there and seemed to be a boulevard on the side, and it didn’t seem there should be any objection to the road to have the ditch down there.

“Q: In the road?

“A: Down on the boulevard. We didn’t put it on the road. The graded road was put to the side of it. That is what I told them. They immediately said “You are probably right.” “It is alright with us.” And Bushnell said “Fill that hole there” and it would be all right to put it there. There was nothing said at the time whether it was a road or a boulevard, outside of the fact I mentioned it that way. The road was extra wide and I didn’t see that the ditch would interfere with the road at all.

“Q: I would like an answer to my question.

“A: Well, as was stated there, it never come up whether that was, but it was the supposition probably that it was, as I testified before, but the question of the boundary never come up, outside of what I have stated before.

“Q: (Mr. Cater) Mr. Tyler, when you came through Mr. Carter’s land, did you get permission?

“A: Yes, sir. I didn’t. I think Mr. Perkins was on the ditch at that time, and he made the arrangements with Carter.

“Q: Did you get anything in writing from him?

“A: I didn’t. I think there was a deed made to the ditch company for it.’

“4. The witness Morgan, who had been county engineer for the Union County since 1922 and was also county surveyor and roadmaster, and who made the survey of the plaintiffs’ land in April, 1946, as well as a map thereof which is in evidence, testified with reference to the southwesterly line of the property: ‘When I made the survey, it was my endeavor to run that portion of the line as near as I could determine on the edge of the county road right of way or the edge of the road right of way I should say.’ The line which he so ran was the line on which the plaintiffs’ fence is located. Moreover, the description which he prepared for the deed from Wise and wife to the plaintiffs concludes; ‘Being the same premises conveyed by L.J. Walls and Millie Walls, his wife, to Bernard W. Wise and Nancy G. Wise, his wife, by deed dated October 22nd, 1942.’ The Walls’ deed describes the property as ‘bounded ... on the south by old county road.’ While such a reference does not render it conclusive that it was the intention of the grantor to convey all the premises included in the former deed,²¹ yet there is nothing in this record to indicate that the reference did not mean exactly what it said.

“At the time of the ineffectual proceedings for location of the road, and for many years thereafter during the period of use of the road by the public the statute provided: ‘All county roads shall be sixty feet in width, unless the county court shall, upon the prayer of the petitioners for the same, determine on a different width.

“Until 1931 the standard width of 60 feet continued in effect, though changes were made in the maximum and minimum widths allowable upon prayer of the petitioners.²³ By Chapter 326, Oregon Laws 1931, the county court was given discretion to fix the width, which must be not less than 30 feet; and ever since then the county court has had this power with certain changes respecting the minimum width allowable.²⁴

"5, 6. The factors to be taken into consideration in determining the width of a highway established by prescription were thus delineated in the opinion in the Bayard, *supra*, case:

" '... As a general rule, when the highway depends solely, for its establishment upon adverse and continuous user by the general public, its width and extent of servitude are measured and determined by the character and extent of the user, for the easement cannot, upon principle or authority, be broader than user.²⁵ Other conditions, however, may be effective to extend the exterior limits beyond the thread or course of actual travel, as where inclosures may have been permanently maintained by persons affected with reference to the highway, or the use is referable to a survey and plat recognized and adopted by owners of lands over which the way extends, or was under color of ineffectual proceedings to establish a legal road under the statute.²⁶ Even where the highway is founded solely upon user, its width or extent of servitude is usually a question of fact for the jury. It would seem that it ought not, where the topography of the locality will permit, to be confined exclusively to the beaten track or thread of actual travel, because of the exigency that experience has shown for the passing and repassing of those in the use of it. '²⁷

"7. In *City of Newberg v. Kienle*²⁸ this court approved the following from *Washington Borough v. Steiner*:²⁹

"Where the right to a public highway is acquired by adverse user, an important element in determining the width thereof is the recognition of the limits of the way by the owners whose lands front thereon, as indicated by the monuments and fences which they themselves place upon the ground, and the lines which they fix for the same in making conveyances of their property.' "³⁰

And the court cited Elliott:

"... A deed between third parties referring to the way has likewise been held competent 'upon the question of the location and existence of the way, as a matter of public and general interest upon which reputation is admissible.' "³¹

Principle 101

"The erection of a fence or wall as a permanent structure along the side of a wrought road is more probably than not intended to mark the line separating highway use from private occupancy and possession, in the absence of evidence that it was not thus intended. As physical barriers such structures, especially stone walls apparently designed as permanent boundaries, normally denote separation and distinction of use, and are notice of the line to which use is made."³²

8-11. (Principle 102).

Principle 102

"The usual width of highways in the locality is a pertinent factor."³³

"...Declarations of the owner of the land over which the road runs, or of the public authorities, tending to show that it is or is not a highway, are admissible as are also acts of public authorities in working or otherwise recognizing the highway, in allowing a road tax to be worked out on the road in question, or in refusing to assess the land for taxation. Evidence may be given that it is the general understanding in the community that the locus *in quo* is a highway.' "³⁴

"12. The evidence in this case presents a number of relevant facts which convince us that the county road and southwesterly boundary of plaintiffs' land are contiguous. These facts include deeds so describing the property, the maintenance of the line fence for so many years, and the fact that the standard width of a county road was 60 feet. In addition the county court, in its dealings with the defendant, asserted its jurisdiction over the way in dispute and the defendant recognized its authority in that regard. Before the defendant built its ditch on the property of Mr. Carter it bought a right of way from him and received a deed to it. It did not even inquire, however, as to the ownership of the land lying between the plaintiffs' fence and improved portion of the road, but evidently assumed that it was public property, and, so believing, asked permission of the county authorities to locate its ditch there."

(Note: This is one of the points that was sought by the line of questioning in the testimony quoted. If the defendant honestly believed it was constructing the ditch outside of, and abutting the county road, as it claimed, then it must have concluded the ditch would be constructed on private land. And if this was the defendant's conclusion, then it would be justifiable to expect it to have purchased a right of way from the plaintiff, just as it did when it planned to construct the ditch across the land of Carter.)

"This permission was granted both orally, and, as we think, by the written consent which is in evidence. We do not accept the witness Tyler's version of the arrangement for disposal of the dirt excavated from the ditch (Note: although in all probability the underlying fee in the road was in the plaintiffs-not at issue in this case-and consequently, the plaintiffs were entitled to the dirt.) It is quite different from that given by another witness, Alfred J. Bushnell, who was called by the defendant to testify on this subject. He was present when the arrangement was made, and testified that there was a big hole on his father's land, that the representatives of the defendant asked permission to put the dirt in the hole, that this was

considered to be 'a favor to both of us'-that is, to his father and the defendant-and that neither he nor his father gave anything for the dirt. We think this testimony is to be preferred to Tyler's, not only because it comes from a disinterested source, but also because it is more reasonable and probable, since the defendant knew how to obtain a right of way over private property, and, moreover, in its own view of the matter, had already acquired from the county all the legal authority to build its ditch that it needed. That being so, why should it have bargained with Bushnell for a right of way? We think the agreement was simply one under which the defendant got rid of the dirt and Bushnell got the hole in his land filled.

*"Our conclusion from the evidence is that defendant's ditch is in the county road and that plaintiffs' land adjoins the county road. They are, therefore, abutting owners with the right of access to the highway, which is cut off as long as defendant maintains its irrigation ditch as an open ditch."*³⁵

The remainder of the case settled other issues unrelated to the width of the county road, and are discussed elsewhere in this publication. The ditch was held to be a public nuisance and the Irrigation Canal Company was required to provide access across the ditch so the plaintiffs were provided a means of ingress to and egress from their abutting land. In a petition for rehearing,³⁶ the court noted that there was nothing that it had not considered and discussed, except a contention that, to quote from the brief:

"The Court's opinion gives a road 80 feet wide without any proof of such a road being necessary of required."

The **court** responded:

"This assertion is based on what, in our opinion, is an unwarranted assumption that the southerly boundary of the road is the northerly boundary of the (UPRR) right of way, and that assumption in turn derives from the description in the ineffectual proceedings to establish a road. For reasons which it is unnecessary to repeat *we rejected the plaintiff's contention that the width of the road could be determined by reference to those proceedings*. That being so, we were unable to see how they can have evidentiary value for any purpose. Assuming, however, that resort may be had to the proceedings for the purpose suggested by counsel, we will consider counsel's contention that the description in the petition fixes the southerly boundary of the road. The petition describes a proposed road as 'running along the north side of the right of way of the (O.R. & N.) Company.' This, it is said, means the road was to be contiguous with the North boundary of the right of way. *But this is not necessarily so, and in this instance the construction suggested would be unreasonable.*

"24. (See Principle 103, as follows:)

Principle 103

"The word 'along' is, defined in Funk & Wagnall's Dictionary as 'At points extending through or over the length (of anything); by the side; near.' The meaning of the word must be determined from the context, and it does not necessarily imply contact."³⁷

"For a portion of its length opposite the plaintiffs' property the railroad right of way is 60 feet in width. It then widens out to be 100 feet, and the north line becomes 20 feet closer to plaintiffs' land (20 feet additional on *each side of the center line*) than is the case with the remainder of the right of way to the west. According to the testimony of the witness McClain, an engineer who prepared two of the maps in evidence, this additional 20 feet was 'bought after, in later years.' He did not state when it was bought, and there is nothing to indicate whether it was before or after the abortive proceedings were commenced. But, whatever may be the fact about that, it is unreasonable to suppose that the petitioners intended the road to adjoin the (r/w) as it is now because the line of the road would have then proceeded in a southeasterly direction along the railroad right of way some 300 or 400 feet, then turn at left angles to the northeast for a distance of 20 feet, and then, turning again at right angles, continue in a southeasterly direction. It would be equally unreasonable to say that, if the railroad right of way at the time of the attempted establishment of the road was 60 feet in width throughout its entire length, a county road was established which adjoins the railroad's right of way because, if that be the case, it would follow that the railroad company is now occupying 20 feet of the county road. *We conclude, therefore, that the words 'along the north side of the right of way' in this instance mean near the right of way.*

"Moreover, the boundary of the road, had one been established pursuant to the ineffectual proceedings, would not necessarily have been the exact line referred to the petition for the viewers, had there been any, might have made reasonable deviations so long as they stayed within the course specified in the petition.³⁸ But since there were no viewers and the proceedings were without legal effect for any purpose, the entire discussion would seem purely academic.

"Our holding is that the road is 60 feet in width, its northerly boundary being contiguous with the southerly boundary of plaintiff's land.

"We are not persuaded that we should change the views of this case heretofore expressed, and the petition is therefore denied."³⁹

Miscellaneous Rules and Principles of Law-Road Widths

The case of *Huggett et ux v. Moran et ux*⁴⁰ was a suit to rescind a contract for purchase of real property on grounds of alleged false representations by the defendant that the road leading to the property was a county road. The court considered the possibility that the road was under jurisdiction of the county by adverse user by the public and continued maintenance by the county. The case is discussed and quoted in detail in the section of this publication on "Public Ways by Prescription." The rule announced by the court regarding the width of a way established by prescription is:

Principle 104

"Whenever a statute prescribes the minimum width of public roads to be established in the future, and a public road is established by prescription, the width thereof is the minimum necessary to the establishment of a legal road in absence of a taking of a greater amount."⁴¹

But in *Silverton v. Brown*⁴² the court supplied this advice:

Principle 105

"While it is a general rule that the width of a highway established entirely by user is limited to the ground actually used, the question is usually for the jury, giving a proper consideration to the circumstances and conditions attending the same."⁴³

For information on determining the width of a dedicated waterfront street, refer back to the case of *Parrish v. Stephens, supra*, cited in its entirety in this publication.

City of Eugene v. Garrett⁴⁴

(Width of a street created by abutting subdivision)

This was a suit to establish the right of the City of Eugene to a street known as Agate Avenue. The facts as set out in the Supreme Court report are:

"In 1890 'Fairmount,' Lane County, Oregon, was platted into lots and blocks with streets and alleys. It was located some distance beyond the limits of the City of Eugene as the same then existed. The addition was embraced within the limits of the donation land claim of William Smith and wife, with the west line of the claim as the west line of Fairmount. The street on the west side was designated as Agate Avenue, and extended from the Oregon & C.R.R. right of way on the north to the south side of the platted portion of

the claim. This street was platted and dedicated to the **width of 53 feet to 60 feet**; the variation being due to the fact that the west line of the claim did not coincide with the line of the street. (Note: Apparently, this meant the two lines were not parallel.)

"In 1891 University Addition to Eugene was platted with the east line the same as the West line of Fairmount (Note: apparently meaning the two additions abutted one another), and the plat shows the street **90 feet wide** from the east line of Agate Avenue. This would take 53 feet to 60 feet east of the claim line and 30 to 37 feet on the west of the claim line to make the width dedicated.

"In 1892 the owners of Fairmount Addition filed an amended plat, subdividing some of the lots. This plat shows the west line of the lots facing on Agate Avenue, 11 (eleven) feet farther west than the first, in order to correct an error in the first plat and to conform to the stakes set in the ground marking that line of the lots.

"In 1895 all that part of University Addition south of 15th Street was ordered vacated by the County Court of Lane County. Thereafter the owners of University Addition instituted a suit in the Circuit Court to quiet title to this tract of 34 acres, and to register the same under the Torrens Registration Act. After due service and publication of notice a decree was rendered in effect quieting the title and ordering the same registered. After this the title to the tract was acquired by the Board of Regents of the University of Oregon. This tract embraced all the land which was formerly a part of University Addition, from the south line of 15th Street to 18th Street. Both of the additions mentioned, were outside of the limits of the City of Eugene, and were not within the boundaries of any municipality, until the limits of the City of Eugene were extended by an act of the legislature in 1903, after which a portion of what was formerly University Addition, south of 18th Street, was platted as Gross Addition, and the plat was accepted by the city and duly recorded. In 1908 the city council of Eugene passed an ordinance providing for the improvement of Agate Avenue. The centerline of the improvement was declared to be 10 feet east of the claim line above referred to. The street was then improved by grading 40 feet in width, with a high grade of macadam 16 feet in the center, of a *70 foot street*. Wooden sidewalks were constructed along the west side of the 70 foot line for a portion of the distance north of 15th Street, and some shade trees were planted which are now about twelve feet high. Gutters and drains were arranged to conform to this proposed line, and the plumbing of the property owners was connected with the sewers. By an agreement with the Board of Regents of the University the use of a sufficient area to make a 70 foot street along

the 34 acre tract was obtained, and the fence on the east side of the tract was adjusted to this line agreed upon.

"In 1914 the property owners along Agate Avenue petitioned the city council to take formal action to *definitely determine the lines of the street*. An ordinance was passed by the council *declaring the street to be 70 feet in width* and vacating the remaining portion. This ordinance, however, was vetoed by the mayor and never became effective. Therefore it cannot be further considered in connection with this case. This suit was instituted by the direction of the city officials to quiet title to the street *to the width of 90 feet, as formerly dedicated*."

The Circuit Court of Lane County passed a decree establishing the line of the street as prayed for (90 feet) in the complaint, and the answering defendants appealed. Mr. Justice Bean delivered the following opinion for the Supreme Court:

"1, 2. We shall first consider that part of Agate Avenue not adjacent to the University tract. The request to establish a seventy-foot street and vacate the remainder thereof came principally from the property owners on the west side of the street and north of the University tract. Prior to 1909 this street had been used but little. It was then graded to the width of 40 feet with macadam in the center of the grade 16 feet in width. Sidewalks were constructed for a portion of the distance on the west side and some five or six dwelling houses were built and some of the lots graded and adorned with shrubbery with a view to conforming to the proposed 70 foot street. *None of the houses were built within the 90-foot street line* but some of them are near that line. It appears from the evidence, taking into consideration all of the proceedings relating thereto, that it was proposed by some of the city officials, and desired by some of the property owners, that a 70-foot street should be established. This was never done. Most of the lot owners who made improvements on the west side of the street knew that no portion of the 90-foot street had ever been vacated. All of them could, with reasonable diligence, have obtained such information. This is shown and recognized by their petition to the city council to vacate a portion of the street and establish the same seventy feet wide, as proposed by the ordinance which was vetoed by the mayor. Plainly expressed, these lot owners took chances on the street being narrowed. Their request in this respect was denied. Subdivision 36 of the charter of the city of Eugene, Special Law of Oregon, 1905, page 254, empowers the city council to provide for the vacation of any street or alley, upon the petition or with the consent of not less than three-fourths of the owners of the property adjoining or abutting upon such street or alley or

part thereof to be so vacated. *The passage of the ordinance for the partial improvement of Agate Avenue and fixing the center line of the street, without the required petition or consent, could not have the effect of vacating a portion of the street. The municipal authorities have no right to sell or dispose of streets or alleys dedicated to the public except in the manner provided by law.*⁴⁵

It is contended on behalf of the defendants that the city is estopped from claiming a street 90 feet wide, for the reason it has never used any portion of the street outside of the 70foot line, and has by its acts led the property owners to improve their property to that line. It is not usually expected that a city will improve all of its streets at one time. It may also, if necessity requires, with the same propriety grade a portion of a street. When this street is permanently improved or paved, the work already done will not be lost. The evidence in this case does not disclose acts done by the adjoining proprietors which indicate that they, in good faith, have claimed a part of the highway as their own property, or have expended money on the faith of such a claim by adjusting their property to the highway as they claim it to be, so that such private rights are of more persuasive force than those of the public. In other words the city is not estopped by its acts from asserting its rights to the full width of this part of the street, under the rule adopted in this state ...⁴⁶

"3, 4. As to the portion of Agate Avenue between 15th Street and 18th Street, along the east side of the University tract a different situation is presented. It should be remembered that in 1895 upon the petition of the owners of University Addition the County Court of Lane County ordered vacated all that part of the streets and alleys of the addition south of the south line of 15th Street as designated upon the plat. This affected the 34 acre tract. The order was acted upon. Thereafter the owners of the tract instituted proceedings in the Circuit Court for the purpose of quieting the title to the tract and registering the same. After due service and publication of notice a decree was passed adjudging the Lane County investment Company a corporation to be the owner in fee simple and in possession of said tract; and that no other person or corporation had any interest or claim of any kind to said land; and confirming such title, and ordering the same registered as provided by the statute. After this the 34 acre tract, extending to the east line of the Fielding McMurray D.L.C. was conveyed to the Board of Regents of the (U of O) for university purposes.

"It is contended on behalf of the city that the County Court was without jurisdiction to order a vacation of the streets and alleys for the reason that the petition therefore did not state that University Addition was not within the limits of any incorporated city or town,

and did not show that the addition was outside the boundaries of the City of Eugene, in order to conform to the requirements of Sections 3276 or 3284, L.O.L. The city limits were then fixed by the legislative charter of Eugene, and the County Court could take judicial notice of the same and also of the public survey of the D.L.C. which was named upon the plat recorded and referred to in the petition.” However, this may be we do not deem it necessary to decide as to the force of the order of vacation of the County Court. The decree of the Circuit Court precludes the city authorities from establishing Agate Avenue as 90 feet in width, along the east side of the University tract, so as to appropriate a portion of the land belonging to the state. The Board of Regents relied upon the title to the 34 acre tract according to the decree of the Circuit Court as they had a right to do. Equity does not demand that the title to the streets and alleys in that part of what was formerly University Addition should be disturbed, at the suit of a political division of the state. Such claim is not in harmony with the agreement made by city officials and the Board of Regents, as mentioned above.

“The decree of the lower court will be modified so as to exclude from the declaration of a street 90 feet in width, all that portion of Agate Avenue over the University Tract between 15th Street and 18th Street and affirmed as to the remainder of the decree.”

On a petition for rehearing, the rehearing was denied. Mr. Justice Bean delivered the following opinion of the court.⁴⁸

“In a petition for rehearing, counsel for the defendants urge that this is not a suit for equitable cognizance, for the reason that the plaintiff has not shown that the land improved *within the street* is not in possession of another. There is more than one ground for equitable interference.

“It is conceded that Agate Avenue in the City of Eugene, was regularly dedicated as a public street to the width of 90 feet and that the plat and dedication were duly recorded. The fences and so forth mentioned in the answer of defendants indicate an encroachment upon this public highway.

“5-7. It is also shown and unquestioned that a portion of the street is improved and occupied by the public to the width of about 70 feet. *Where there is possession and user of apart of the street within the well-defined limits of the dedication, record of which has been duly made, it amounts constructively to an occupation of the entire dedicated width as designated upon the plat in so far as the possession is necessary for the purposes of this suit.*”⁴⁹ This rule has been applied to public highways where the question of adverse possession was involved and by analogy is applicable here. A city as trustee of streets

for the use of the public is in duty *bound to remove all obstructions and encroachments which materially disturb the public user.* Any course may be adopted which is consistent with fundamental law and is adequate and best adapted to effect the desired result and protect the rights of the public in the street.⁵¹ An unauthorized obstruction of a public highway is a nuisance.⁵² The application of Section 341, L.O.L., providing for the abatement of a nuisance, or a summary removal, might not be appropriate in a case of this kind, where there is a difference of opinion between city officials and some dispute between lot owners and the city. The remedy provided by the section of the Code for nuisances is not conclusive; but whenever a nuisance will cause irreparable damage or require numerous actions equity has concurrent jurisdiction with courts of law and will enjoin continuance of the objectionable conditions.” In legal effect the encroachments upon the street in question, or trespass upon the easement, constitute a purpresture or public nuisance. One of the earliest recognized forms of public nuisance with which equity has interfered is that of purpresture. The jurisdiction of equity in cases of purpresture, as well as of public nuisance, generally rests in the necessity of preventing mischief and avoiding vexatious litigation. This remedy is more efficacious than that at law.⁵⁴ We therefore feel safe in holding that equitable jurisdiction in this case is founded upon solid grounds.

“... The petition for rehearing is denied.”⁵⁵

Alteration of County Roads-Case Study, Re Procedural -Problems

The case of *Nyman v. City of Eugene*⁵⁶ was found to be instructive in resolving dedication and road and highway problems. This case was difficult to categorize under the subjects discussed to this point in this publication. Yet this case announces rules, principles of law and considerations that are important to the subject of public ways, specifically county roads. Consequently, it is presented as a separate section of this publication.

The primary issue was the effect to be given to a recitation in a county court (not the circuit court) that certain property owners agreed to the widening of a county road. The Court of Appeals held that the recitation was insufficient to confer jurisdiction on the county court “without an affirmative showing in the record that all of such owners signed the agreement.”⁵⁷

The Oregon Supreme Court granted a review.”⁵⁸

The parties submitted this controversy without suit or action pursuant to ORS Chapter 27.⁵⁹ The facts were stipulated as follows:

"Plaintiff is the owner of real property adjacent to a road in the City of Eugene known as Barger Drive ... (orig. established as a county road in 1895, with a 40 foot r/w). The public has used the roadway at all times since.

"On or about (1-31-51), the Lane County Court adopted Resolution 2178 declaring its intention to widen Barger Drive to 50 feet. The resolution stated that the widening was '(a)ll as agreed to by the property owners abutting on said road.' However, the parties to the present proceeding *have failed to find any record that plaintiff's predecessor in interest agreed to the widening.* The parties located County Road File 2178 as it now exists and found in that file an agreement to the widening of the road, consisting of three unnumbered pages which were executed (2-1950). The agreement contains the signatures of certain owners of property abutting Barger Drive at that time, but *the signature of the plaintiff's predecessor in interest does not appear on any of the pages.*

"Pursuant to Resolution 2178, notice of the widening was posted and a return of that notice was made on or about (2-5-'51). On (4-2-'52), the county court decided to establish a 50-foot right of way and made an entry in the county journal to that effect ⁶⁰

"In the fall of 1952, Lane County blacktopped Barger Drive. The blacktop was within the boundaries of the original 40-foot right of way. The fences ran approximately one-quarter mile along Barger Drive but did not traverse the property of plaintiff's predecessor. Lane County maintained the roadway until 1966, when the City of Eugene assumed jurisdiction.

"On (4-14, 1975), the City adopted an ordinance providing for the improvement of Barger Drive, including the widening of the roadway. In (9-1975), the City commenced construction of Barger Drive improvements on that portion of the (r/w) that Lane County sought to acquire in 1952. That portion includes a strip of the property owned by plaintiff.

"Plaintiff contends that no actions of Lane County or the City of Eugene have operated to widen the right of way and that she is entitled to compensation for the taking of the strip on her property. The City contends that plaintiff's rights are subject to a right of way in the public because: (1) the 1952 Lane County order lawfully extended the right of way to include the strip on plaintiff's property; (2) plaintiff cannot now collaterally attack the 1952 resolution because her predecessor in interest failed to seek a writ of review and because of passage of time; and (3) plaintiff's rights to the disputed property are barred by the doctrine of adverse user.

"I. Validity of the 1952 Order

Plaintiff contends that the 1952 order is invalid because the resolution on which it was based contained no *statement of public necessity* or, alternatively, because the signature of her predecessor in interest does not appear on any of the documents found in public records. The trial court agreed with plaintiff's first contention, concluding that the statement of public necessity is 'jurisdictional' and that the failure to include such a statement *rendered the 1952 order 'void.'* The Court of Appeals rejected the plaintiff's first contention. However, it agreed with her alternate position; concluding that in order for the county court to acquire 'jurisdiction' to widen a road by agreement, *the signatures of all affected property owners had to appear in the record."*

The Supreme Court provided an enlightening explanation of *jurisdictional*, as used here:

"It is important to observe at the outset that the characterization of a statutory mandate as 'jurisdictional' simply states a conclusion. In the context of a case such as this, it means that this court has concluded that failure to comply with the statutory requirement renders the government action void as to this particular party. The characterization is, therefore, the ending point of our analysis, not the starting point. In a number of cases, however, this court has characterized statutory requirements as 'jurisdictional' with little or no analysis. Thus, in various challenges to the establishment or alteration of roads, we have held that the county court acted without 'jurisdiction' when it relied on an earlier non-final order by the same court ⁶¹ when no statement of public necessity appeared in the authorizing resolution; ⁶² when an affidavit disclosed that notice was not posted according to statutory requirements; ⁶³ when a recitation in the record did not disclose the manner in which notice had been posted; ⁶⁴ when the petition to establish the road did not describe the road's terminus; ⁶⁵ and when there was no recital in the record that notice had been given to affected landowners ⁶⁶ At the same time, we have dismissed challenges on the ground that the alleged defects were not 'jurisdictional'; holding that once 'jurisdiction' is established, the county court proceedings are 'presumed' regular. ⁶⁷

"It is difficult, if not impossible, to determine from these cases why certain statutory requirements are considered 'jurisdictional' and others not. Our decisions also seem to apply the concept of jurisdiction indiscriminately without distinguishing 'legislative' or policy-making functions from 'quasi judicial' or factdetermining functions ⁶⁸ We are now of the opinion that clear analysis in this area requires that we establish criteria for determining what statutory requirements are indispensable to the validity of the challenged action. We are also of the opinion that our

analysis will be facilitated if we abandon the use of the label ‘jurisdiction’ in cases as this and focus instead on the specific statutory language that permits the government to affect the rights and obligations of its citizens.

“ORS 368.405⁶⁹ provides that proceedings for the establishment and alteration of public roads may be instituted by petition of freeholders, by resolution of the county court, by grant of owners of necessary rights of way, or by condemnation proceedings. The mechanics of establishing a road by petition are described in ORS 368.430-.465, and the mechanics of establishing a road by resolution are described in ORS 368.470. Because ORS 368.470 requires that the county court, when establishing a road by resolution, *give notice ‘as provided for upon the filing of a petition for such purposes’ and that it follow ‘like proceedings ... as in the case of the filing of a petition,’* the procedures are basically the same whether the court acts under a petition or a resolution.”

The Supreme Court decision is as follows:

“1. ORS 368.470(7) also allows the county to ‘procure right of way’-by ‘agreement.’ Subsection (7) was apparently designed to *permit the county to dispense with some of the formalities described below when all the affected property owners agree to the action.*

However, the subsection must be read to mean that *absent agreement of all the property owners affected, the same proceedings must be followed as in the case of the filing of a petition.*

“ORS 368.445 (1) provides that when the petition authorized by ORS 368.430 is presented to the court:

“... (I)t shall be accompanied by satisfactory proof by affidavit that:

“(a) Notice has been posted at the place of holding county court and at three public places in the vicinity of the proposed road to be located, laid out, relocated or changed, 30 days previous to the presentation of the petition, notifying all persons concerned that the application will be made to the court at its next term.

“(b) Notice has been forwarded by mail, postage prepaid, not less than 30 days prior to the date of the presentation of the petition, to each record owner of land, on or over which the proposed road or portion thereof is to be laid out, relocated or changed, at the last-known post-office address of the owner .⁷⁰

“ORS 368.445(2) provides:

“‘If the address of the owner is unknown to the person mailing the notice mentioned in paragraph (b) of subsection (1) of this section, it may be mailed to the address given on the latest tax roll in the office of the tax collector of the county. If the address is unknown

to the person mailing the notice, cannot with reasonable diligence be ascertained and cannot be found on the latest tax roll, the notice may be addressed to the owner at the county seat of the county where the land is situated.’⁷¹

“ORS 368.455 requires that the notice contain a description of the proposed road, the date of presentation to the county court, and, if the road is initiated by petition, the signature of one or more of the petitioners. ORS 368.450 provides that any owner of land affected by the proposed road who signs the petition waives all further notice.

“ORS 368.460 provides that upon presentation of the petition ‘with satisfactory proof of posting and mailing notice,’ the county court shall appoint a board of road viewers to survey the proposed road and assess damages. Having done this, the viewers are required to file a report, which must be read at public meetings by the county court at least twice .⁷² ORS 368.480 then provides:

“‘At any time prior to the expiration of the day on which the report mentioned in ORS 368.480 is publicly read for the second time, any person whose lands are directly affected by the report may file a petition for damages, and any freeholder, residing in the road district where the road is located, whose name does not appear upon the petition, may file a remonstrance against the proposed establishment.... Failure to file a petition for damages within the time allowed by this section is *a waiver of all rights thereto by every person interested therein, except minors or other persons under disability*⁷³ (emphasis supplied).’

“After considering the report by the road viewers and any claims for damages or remonstrances, the county court may adopt or reject the report and enter an order to that effect.⁷⁴ That order may be appealed to the circuit court, as may the award for damages, within 20 days after the report is adopted .⁷⁵ On appeal, the circuit court’s scope of review is limited by ORS 368.535, which provides:

“‘No final order establishing, altering or relocating any road or highway shall be set aside or annulled upon appeal or review, nor shall any county court refuse to render any such final order, on account of any defect or irregularity in the petition or resolution, or notice thereof, which does not materially affect the substantial rights of an interested part. *The following irregularities are immaterial defects:*

“‘(1) Errors of description of the intermediate points, courses or distances of the proposed road, when the proposed road can be otherwise definitely located.

“‘(2) *Errors in the posting of the notices, where it can be shown that all persons objecting to the proceed-*

ings for the proposed road had actual notice thereof prior to the time of the first reading of the petition or resolution.

“(3) Errors in or omissions of the names of the petitioners appearing on the notice, where no remonstrance is filed.”⁷⁶

“2. As we read the above statutes, they demonstrate a legislative intent to place the burden of objecting to a proposed road on the property owners who may be affected by the decision to establish or alter the road. At the same time, however, the statutes impose strict requirements on the county to ensure that affected property owners receive **actual notice** of the proposal insofar as possible. On appeal, an order of the court may not be set aside if the irregularity affects the ‘substantial rights of an interested party.’

“In establishing a statutory scheme for road development, the legislature was faced with two competing policies. On the one hand, it wished to ensure that county orders establishing roads would be final and unassailable. At the same time, it wished to ensure that all parties who might be affected by the road would have an opportunity to participate in the decisionmaking process. This was particularly true with respect to property owners over whose land the road would be established and who had a property interest as well as a general civic interest in the decision. Accordingly, the legislature, while limiting the nature of defects that could be used to attack an order, established elaborate procedures for ensuring that affected property owners received actual notice of the proceedings.

“3. From our reading of the statutory scheme, we conclude that with respect to persons whose property must be acquired for the road, compliance with the notice requirements contained in ORS 368.445 is **indispensable to the validity of the action and that failure to comply with those requirements prevents the county from barring claims for compensation by owners who do not receive notice.** We also conclude that **compliance with the other statutory requirements is not indispensable to the validity of the action unless the non-compliance in some way renders the notice ineffective. We think this conclusion reflects the balance** that the legislature struck in enacting ORS 368.405 *et seq.* To the extent the cases cited above are inconsistent with our holding today, they are disapproved.

“4. It follows from this that we must reject plaintiffs claim that the 1952 order by the Lane County Court is ‘void’ because of the court’s failure to include a statement of public necessity deprived it of ‘jurisdiction.’ No contention is or could be made that a statement of public necessity was necessary to give plaintiffs predecessor in interest fair notice of County Court proceedings.

“A different question, however, is presented by the plaintiffs second contention. Plaintiff contends, and the Court of Appeals agreed, that where a county court attempts to *establish a road ‘by agreement’ pursuant to ORS 368.470(7), it can ‘obtain jurisdiction’ so as to cut off a landowner’s claim to compensation only if the record affirmatively shows the agreement of all the effected land owners.* Because the signature of plaintiffs predecessor in interest does not appear in the county court records, the Court of Appeals held that the Lane County Court did not have ‘jurisdiction’ when it acted in 1952.

“Insofar as the majority of the Court of Appeals refers to the *jurisdiction*’ of the county court to widen the road, it reflects the analytical error found in past opinions by this court. It also illustrates why we believe it is preferable that the label be abandoned in the context of cases such as this. A county court that decides to widen a road is not acting judicially at all but rather is making a policy decision. The concept of jurisdictional is judicial in nature and is out of place in the legislative context.

“5,6. Nevertheless, we agree with the Court of Appeals’ ultimate conclusion. As noted above, we read ORS 368.470(7) as allowing the county to ‘procure right of way’ by ‘agreement’ only if the agreement includes all the property owners whose land will be taken for the road. If the agreement does not include all the property owners, the county may cut off the claims of nonparticipating owners only by complying with the notice requirements contained in ORS 368.445. Either ‘agreement’ or notice is indispensable to the validity of the order if the effect of the order is to deprive persons of their property. We therefore examine the record before us to see if these requirements are met.

“The City admits the plaintiff’s predecessor in interest did not sign the three pages of ‘agreement’ found in County Road File 2178, and there is nothing else in the record that indicates plaintiffs predecessor agreed to the widening or received notice thereof pursuant to ORS 368.445. The City, however, contends that the statement in Resolution 2178 that the widening of Barger Drive was ‘(a)ll as agreed to by the property owners on said road’ is prima facie evidence that all the affected property owners agreed to the widening, that there is no affirmative evidence to rebut the recitation, and that absent such evidence, the recitation is sufficient to show that the County Court validly widened Barger Drive ‘by agreement.’

“We shall assume, without deciding, that a recitation that *all* the affected property owners agreed to the widening would have the effect contended for by the City.⁷⁷ The fact remains that *Resolution 2178 does not contain such a recitation.* The resolution simply

states that the widening was ‘(a)ll as agreed to by the property owners abutting on said road.’ *It does not necessarily mean to state that the widening was agreed to by all the property owners.* Given the state of the record, particularly the contents of County Road File 2178, we decline to give the recitation the broader construction contended for by the City. It is just as reasonable to conclude that the recitation was intended to mean that the widening was agreed to by the property owners who signed the three-page document in the file as it is to conclude that the recitation refers to all property owners.⁷⁸ This is particularly true in light of the sequence of events occurring from 1950 through 1952. In 1950, a group of property owners signed the document found by the parties in the county road file. On January 31, 1951, the county court adopted Resolution 2178 declaring that the widening was ‘all as agreed to by the property owners abutting on said road.’ There is nothing in the official record, the file, or the stipulated facts to indicate an investigation by the county to determine whether there were property owners abutting Barger Drive in addition to those who signed the document. It is reasonable to conclude from this that the language used in the recitation was *intentional*, because at the time it adopted Resolution 2178 the county court may not have *known* whether all the property owners agreed to the widening.

“7. We do not say, of course, that the City’s interpretation of the recitation is an unreasonable one. Nevertheless, we believe that if a bare recitation in a public record is to be considered *prima facie evidence*⁷⁹ of the fact alleged, this court should not **extend the effect of the recitation** beyond what it literally states, at least in cases where the matters dealt with in the recitation concern elements of procedural fairness and there is evidence tending to indicate that the recitation may not have been a carefully considered one.”⁸⁰

“8. The City also relies on the statutory presumption contained in ORS 41.360 (15) that official duty has been regularly performed. *We hold that the presumption cannot be applied to establish that the Lane County Court gave notice to (the) plaintiff’s predecessor in interest.* In a long line of prior decisions, this court has held that a county court that seeks to establish or alter a road can bar claims of affected property owners to compensation for the taking of their property only if it actually appears in the records that the county complied with the notice statutes.” We think this rule has developed out of more than a formalistic concern over ‘jurisdictional’ requirements and that the **prima-ry concern** is one of fairness to the property owners. It is not unreasonable to require the county to make some record, at least by way of ‘allegation or recital,’ that notice requirements have been complied with when it **attempts to acquire property of others**. On the other hand, to ‘*presume*’ that notice was given simply

by virtue of the fact that an order was entered would impose an almost insurmountable burden of proof on the property owner to prove lack of notice, particularly in a case as this when the county does not act on its order until over 20 years after it is entered.”⁸²

“9. Moreover, even were we to hold the presumption available in this case, one of the conditions precedent to the operation of the presumption is ‘that the circumstances of the particular case add some element of probability.’”⁸³ For the reasons stated above, we do not believe the circumstances of this case suggest an element of probability that plaintiff’s predecessor in interest received notice of the 1951 proceedings.

“Contrary to the position taken by plaintiff, however, we do not conclude from this that the 1952 order is ‘void’ for ‘lack of jurisdiction.’ We agree with the conclusion reached by Judge Joseph in his concurring opinion in the Court of Appeals that the failure of the Lane County Court to procure the agreement of plaintiff’s predecessor did not deprive the county court of ‘jurisdiction’ to acquire the property of the persons who signed the agreement.

“10. The county court complied with the initial requirements of ORS 368.470 when it declared its intention by resolution to widen Barger Drive and when it posted notices to that effect. The passage of the resolution being a legislative act, it was not necessary, *at this stage of the proceedings*, for the County to acquire ‘jurisdiction’ over anyone. In order to acquire the property necessary for the road, however, it was necessary that the County comply with the notice requirements contained in ORS 368.445, which include a requirement that notice be mailed to the last known address of each affected owner.

“11. With respect to the property owners who joined in the 1950 agreement, however, mailed notice was not required. ORS 368.450 provides that any owner of land who signs the petition authorized by ORS 368.430 waives all further notice. By analogy, and under a general common law principles of waiver,⁸⁴ a county court that attempts to authorize a road by resolution need not send mailed notice to persons who have signed an agreement to *give up their property for the road*. It follows that insofar as the property owners who signed the 1950 agreement are concerned, the Lane County Court had the power to acquire their property.

“In summation, we hold that (1) the Lane County Court validly acquired the property of those persons who signed the 1950 agreement, and (2) the Lane County Court did not validly acquire the property of plaintiff’s predecessor in interest because it does not appear in the record, either by proof or by recital, that plaintiff’s predecessor agreed to or received notice of the proposed widening.

“II. Plaintiff’s Collateral Attack

“The City’s second contention is that the plaintiff is barred from collaterally attacking the county court’s 1952 order because (1) the only means of challenging the 1952 order is by writ of review,⁸⁵ and plaintiff’s predecessor in interest failed to pursue that remedy, and (2) plaintiffs collateral attack is barred *by the passage of time*.

“12. In light of our conclusion above that Lane County never validly acquired the property of plaintiffs predecessor in interest, we must reject the City’s contention that plaintiff is now barred from seeking remedy because her predecessor failed to challenge the county court’s 1952 order by writ of review. On this point we agree with the analysis contained in Judge Joseph’s concurring opinion below:

“‘On the record before us, the defendant City simply entered on property **it did not own**. It did not own it because the County had never got beyond the stage of simply declaring its intention to take the property by resolution ... and posting the notices.’⁸⁸

“13. We find the City’s claim that plaintiffs remedy is barred by the passage of time equally unconvincing. The City argues that plaintiffs predecessor in interest had to challenge the county court decision within 60 days, the period established by the writ of review statute.⁸⁷ Alternatively, the City argues that plaintiffs claim is barred by the statutes of limitation because more than 10 years have passed since the order of the county court.” Both of these arguments beg the basic question, which is whether or not the 1952 order was binding on the plaintiff’s predecessor. If it were, plaintiff would lose on the merits. If not, the present controversy *simply arises out of a trespass by the City that occurred in 1975*.

“14. With respect to the City’s claim that plaintiffs remedy is barred by the equitable doctrine of laches, we are generally in agreement with the analysis contained in the majority opinion of the Court of Appeals. Moreover, even were we to agree with the city that plaintiff was on notice of the County’s claim when she purchased her property in 1967, we are aware of no rule of law that would require plaintiff to immediately have brought a declaratory judgment procedure or the like in order to determine whether that claim was valid. There was no actual interference with plaintiff’s rights until the City began improving Barger Drive in 1975, and she then asserted her claim immediately. The fact that the City ‘planned for, held hearings on, financed and began construction of the improved road’ did not serve to charge her with knowledge that the City planned to take her property without compensation.

“III. Adverse User

“The City’s final contention is that the 1952 order by the Lane County Court conferred color of title to the disputed property upon the County and that the County, and now the City, have thus acquired title by adverse possession.

“15. We have recognized that a possessor having color of title to a parcel of land may acquire title by adverse possession of the land described in the deed through the actual possession of only a part.⁸⁹ This doctrine of ‘*constructive adverse possession*,’ however, is applicable only when the land described in the deed is recognized in the community as a single defined lot.⁹⁰ *The doctrine has no application when the premises consists of several known lots or tracts even though they are described in the same deed. In such a case, each parcel is distinct, and an entry upon one parcel under color of title is not constructive occupancy of all.*”⁹¹

“16. We find these cases dispositive of the City’s claim that it acquired title to the strip of land on plaintiff’s property by constructive adverse possession. Even if we assume that the 1952 action by the Lane County Court conferred color of title upon the county to a 50-foot wide right of way extending the length of Barger Drive, there is nothing in the stipulated facts to indicate that the County, or the City, actually possessed any part of plaintiff’s property until 1975, when the City began construction of the Barger Drive improvements. Plaintiff’s property is *a distinct parcel of land*, and the County’s extension of the Barger Drive fences onto the property of others did not enable it to constructively possess the property of the plaintiff.

“The City also contends that it is entitled to the disputed strip of land under this court’s holding in *Huggett v. Moran*,⁹² where we said:

“‘Whenever a statute prescribes the minimum width of public roads to be established in the future *and a public road is established by prescription*, the width thereof is the minimum necessary to establishment of a legal road in the absence of evidence of the taking of a greater amount (emphasis ours).’

“We agree with the Court of Appeals that the City’s reliance on *Huggett* is misplaced. Unlike *Huggett*, this case does not involve a road established by prescription, and the reasoning we used in *Huggett* is therefore inapplicable.

“The decision of the Court of Appeals is affirmed.”⁹³

Nyman is important to Oregon road and highway law. The principles of law announced or confirmed were needed to clarify two obvious fallacious presumptions.

One presumption is that just about any statutory requirement for establishing, altering the route, or widening a county road could be ignored because these highways were under “jurisdiction” of the county courts. This opinion was not only held by many county courts, it was held by the circuit courts and obviously, at times, the Supreme Court, i.e.:

“Our decisions also seem to apply the concept of jurisdiction indiscriminately without distinguishing ‘legislative’ or policy-making functions from ‘quasi-judicial’ or fact-determining functions.”⁸⁴

The idea that statutes could be disregarded in matters involving the taking of private real property for a public way can be confusing. A question to consider when reviewing road and highway statutes and the cases relating to those laws: “Why would the Oregon Legislature bother to establish and amend the county road statutes if the statutes could be disregarded by the county courts?” Apparently, the term *jurisdiction* has been interpreted differently by county courts, circuit courts, and, on occasion, the Supreme Court. The Supreme Court, in *Nyman*, identified that term as part of the problem, i.e.:

Principle 106

The term “jurisdiction” is inappropriate in situations where a county court decides to widen or alter the location of a county road. “A county court that decides to widen (or alter the location of) a road is not acting judicially at all, but rather is making a policy decision. The concept of jurisdiction is judicial in nature and is out of place in the legislative context.”⁹⁵

Consequently, it is not within the “jurisdiction” of a county court to dispense with the notice requirement ordered by the Oregon Revised Statutes.

Principle 107

“... With respect to persons whose property must be acquired for the road, compliance with the notice requirements contained in the ORS is indispensable to the validity of the action, and failure to comply those requirements prevents the county from barring claims for compensation by owners who do not receive notice.”⁹⁶

Principle 108

As regards the acquisition of real property for establishing, widening or altering a road, “Compliance with other statutory requirements is not indispensable to the validity of the action unless the non-compliance in some way renders the notice ineffective.”⁹⁷

And as regards those conclusions, the court said they “reflect the balance that the legislature struck in enact-

ing ORS 368.405 *et seq.* To the extent the cases cited above are inconsistent with our holding today, they are disapproved.” A re-examination of holdings 4, 5 and 6 will explain why the statutory requirement of “notice” could not be disregarded, yet a “statement of public necessity” could be dispensed with.

The other presumption that exists is actually a misunderstanding of how one statutory presumption is to be applied. The statutory presumption, now contained in ORS 40.135 (and was ORS 41.360 in 1979), is the presumption, “Official duty has been regularly performed.” That presumption is dependent on many other presumptions, including another presumption of statutory law: “The law has been obeyed.” Both of these presumptions rely on unofficial presumptions, or assumptions, that (a) those who are presumed to know the law, do know the law, (b) those who are presumed to know the law, understand that law, (c) those who know the law, know when the laws can be dispensed with, (d) those who are in the capacity to make official decisions, will abide by the law when so required, and (e) those who are assigned statutory responsibilities, in the chain of command beginning at the county court level, will do as instructed.

Obviously, those presumptions, or assumptions, do not always prove to be accurate. Consequently, the legislature has provided: -

*‘In civil actions and proceedings, a presumption imposes on the party against whom it is directed the burden of proving that the non-existence of the presumed fact is more probable than its existence.’*⁹⁸

The fallacious presumption exists that where a county has *jurisdiction* to widen, alter or establish a road, the presumption that “official duty has been performed” bars any attack on the actions of the county.

To the laymen, such a presumption is “taking an awful lot for granted.” Indicative of this are the cases presented in this chapter, where a city, county, or the state has lost its case due to “too much being presumed or assumed.” Such is the case in *Nyman*. The court held that the presumption that “official duty has been regularly performed” could not be applied to establish that the county had performed every necessary duty. The court felt that “to ‘presume’ that notice was given simply by virtue of the fact that an order was entered would impose an almost insurmountable burden of proof on the property owner to prove lack of notice ...

This principle, established in “a long line of prior decisions” by the court, was developed out of a “primary concern” of “fairness” to the property owners:

Principle 109

"A county court that seeks to establish or alter a road can bar the claims of affected property owners to compensation for the taking of their property only if it actually appears in the records that the county complied with the notice statutes."

In other words, some evidence of an effort to comply is necessary to the application of the presumption.

As ORS 40.120 implies, for the presumption that *official duty has been performed* to be applicable, there must be some circumstance of the case that would indicate that in all probability the "official duty" would have been performed. In *Nyman*, the court felt this case did not hold such circumstances, and, in all probability, notices were not mailed as required. This was because the widening was by resolution. With respect to the property owners who join in such agreements:

Principle 110

"... A county court that attempts to authorize a road by resolution need not send mailed notice to persons who signed an agreement to give up their property for the road." This rule is based on statutory law that provides that any owner of land who signs the petition (authorized by ORS 368.430) waives all further notice.

Consequently, in all probability, the county overlooked the plaintiff who never signed the agreement. Here, some evidence or indication was necessary to presume that "official duty had been regularly performed."

The presumption that "official duty has been regularly performed" remains a necessity in Oregon Law. As regards county roads, the presumption allows counties to establish, alter or widen a road without each action being open to frivolous or vexatious suits on those actions. But, as emphasized by the court, the legislature "wished to ensure that all parties who might be affected by the road *would have an opportunity to participate in the decision-making process. This was particularly true with respect to property owners over whose land the road would be established and who had a property interest as well as a general civic interest in the decision.*"

Abandonment of a Public Easement

Abandonment of real property is the relinquishment of all right, title, claim and possession, with the intention of not reclaiming it or resuming its ownership, possession

*or enjoyment.*⁹⁹ *Land cannot be abandoned in favor of a specific party. The act of abandonment must be voluntary and intentional.*

One method of terminating an easement is by the act of *abandonment*. However, it has long been recognized that abandonment is not a recognized means of terminating a public way, except in absence of a vacation statute. Since Oregon has such statutes, abandonment is not recognized as a common-law vacation of public ways.

Abandonment of a public way has not been a big subject of controversy or litigation in Oregon road law. So it is not essential to devote a lot of time and space to this subject. However, it is important enough to justify some attention here. The case of *Martin v. Klamath County*¹⁰⁰ will help explain how abandonment is relevant to the Law of Dedication and road law in this state. That case is quoted in the section of this publication on "The Extinguishment of Public Ways." The principles of law announced by the court, relevant to abandonment, were:

Principle 111

The doctrine of common-law abandonment does not apply in an action by a landowner to quiet title to a strip of land which has previously been used by the public as a roadway.¹⁰¹

Principle 112

The fact that the legislature provides a method whereby a county (or city) may abandon a road (street or alley) is positive inhibition against other methods of termination.¹⁰²

Dedicated Parks, Public Squares, Etc.

Note: The elimination of sections of state highways is often referred to as abandonment. The provisions of statutory law governing such abandonment is provided by ORS 366.300.

As was announced at the beginning of this publication:

*"There is no difference in the principles applicable to the dedication of public streets and public squares or parks."*¹⁰³

The sections of this publication on "Common Law Dedications" and "Statutory Dedications" apply equally to dedicated public parks and squares, *except: the effect of the dedication of such lands differs in that the fee in dedicated parks and squares is in the city or county having jurisdiction over the land at the time of dedication.*

Consequently, the title to a park, common or square vests in the city in which the land is located (ORS 271.150) or in the county when the park, common or square is outside the city boundary of any city.

Principle 113

“... If a public square is vacated the title thereto shall vest in the city.”¹⁰⁴

Under Principle 75: “If the property vacated is a public square, the property shall vest in the county.”¹⁰⁵

Note: Before making a final determination of where title to a public park, square or common vests, the plat should be carefully examined to see if the dedicatory has designated some other party or parties as fee simple owners of the underlying fee in the land.

Endnotes

1. Latourette v. County Court, 121 Or. 323, 255 P. 330.
2. Amended by 1953 Or. Laws ch. 229 subsec 2; 1971 Or. Laws ch. 427 subsec 1; and 1981 Or. Laws ch. 153 subsec 66, renumbered ORS 368.041.
3. Formerly ORS 368.415, prior to 1981. Note: ORS 368.036, noted in subsection 1, relates to standards for county roads and road work.
4. ORS 368.201.
5. Id., subsection (1)
6. Id., subsection (2a) 7. Id., subsection (2b)
8. Id., subsection (2c)
9. 1981 Or. Laws ch. 153, subsec 25.
10. Latourette v. County Court, 121 Or. 323, 255 P. 330. See: 9 L.R.A. 95; 11 L.R.A. 59.
11. Section 5441, Or. Laws.
12. Steiwer v. Steiwer, 112 Or. 485, 489, 490, 230 P. 359; Or. Laws, subsec 4555; Lauderback u. Multnomah County, 111 Or. 631, 226 P. 697; Keane v. Portland, 115 Or. 1, 7, 235 P. 677; Lewis, Eminent Domain, 3d ed., subsec 387; Elliotts’ Roads and Streets, 3d ed., subsec 355; 20 C.J. 881, subsec 310.
13. Or. Laws, subsec 4539.
14. Latourette v. County Court, 121 Or. 323 at p. 331, 255 P. 330.
15. Id. See: 9 L.R.A. 95, Notes on statutory procedure for widening highway. Also see: 11 L.R.A. 59.
16. Sweet et al v. Irrigation Co., 198 Or. 166. (1953) 254 P.2d 700.
17. 198 Or. at p. 174.
18. Nosier u. Coos Bay R.R. Co., 39 Or. 331, 334, 64 P. 644; Bayard v. Standard Oil Co., 38 Or. 438, 447, 63 P. 614, (discussed under this chapter in section on “Prescription”).
19. Bayard v. Standard Oil Co., supra; Siluerton v. Brown, 63 Or. 418, 128 P. 45; Montgomery v. Somers, 50 Or. 259, 90 P. 674.
20. 198 Or. 166 at pp. 178 and 179.
21. 18 C.J. 282, Deeds subsec 250.
22. Subsec 4790 B & C.
23. See: 6293, L.O.L.; subsec 4539, 1920 Or. Laws subsec 44-1305, Oregon Code annotated (1930).
24. See: subsec 100-1205, O.C.L.A., and subsequent amendments thereof, 1947 Or. Laws, ch. 498, 1951 Or. Laws, ch. 132.
25. Cit. authorities.
26. Whitesides v. Green, Utah, 34, 57 Am. St. Rep. 740, 44 P. 1032; Pillsbury v. Brown, 82 Me. 450, 19 A. 858, 9 L.R.A. 94; Sprague v. Waite, 17 Pick. 309; Bartlee v. Beardmore, 77 Wis. 356, 46 N.W. 494.
27. 38 Or. 446, 447.
28. City of Newberg v. Kienle, 60 Or. 486, 489, 120 P. 3.
29. Washington Borough v. Steiner, 25 Pa. Super. 392.
30. To the same effect see: Hoban v. Bucklin, 88 N.H. 73, 80, 184 A. 362, 186 A. 8; Geer v. Chapin, 163 El. App. 654, 659, 660; Whiteside v. Green, supra; Burrows v. Guest, 5 Utah 91, 12 P. 847; 39 C.J.S. 939, Highways, subsec 20.
31. Elliotts’ Roads and Streets, supra, 4th ed., 242, subsec 198
32. Sweet et al v. Irrigation Canal Co., 198 Or. 166 at p. 187, 88 N.H. 80.
33. Whitesides v. Green, supra; Town of Randall u. Rovelstad, 105 Wis. 410, 430 81 N.W. 819; Bartlett v. Beardmore, 77 Wis. 356, 46 N.W. 494, 496.
34. 39 C.J.S., Highways, subsec 23; See, also: 29 C.J. 392, Highways, subsec 28; Parkey v. Galloway, 147 Mich. 693, 111 N.W. 348; Richardson v. State, 109 Tex. Crim. 403, 5 S.W. 2d 1412.
35. Sweet et al v. Irrigation Canal Co., 198 Or. 168, 254 P.2d 700. Petition on rehearing denied, 198 Or. 202, 266 P.2d 252.
36. Id., at pp. 202, 204.
37. Watts v. City of Winfield, 101 Kan. 470, 168 P. 319. See, also: Williams v. Routt County, 37 Colo. 55, 84 P. 1109; Pratt v. Atlantic and St. Lawrence Railroad Co., 42 Me. 579, 585; People v. Astle, 337, Ill. 253, 256, 169 N.E. 185.
38. Ames v. Union County, 17 Or. 600, 605, 22 P. 118.
39. Sweet et ux v. Irrigation Canal Co., supra, 198 Or. 166, 254 P.2d 700. Petition on rehearing denied, 266 P.2d 252.
40. Huggett et ux v. Moran et ux, 201 Or. 105, 266 P.2d 692 (1954).
41. Pillsbury v. Brown, 82 Me. 450, 19 A. 858, 9 L.R.A.; Kritzberger v. Train County, 62 N.D. 208, 242 N.W. 913; City of Seattle v. Abrahamson, 109 Wash. 116, 186 P. 644; 25 Am. Jur. 360, Highways, subsec 36; 39 C.J.S. 939, Highways, subsec 20.
42. Silverton v. Brown, 63 Or. 418, 128 P. 45.
43. Id., at page 425, cit: Bayard v. Standard Oil Co., 38 Or. 438, 63 P. 614.
44. City of Eugene v. Garrett, 87 Or. 435, 169 P. 649, 170 P. 731.
45. Christian v. Eugene, 49 Or. 170, 174, 89 P. 419.
46. Oliver v. Synhorst, 48 Or. 292, 86 P. 376. 7 L.R.A. (N.S.) 243; Schooling

- v. Harrisburg, 42 Or. 494, 71 P. 605; Oliver v. Synhorst, 58 Or. 582, 109 P. 762, 115 P. 594; Crusen v. Lebanon, 64 Or. 593, 131 P. 316; and Portland v. Inman-Poulsen Lumber Co., 66 Or. 86, 133 P. 829, Ann. Cas. 1915B, 400; 46 L.R.A. (N.S.) 1211.
47. See: 17 Am. & Eng.- Enc. of Law, 2d ed, pp. 894, 940 and 913.
 48. City of Eugene v. Garrett, supra, 87 Or. at 443, 170 P. 731.
 49. Joy v. Stump, 14 Or. 361, 12 P. 929.
 50. Bayard v. Standard Oil Co., 38 Or. 438, 447, 63 P. 614.
 51. 28 C.Y.C., p. 896.
 52. 37 C.Y.C., p. 247.
 53. Fleischner v. Citizen's Real Estate & Inv. Co., 25 Or. 119, 129, 35 P. 174, Blagen v. Smith, 34 Or. 394, 402, 56 P. 292, 44 L.R.A. 522; Union Power Co. v. Lichty, 42 Or. 563, 566, 71 P. 1044; Morton v. Oregon S.L. Ry. Co., 48 Or. 444, 87 P. 151, 1046, 120 Am. St. Rep. 827; 7 L.R.A. (N.S.) 344.
 54. 1 High on Injunctions, 4th ed. sub-sec 759.
 55. City of Eugene v. Garrett, supra.
 56. Nyman v. City of Eugene, 286 Or. 47, 593 P.2d 515, (1978).
 57. 32 Or. App. 307, 315, 574 P.2d 332 (1978).
 58. When it granted review, the Supreme Court requested argument on the following questions:

"Did the 1952 Lane county court have jurisdiction to enter ith order widening the County Road?

"What are the jurisdictional requirements which had to be met before the order could be entered?

"Do the necessary facts appear on the face of the record to prove that these jurisdictional requirements were satisfied?

"In particular, is the recital in the record that the road widening was `all as agreed to by the property owners abutting said road' sufficient or must the record show affirmatively that all such property owners agreed to the road widening?"
 59. Citing ORS ch. 27, i.e. ORS 27.010, 27.020 and 27.030.
 60. No formal order widening the road appears in the record in this proceeding. The only evidence of the order is the journal entry, which provides as follows:

"2178

"In the Matter of the Resolution of the County Court for widening of a County Road

"Now at this time this matter came on regularly to be heard and is hereby ordered established as a 50-foot right of way."

(The wording to the right of these three lines was "Order Established.")
 61. Columbo et al v. Hewitt et al, 221 Or. 121, 350 P.2d 893 (1960).
 62. Latourette v. County Court, 121 Or. 681, 226 P. 697 (1924).
 63. Lauderback et al v. Multnomah County, 111 Or. 681, 226 P. 697 (1924).
 64. State of Oregon v. Officer, 4 Or. 180.
 65. Johns v. Marion County, 4 Or. 46
 66. Thompson v. Multnomah County, 2 Or. 34 (1861).
 67. Morton v. Hood River, 88 Or. 144, 171 P. 584 (1918); French Glen Co. v. Harney County, 38 Or. 138.
 68. Cf., Fasano v. Washington Co. Comm., 264 Or. 574, 507 P.2d.
 69. "Citation is to the current (1979) statutes for convenience. The statutes in effect at the time of the 1952 order did not materially differ from the current statutes."
 70. The Supreme Court cited 1979 law for convenience.
 71. Id.
 72. ORS 368.480, ORS 368.485 (1979 law).
 73. 1979 law cited.
 74. ORS 368.495, 368.500 (1979 law).
 75. ORS 368.525 (1979).
 76. Citing 1979 law. Check current statutes for the law that must be followed for establishing, altering or relocating a county road at the present.
 77. See: ORS 43.370. But see: Lauderback et al v. Multnomah County, 111 Or. 681, 701, 226 P. 697 (1924), holding that a journal entry that notice has been posted aiding a defective affidavit must also be supported by some competent evidence of record.
 78. See: 1 Freeman on Judgments 812-13, 5th ed, 1925, where the author states: "The recitals or findings of jurisdiction may affirm, in general terms, the service, or due service, of process, without indicating that the attention of the court has been specially called to the kind of service made, or that it has based its finding upon other evidence than that disclosed by the record. In such cases it is not reasonable that the general statement should prevail over the evidence contained in the record. It should rather be construed as referring to and founded upon it; and if the service shown by it is not such as will support the judgment, it should be treated as void, notwithstanding the general statement in the judgment that process has been duly served." (Emphasis supplied, and footnote omitted in the court report.)
 79. Prima facie evidence is, in the judgment of the law, sufficient to establish a given fact, or the group or chain of facts constituting a party's claim or defense, and which, if not rebutted or contradicted, will remain sufficient. "It is evidence which suffices for proof of a particular fact until contradicted or overcome by other evidence." Black's Law Dictionary, rev. 4th ed., page 1354, cit. Dodson v. Watson, 110 Tex. 355, 220 S.W. 771, 772, 11 A.L.R. 583.
 80. Cf., State of Oregon v. Officer, supra (holding a recitation that proof of posting notices had been made "to the satisfaction of the court" insufficient to prove that it had been made as required by statute).
 81. Lauderback v. Multnomah County, supra; State of Oregon, supra; Thompson v. Multnomah County, supra.
 82. "As the Court of Appeals noted, the presumption could just as easily operate to require a conclusion that plaintiff's predecessor did not agree to the widening. ORS 41.360 (15) establishes a disputable presumption that official duty has been regularly performed. ORS 205.110(2)(d) imposes a duty on the county clerk to file all papers delivered to him (or her) for filing. We could therefore assume that the clerk did not receive any documents relevant to Resolution 2178 other than those appearing in County Road File 2178."

83. Highway Com. u. Heintz Constr., 245 Or. 530, 539, 423 P.2d 175 (1967).
84. Wood v. Honeyman, 178 Or. 484, 548, 169 P.2d 131, 171 A.L.R. 587 (1946); Kinkade v. Myers, 17 Or. 470, 21 P. 557 (1889); White v. Northwest State Co., 5 Or. 99 (1873).
85. ORS 203.200 provides: "The decisions of the county court made in the transaction of county business shall be reviewed only upon the writ of review provided by the civil procedure statutes." The provisions governing the availability of the writ are contained in ORS 34.010 through .100.
86. 32 Or. App. 326.
87. ORS 34.030 provides in part: "... A writ shall not be allowed unless the petition therefor is made within 60 days from the date of the decision or determination sought to be reviewed" (1979).
88. ORS 12.050 provides: "An action for the recovery of real property, or for the recovery of the possession thereof, shall be commenced within 10 years" (1979 law). ORS 12.115 (1) provides: "In no event shall any action for negligent injury to person or property of another be commenced more than 10 years from the date of the act of omission complained of" (1979). ORS 12.140 provides: "An action for any cause not otherwise provided for shall be commenced within 10 years" (1979 law).
89. See: e.g., Arrien v. Levanger, 263 Or. 363 370, 502 P.2d 573 (1972)
90. See: American Law of Property, 820 Casner ed., 1974.
91. Real Estate Co. v. Hendrix, 28 Or. 485, 42 P. 514 (1895); Hicklin u. McClear, 18 Or. 126, 22 P. 1057 (1889); Wilson and Wakeman v. McEwan, 7 Or. 87 (1879).
92. Huggett u. Moran, 201 Or. 105, 112, 266 P.2d 692 (1954).
93. Nyman v. City of Eugene, supra. 94. Id.
95. Id. at pp. 57, 58.
96. Nyman v. City of Eugene, supra, at pp. 56, 57.
97. Id.
98. ORS 40.120. 1981 Or. Laws ch. 892 subsec 17.
99. See: Jackson v. Steinberg, 186 Or. 129, 200 P.2d 376.
100. Martin v. Klamath County, 39 Or. App. 455 (1979), 592 P.2d 1037.
101. Id. 102. Id.
103. Steel v. City of Portland, 23 Or. 183.
104. ORS 271.140 amended by 1981 Or. Laws ch. 153, subsec 58 (as exists Sept. 27, 1987).
105. ORS 368.366(b) (1985 law).

TABLES

TABLE 1 — CONVERSION FACTORS

TO CONVERT	TO	MULTIPLY BY
Acres	Sq. Miles	0.0015625
Acres	Sq. Yards	4840
Centimeters	Inches	0.393700
Centimeters	Meters	10-2
Centimeters	Yards	0.01093611
Chains (Gunter's)	Yards	22
Chains (Gunter's)	Feet	66
Decameter	Meters	10
Decimeter	Meter	10-1
Degrees (Sexagesimal)	Minutes (Sexagesimal)	60
Degrees (Sexagesimal)	Radians	0.0174533
Fathoms	Feet	6
Feet	Inches	12
Feet	Meters	0.3048006096
Furlongs	Miles	0.125
Inches	Centimeters	2.540005
Inches	Feet	1/12
Kilometers	Meters	1000
Kilometers	Miles (Nautical)	0.539593
Kilometers	Miles (Statute)	0.6213699495
Leagues (Statute)	Miles (Statute)	3
Links (Gunter's)	Inches	7.92
Meters	Feet	3.280833333
Meters	Inches	39.3700
Meters	Yards	1.093611
Miles (Nautical)	Feet	6080.20
Miles (Nautical)	Miles (Statute)	1.1516
Miles (Statute)	Feet	5280
Miles (Statute)	Kilometers	1.609347219
Minutes (Sexagesimal)	Radians	2.90888 x 10-4
Minutes (Sexagesimal)	Seconds (Sexagesimal)	60
Radians	Degrees (Sexagesimal)	57.29578
Rods	Yards	5.5
Rods	Feet	16.5
Seconds (Sexagesimal)	Minutes (Sexagesimal)	1/60
Square Feet	Acres	0.000022956
Square Feet	Sq. Inches	144
Square Feet	Sq. Meters	0.09290341
Square Meters	Sq. Yards	1.195985
Square Miles	Acres	640
Square Yards	Sq. Feet	9
Square Yards	Sq. Meters	0.83613
Yards	Feet	3
Yards	Meters	0.91440183

TABLE 2
TABLES OF MEASUREMENTS

LINEAR MEASURE

1 foot	=	12 inches	1 furlong	=	1/8 mile
1 yard	=	36 inches	1 furlong	=	220 yards
1 yard	=	3 feet	1 mile	=	320 rods
1 rod	=	5.5 yards	1 mile	=	80 chains
1 rod	=	16.5 feet	1 mile	=	8 furlongs
1 Link*	=	7.92 inches	1 mile	=	1760 yards
1 Chain*	=	66 feet	1 mile	=	5280 feet

SQUARE MEASURE

1 sq. foot	=	144 sq. inches	1 acre	=	160 sq. rods
1 sq. yard	=	9 sq. feet	1 acre	=	43,560 sq. feet
1 sq. rod	=	30.25 sq. yards	1 sq. mile	=	640 acres

SURVEYOR'S SQUARE MEASURE

1 sq. rod	=	625 sq. links*	1 sq. mile	=	640. acres
1 sq. chain*	=	16. sq. rods	1 section	=	640 acres
1 acre	=	10 sq. chains*	1 township	=	36 sections

ANGULAR MEASURE

1 minute	=	60 seconds	1 quadrant	=	90 degrees
1 degree	=	60 minutes	1 semi-circle	=	180 degrees
1 octant	=	45 degrees	1 circle	=	360 degrees
1 sextant	=	60 degrees	1 radian	=	57.30 degrees

MISCELLANEOUS MEASURE.

One length	=	7.5 feet
one pace	=	3 feet
one pace (military)	=	36 inches
one perch (linear)	=	5.5 yards = 16.5 feet
one perch (land)	=	1 square rod
one pole	=	5.5 yards = 16.5 feet
one rod	=	16.5 feet = 5.5 yards
one chain*	=	66 feet
one chain (engineer's)	=	100 feet
one link*	=	7.92 inches
one link (engineer's)	=	12 inches
one furlong	=	660 feet = 1/8 mile
one vara	=	33.33 inches
one rood	=	0.25 acre

*Gunter's chain (66 feet). The words "chain" and "link" should always be interpreted as meaning "Gunter's chain or link." The "engineer's chain" length should never be used unless the deed or survey specifically calls for "engineer's chain." See explanation of both chain measures, under "chain" in the glossary.

TABLE 3 — METRIC TABLES

ABBREVIATIONS

m	—	meter	c	—	centi-	G	—	giga-
a	—	are	d	—	deci-	T	—	tera-
s	—	stere	da	—	deka-	n	—	nano-
g	—	gram	h	—	hecto-	p	—	pico-
liter	—	liter	k	—	kilo-	f	—	femto
u	—	micro-	my	—	myria-	a	—	atto
m	—	milli-	M	—	mega-			

NUMERICAL VALUES

deci-	1/10	deka-	10	giga-	1,000,000,000
centi-	1/100	hecto-	100	tera-	1,000,000,000,000
milli-	1/1,000	kilo-	1000	nano	1/1,000,000,000
micro-	1/1,000,000	Myria-	10000	Pico-	1/1,000,000,000,000
		mega-	100,000	femto-	one quadrillionth
				atto-	one quintillionth

LENGTH

1 micron	=	1/1000 millimeters	=	0.03937 mil
1 millimicron	=	1/1000 micron	=	0.0000394 mil
1 micromillimeter	=	1,000,000 millimeter		
1 micromicron	=	1,000,000 micron		
1 millimeter	=	1/1000 meter	=	0.03937 in.
1 centimeter	=	10 millimeters	=	0.3937 in.
1 decimeter	=	10 centimeters	=	3.937 in.
1 meter	=	10 decimeters	=	39.37 in.
1 dekameter	=	10 meters	=	393.7 in.
1 hectometer	=	10 dekameters	=	328-083 ft.
1 kilometer	=	10 hectometers	=	3280-83 ft.
1 myriameter	=	10 kilometers	=	6.2137 mi.

AREA

1sq. centimeter (cm ²)	=	1 / 10,000 m ²	=	0.1550 sq. in.
1 sq. meter (m ²)	=			1.196 sq. yds.
1 sq. dekameter (dam ²)	=	100 m ²	=	119.6 sq. yds.
1 are (a)*	=	100 m ²	=	119.6 sq. yds.
1 sq. hectometer (hm ²)	=	10,000 m ²	=	2.471 acres
1 hectare (ha)*	=	10,000 m ²	=	2.471 acres
1 sq. kilometer (km ²)	=	1,000,000 m ²	=	0.386 sq. mi.

*"are" and "hectare" should be used for land area.

Note: Weight, capacity, and volume not shown because the values are not needed in cadastral cartography.

TABLE 4 — METRIC CONVERSION TABLES

LINEAR MEASURE

Survey Measure to Metric Measure

1 inch	=	2.54 centimeters	1 link*	=	0.2012 meter
1 foot	=	0.3048 meter	1 chain*	=	20.1168 meters
1 foot	=	30.48 centimeters	1 link (eng.)	=	0.3048 meter
1 yard	=	0.9144 meter	1 chain (eng.)	=	30.480 meters
1 mile	=	1.609 kilometers	1 mile (naut.)	=	1.852 kilometers
1 rod	=	5.0292 meters	1 fathom	=	1.8288 meters
1 pole	=	5.0292 meters	1 league	=	5.5597 kilometers
1 furlong	=	201.168 meters			

AREA

Survey Square Measure to Metric Square Measure

1 sq. inch	=	6.4516 cm ²	1 acre	=	40.468 are
1 sq. foot	=	0.0929 m ²	1 acre	=	0.4047 hectare
1 sq. yard	=	0.8361 m ²	1 sq. mile	=	258.99 hectares
1 sq. rod	=	25.29 m ²	1 sq. mile	=	2.59 km ² ,
1 sq. link*	=	0.0405 m ²	1 section	=	2.59 k _k km ²
1 sq. chain*	=	404.68 m ²	1 township	=	9,324 hectares
1 sq. pole	=	25.29 m ²	1 township	=	93.24 km ²

LINEAR MEASURE

Metric Measure to English Measure

1 millimeter	=	0.03937 inch	1 dekameter	=	32.8083 feet
1 centimeter	=	0.3937 inch	1 hectometer	=	328.083 feet
1 decimeter	=	3.937 inches	1 kilometer	=	0.62137 mile
1 meter	=	39.37 inches	1 kilometer	=	3280.83 feet
1 meter	=	3.208 feet	1 myriameter	=	6.2137 miles
1 dekameter	=	393.7 inches			

SQUARE MEASURE

Metric Square Measure to English Square Measure

1 sq. centimeter	=	0.15499 sq. inch	1 sq. meter	=	10.294 sq. feet
1 sq. decimeter	=	15.499 sq. inches	1 sq. decameter	=	119.6 sq. yards
1 sq. meter	=	1,549.9 sq. inches	1 sq. hectometer	=	2.471 acres
1 sq. meter	=	1.196 sq. yards	1 sq. kilometer	=	0.386 sq. mile

LAND AREA

Metric Square Measure to English Square Measure

1 sq. meter	=	1,549.9 sq. inches	1 hectare	=	2.471 acres
1 centiare	=	1,549.9 sq. inches	1 sq. kilometer	=	0.386 sq. mile
1 are	=	119.6 sq. yards			

*Gunter's chain

TABLE 4 (continued)**CENTIMETERS TO INCHES**

Centimeters		Inches		Centimeters		Inches
2.54	=	1		1	=	0.39370
5.08	=	2		2	=	0.78740
7.62	=	3		3	=	1.18110
10.16	=	4		4	=	1.57480
12.70	=	5		5	=	1.96850
15.24	=	6		6	=	2.36220
17.78	=	7		7	=	2.75590
20.32	=	8		8	=	3.14960
22.86	=	9		9	=	5.54330

METERS — FEET

Meters		Feet		Meters		Feet
0.3048	=	1		1	=	3.28084
0.6096	=	2		2	=	6.56168
0.9144	=	3		3	=	9.84252
1.2192	=	4		4	=	13.12336
1.5240	=	5		5	=	16.40420
1.8288	=	6		6	=	19.68504
2.1336	=	7		7	=	22.96588
2.4384	=	8		8	=	26.24672
2.7432	=	9		9	=	29.52756

METRIC CONVERSION FACTORS

To Convert	To	Multiply by
Square miles	Hectares	258.99881
Square miles	Square meters	2589988.1
Square miles	Square kilometers	2.5899881
Square chains	Square meters	404.68564
Square feet	Square centimeters	929.0304
Square feet	Square meters	0.09290304
Square centimeters	Square feet	0.0010763867
Square centimeters	Square meters	0.0001
Square dekameters	Square meters	100
Square dekameters	Acres	1
Square dekameters	Acres	0.024710538
Square hectares	Square meters	10000
Square kilometers	Square miles	0.38610216
Square kilometers	Square feet	1.0763910×10^7
Square kilometers	Acres	247.10538
Hectares	Acres	2.4710538
Hectares	Square feet	107639.10
Hectares	Square miles	0.0038610×216
Hectares	Acres	100
Hectares	Square centimeters	1×10^8
Hectares	Square meters	10000
Chains	Meters	20.1168

TABLE 5 — METRIC ANGULAR MEASURE

CENTESIMAL SYSTEM

The metric system of angular measure is known as the “centesimal system.”

In the centesimal system, each quadrant of a circle is divided into 100 parts known as “grads” (or grades). Each grad is further divided into decimal parts.

Angles of the centesimal system are written, for example, as: 376g 7289, or as 376g 72' 89"

Which is read as “three hundred seventy-six point seven two eight nine grads”; or, as “three hundred seventy-six grads, seventy-two centesimal minutes, and eighty-nine centesimal seconds.” The first method is recommended.

CENTESIMAL CONVERSION FACTORS

TO CONVERT	TO	MULTIPLY BY
Grads	Circumferences	0.0025
Grads	Degrees	0.9
Grads	Minutes	54
Grads	Seconds	3240
Grads	Radians	0.015707963

CONVERSION — GRADS TO DEGREES

GRADS	=	DEGREES	GRADS	=	DEGREES	GRADS	=	DEGREES
1	=	0.9	35	=	31.5	69	=	62.1
2	=	1.8	36	=	32.4	70	=	63.0
3	=	2.7	37	=	33.3	71	=	63.9
4	=	3.6	38	=	34.2	72	=	64.8
5	=	4.5	39	=	35.1	73	=	65.7
6	=	5.4	40	=	36.0	74	=	66.6
7	=	6.3	41	=	36.9	75	=	67.5
8	=	7.2	42	=	37.3	76	=	68.4
9	=	8.1	43	=	38.7	77	=	69.3
10	=	9.0	44	=	39.6	78	=	70.2
11	=	9.9	45	=	40.5	79	=	71.1
12	=	10.8	46	=	41.4	80	=	72.0
13	=	11.7	47	=	42.3	81	=	72.9
14	=	12.6	48	=	43.2	82	=	73.8
15	=	13.5	49	=	44.1	83	=	74.7
16	=	14.4	50	=	45.0	84	=	75.6
17	=	15.3	51	=	45.9	85	=	76.5
18	=	16.2	52	=	46.8	86	=	77.4
19	=	17.1	53	=	47.7	87	=	78.3
20	=	18.0	54	=	48.6	88	=	79.2
21	=	18.9	55	=	49.5	89	=	80.1
22	=	19.8	56	=	50.4	90	=	81.0
23	=	20.7	57	=	51.3	91	=	81.9
24	=	21.6	58	=	52.2	92	=	82.8
25	=	22.5	59	=	53.1	93	=	83.7
26	=	23.4	60	=	54.0	94	=	84.6
27	=	24.3	61	=	54.9	95	=	85.5
28	=	25.2	62	=	55.8	96	=	86.4
29	=	26.1	63	=	56.7	97	=	87.3
30	=	27.0	64	=	57.6	98	=	88.2
31	=	27.9	65	=	58.5	99	=	89.1
32	=	28.8	66	=	59.4	100	=	90.0
33	=	29.7	67	=	60.3			
34	=	30.6	68	=	61.2			

TABLE 6 — RODS TO FEET

RODS	FEET	RODS	FEET	RODS	FEET	RODS	FEET
.50	8.25	25.50	420.75	50.50	833.25	75.50	1245.75
1.00	16.50	26.00	429.00	51.00	841.50	76.00	1254.00
1.50	24.75	26.50	437.25	51.50	849.75	76.50	1262.25
2.00	33.00	27.00	445.50	52.00	858.00	77.00	1270.50
2.50	41.25	27.50	453.75	52.50	866.25	77.50	1278.75
3.00	49.50	28.00	462.00	53.00	874.50	78.00	1287.00
3.50	57.75	28.50	470.25	53.50	882.75	78.50	1295.25
4.00	66.00	29.00	478.50	54.00	891.00	79.00	1303.50
4.50	74.25	29.50	486.75	54.50	899.25	79.50	1311.75
5.00	82.50	30.00	495.00	55.00	907.50	80.00	1320.00
5.50	90.75	30.50	503.25	55.50	915.75	80.50	1328.25
6.00	99.00	31.00	511.50	56.00	924.00	81.00	1336.50
6.50	107-25	31.50	519.75	56.50	932.25	81.50	1344.75
7.00	115.50	32.00	528.00	57.00	940.50	82.00	1353.00
7.50	123.75	32.50	536.25	57.50	948.75	82.50	1361.25
8.00	132.00	33.00	544.50	58.00	957.00	83.00	1369.50
8.50	140.25	33.50	552.75	58.50	965.25	83.50	1377.75
9.00	148.50	34.00	561.00	59.00	973.50	84.00	1386.00
9.50	156.75	34.50	569-25	59.50	981.75	84.50	1394.25
10.00	165.00	35.00	577.50	60.00	990.00	85.00	1402.50
10.50	173.25	35.50	585.75	60.50	998.25	85.50	1410.75
11.00	181.50	36.00	594.00	61.00	1006.50	86.00	1419-00
11.50	189.75	36.50	602.25	61.50	1014.75	86.50	1427.25
12.00	198.00	37.00	610.50	62.00	1023.00	87.00	1435.50
12.50	206.25	37.50	618.75	62.50	1031.25	87.50	1443.75
13.00	214.50	38.00	627.00	63.00	1039.50	88.00	1452.00
13.50	222.75	38.50	635.25	63.50	1047.75	88.50	1460.25
14.00	231.00	39.00	643.50	64.00	1056.00	89.00	1468.50
14 50	239.25	39.50	651.75	64.50	1064.25	89.50	1476.75
15.00	247.50	40.00	660.00	65.00	1072.50	90.00	1485.00
15.50	255.75	40.50	668.25	65.50	1080.75	90.50	1493.25
16.00	264.00	41.00	676.50	66.00	1089.00	91.00	1501.50
16.50	272.25	41.50	684.75	66.50	1097.25	91.50	1509.75
17.00	280.50	42.00	693.00	67.00	1105.50	92.00	1518.00
17.50	288.75	42.50	701.25	67.50	1113.75	92.50	1526.25
18.00	297.00	43.00	709.50	68.00	1122.00	93.00	1534.50
18.50	305.25	43.50	717.75	68.50	1130.25	93.50	1542.75
19.00	313.50	44.00	726.00	69.00	1138.50	94.00	1551.00
19.50	321.75	44.50	734.25	69.50	1146.75	94.50	1559.25
20.00	330.00	45.00	742.50	70.00	1155.00	95.00	1567.50
20.50	338.25	45.50	750.75	70.50	1163.25	95.50	1575.75
21.00	346.50	46.00	759.00	71.00	1171.50	96.00	1584.00
21.50	354.75	46.50	767.25	71.50	1179.75	96.50	1592.25
22.00	363.00	47.00	775.50	72.00	1188.00	97.00	1600.50
22.50	371.25	47.50	783.75	72.50	1196.25	97.50	1608.75
23.00	379.50	48.00	792.00	73.00	1204.50	98.00	1617.00
23.50	387.75	48.50	800.25	73.50	1212.75	98.50	1625.25
24.00	396.00	49.00	808.50	74.00	1221.00	99.00	1633.50
24.50	404.25	49.50	816.75	74.50	1229-25	99.50	1641.75
25.00	412.50	50.00	825-00	75.00	1237.50	100.00	1650.00

TABLE 7 — CHAINS TO FEET

CHAINS	FEET
.25	16.50
.50	33.00
.75	49.50
1.00	66.00
1.50	99.00
2.00	132.00
2.50	165.00
3.00	198.00
3.50	231.00
4.00	264.00
4.50	297.00
5.00	330.00
5.50	363.00
6.00	396.00
6.50	429.00
7.00	462.00
7.50	495.00
8.00	528.00
8.50	561.00
9.00	594.00
9.50	627.00
10.00	660.00
10.50	693.00
11.00	726.00
11.50	759.00
12.00	792.00
12.50	825.00
13.00	858.00
13.50	891.00
14.00	924.00
14.50	957.00
15.00	990.00
15.50	1023.00
16.00	1056.00
16.50	1089.00
17.00	1122.00
17.50	1155.00
18.00	1188.00
18.50	1221.00
19.00	1254.00
19.50	1287.00
20.00	1320.00
20.50	1353.00
21.00	1386.00
21.50	1419.00
22.00	1452.00
22.50	1485.00
23.00	1518.00
23.50	1551.00
24.00	1584.00

CHAINS	FEET
24.50	1617.00
25.00	1650.00
25.50	1683.00
26.00	1716.00
26.50	1749.00
27.00	1782.00
27.50	1815.00
28.00	1848.00
28.50	1881.00
29.00	1914.00
29.50	1947.00
30.00	1980.00
30.50	2013.00
31.00	2046.00
31.50	2079.00
32.00	2112.00
32.50	2145.00
33.00	2178.00
33.50	2211.00
34.00	2244.00
34.50	2277.00
35.00	2310.00
35.50	2343.00
36.00	2376.00
36.50	2409.00
37.00	2442.00
37.50	2475.00
38.00	2508.00
38.50	2541.00
39.00	2574.00
39.50	2607.00
40.00	2640.00
40.50	2673.00
41.00	2706.00
41.50	2739.00
42.00	2772.00
42.50	2805.00
43.00	2838.00
43.50	2871.00
44.00	2904.00
44.50	2937.00
45.00	2970.00
45.50	3003.00
46.00	3036.00
46.50	3069.00
47.00	3102.00
47.50	3135.00
48.00	3168.00
48.50	3201.00
49.00	3234.00

CHAINS	FEET
49.50	3267.00
50.00	3300.00
50.50	3333.00
51.00	3366.00
51.50	3399.00
52.00	3432.00
52.50	3465.00
53.00	3498.00
53.50	3531.00
54.00	3564.00
54.50	3597.00
55.00	3630.00
55.50	3663.00
56.00	3696.00
56.50	3729.00
57.00	3762.00
57.50	3795.00
58.00	3828.00
58.50	3861.00
59.00	3894.00
59.50	3927.00
60.00	3960.00
60.50	3993.00
61.00	4026.00
61.50	4059.00
62.00	4092.00
62.50	4125.00
63.00	4158.00
63.50	4191.00
64.00	4224.00
64.50	4257.00
65.00	4290.00
65.50	4323.00
66.00	4356.00
66.50	4389.00
67.00	4422.00
67.50	4455.00
68.00	4488.00
68.50	4521.00
69.00	4554.00
69.50	4587.00
70.00	4620.00
70.50	4653.00
71.00	4686.00
71.50	4719.00
72.00	4752.00
72.50	4785.00
73.00	4818.00
73.50	4851.00
74.00	4884.00
74.50	4917.00

CHAINS	I FEET
75.00	4950.00
75.50	4983.00
76.00	5016.00
76.50	5049.00
77.00	5082.0
77.50	5115.00
78.00	5148.00
78.50	5181.00
79.00	5214.00
79.50	5247.00
80.00	5280.00
80.50	5313.00
81.00	5346.00
81.50	5379.00
82.00	5412.00
82.50	5445.00
83.00	5478.00
83.50	5511.00
84.00	5544.00
84.50	5577.00
85.00	5610.00
85.50	5643.00
86.00	5676.00
86.50	5709.00
87.00	5742.00
87.50	5775.00
88.00	5808.00
88.50	5841.00
89.00	5874.00
89.50	5907.00
90.00	5940.00
90.50	5973.00
91.00	6006.00
91.50	6039.00
92.00	6072.00
92.50	6105.00
93.00	6138.00
93.50	6171.00
94.00	6204.00
94.50	6237.00
95.00	6270.00
95.50	6303.00
96.00	6336.00
96.50	6369.00
97.00	6402.00
97.50	6435.00
98.00	6468.00
98.50	6501.00
99.00	6534.00
99.50	6567.00
100.00	6600.00

TABLE 8 — DECIMAL EQUIVALENTS OF FRACTIONS

FRACTION				DECIMAL	FRACTION				DECIMAL
1/8	1/16	1/32	1/64	0.015625	5/8	9/16	17/32	33/64	0.515625
			2/64	0.03125				34/64	0.53125
			3/64	0.046875				35/64	0.546875
		2/32	4/64	0.0625			18/32	36/64	0.5625
			5/64	0.078125				37/64	0.578125
			6/64	0.09375				38/64	0.59375
	2/16	3/32	7/64	0.109375		10/16	19/32	39/64	0.609375
			8/64	0.125				40/64	0.625
			9/64	0.140625				41/64	0.640625
		5/32	10/64	0.15625			21/32	42/64	0.65625
			11/64	0.171875				43/64	0.671875
			12/64	0.1875				44/64	0.6875
1/4	3/16	6/32	13/64	0.203125	3/4	11/16	22/32	45/64	0.703125
			14/64	0.21875				46/64	0.71875
			15/64	0.234375				47/64	0.734375
		7/32	16/64	0.25			23/32	48/64	0.75
			17/64	0.265625				49/64	0.765625
			18/64	0.28125				50/64	0.78125
	4/16	8/32	19/64	0.296875		12/16	24/32	51/64	0.796875
			20/64	0.3125				52/64	0.8125
			21/64	0.328125				53/64	0.828125
		9/32	22/64	0.34375			25/32	54/64	0.84375
			23/64	0.359375				55/64	0.859375
			24/64	0.375				56/64	0.875
3/8	5/16	10/32	25/64	0.390625	3/4	13/16	26/32	57/64	0.890625
			26/64	0.40625				58/64	0.90625
			27/64	0.421875				59/64	0.921875
		11/32	28/64	0.4375			27/32	60/64	0.9375
			29/64	0.453125				61/64	0.953125
			30/64	0.46875				62/64	0.96875
	6/16	12/32	31/64	0.484375		14/16	28/32	63/64	0.984375
			32/64	0.50				64/64	1.0
		13/32					29/32		
1/2	7/16	14/32			1	15/16	30/32		
		15/32					31/32		
	8/16	16/32				16/16	32/32		

To change a fraction to a decimal divide the numerator by the denominator and write the quotient in decimal form.

Example: $3/5 = 3 \div 5 = .60$

Example: $1/7 = 1 \div 7 = .142857$

TABLE 9 — MAP SCALE CONVERSIONS

MAP SCALE Inches to Feet	STATUTE MILES Per Inch	KILOMETERS Per Inch	RATIO
*1" = 50'	.0095	.0153	1:600
*1" = 100'	.0189	.0305	1:1200
1" = 167'	.0316	.0508	1:2000
*1" = 200'	.0379	.0610	1:2400
1" = 300'	.0568	.0914	1:3600
*1" = 400'	.0758	.1219	1:4800
1" = 417'	.0789	.1270	1:5000
1" = 500'	.0947	.1524	1:6000
1" = 600'	.1136	.1829	1:7900
1" = 660'	.1250	.2012	1:7920
*1" = 800'	.1315	.2438	1:9600
1" = 833'	.1578	.2540	1:10000
1" = 880'	.1667	.2680	1:10560
1" = 1000'	.1894	.3050	1:12000
1" = 1320'	.2500	.4020	1:15840
1" = 1666'	.3156	.5080	1:20000
1" = 1760'	.3333	.5360	1:21120
*1" = 2000'	.3788	.6100	1:24000**
1" = 2083'	.3945	.6350	1:25000
1" = 2640'	.5000	.8040	1:31680
1" = 4000'	.7575	1.2190	1:48000**
1" = 5208'	.9864	1.5870	1:62500**
1" = 5280'	1.0000	1.6090	1:63360
1" = 6250'	1.1837	1.9050	1:75000
1" = 6666'	1.2626	2.0320	1:80000
1" = 8333'	1.5780	2.5400	1:100000
1" = 20856'	3.9500	6.3570	1:250000**
1" = 26400'	5.0000	8.0500	1:316000
1" = 41666'	7.8910	12.7000	1:500000
1" = 83333'	15.7830	25.4000	1:1000000

* Denotes state standard map scales.

** Denotes U.S.G.S. map scales.

NOTE: The designation of quadrangle maps by "minutes" (such as 30 minute quad.) does not denote scale, rather, it denotes the geographical area covered in minutes of longitude.

**TABLE 10 — RADIANS TO DEGREES, MINUTES & SECONDS
& RADIANS TO DEGREES IN DECIMALS**

RAD.	° ' "	RAD.	° ' "	RAD.	° ' "	RAD.	° ' "	RAD.	° ' "
1	57° 17' 44"	.1	5° 43' 46"	.01	0° 34' 22"	.001	0° 03' 26"	.0001	0° 00' 20"
2	114° 35' 29"	.2	11° 27' 33"	.02	1° 08' 45"	.002	0° 06' 52"	.0002	0° 00' 41"
3	171° 53' 14"	.3	17° 11' 19"	.03	1° 43' 07"	.003	0° 10' 18"	.0003	0° 01' 01"
4	229° 10' 59"	.4	22° 55' 05"	.04	2° 17' 30"	.004	0° 13' 45"	.0004	0° 01' 22"
5	286° 28' 44"	.5	28° 38' 52"	.05	2° 51' 53"	.005	0° 17' 11"	.0005	0° 01' 41"
6	343° 46' 28"	.6	34° 22' 38"	.06	3° 26' 15"	.006	0° 20' 37"	.0006	0° 02' 03"
7	401° 04' 13"	.7	40° 06' 25"	.07	4° 00' 38"	.007	0° 24' 03"	.0007	0° 02' 24"
8	458° 21' 58"	.8	45° 50' 11"	.08	4° 35' 01"	.008	0° 27' 30"	.0008	0° 02' 45"
9	515° 39' 43"	.9	51° 33' 58"	.09	5° 09' 23"	.009	0° 30' 56"	.0009	0° 03' 05"

RADIANS TO DEGREES IN DECIMALS

RAD.	DEGREE
1	57.2958
2	114.5916
3	171.8873
4	229.1832
5	286.4789
6	343.7747
7	401.0705
8	458.3662
9	515.6620

TABLE 11 — DEGREES, MINUTES SECONDS TO RADIANS

DEGREE	RADIAN	MIN.	RADIAN	SEC.	RADIAN
1	0.01745 33	1	0.00029 09	1	0.00000 48
2	0.03490 66	2	0.00058 18	2	0.00000 97
3	0.05235 99	3	0.00087 27	3	0.00001 45
4	0.06981 32	4	0.00116 36	4	0.00001 94
5	0.08726 65	5	0.00145 44	5	0.00002 42
6	0.10471 98	6	0.00174 53	6	0.00002 91
7	0.12217 30	7	0.00203 62	7	0.00003 39
8	0.13962 63	8	0.00232 71	8	0.00003 88
9	0.15707 96	9	0.00261 80	9	0.00004 36
10	0.17453 30	10	0.00290 89	10	0.00004 85
20	0.34906 59	20	0.00581 78	20	0.00009 70
30	0.52359 88	30	0.00872 66	30	0.00014 54
40	0.69813 17	40	0.01163 55	40	0.00019 39
50	0.87266 46	50	0.01454 44	50	0.00024 24
60	1.04719 76	60	0.01745 33	60	0.00029 09
70	1.22173 05				
80	1.39626 34				
90	1.57079 63				

$1^\circ = 0.01745\ 32925\ 19943$ radians

$1^\circ = 60'$; $1^\circ = 3600''$

1 radian = $57^\circ\ 17'\ 44''$.80625

π radians = 180° ; $\pi - 180^\circ =$ radians in 1° ; $180^\circ - \pi =$ deg. in 1 rad.

$1/\sqrt{\pi} = 0.56418958$; $\sqrt[3]{\pi} = 1.46459189$; $\sqrt[3]{\pi} r = 2.14502940$

TABLE 12 — COMPASS CONVERSIONS: CARDINAL TO ANGULAR

CARDINAL POINTS	INTERCARDINAL POINTS	ANGULAR Degrees	MEASURE Minutes
North		0°	0'
	N. by E.	11°	15'
	N.N.E.	22°	30'
	N.E. by N.	33°	45'
	N.E.	45°	0'
	N.E. by E.	56°	15'
	E.N.E.	67°	30'
	E. by N.	78°	45'
East		90°	0'
	E. by S.	101°	15'
	E.S.E.	112°	30'
	S.E. by E.	123°	45'
	S.E.	135°	0'
	S.E. by S.	146°	15'
	S.S.E.	157°	30'
	S. by E.	168°	45'
South		180°	0'
	S. by W.	191°	15'
	S.S.W.	202°	30'
	S.W. by S.	213°	45'
	S.W.	225°	0'
	S.W. by W.	236°	15'
	W.S.W.	247°	30'
	W. by S.	258°	45'
West		270°	0'
	W. by N.	281°	15'
	W.N.W.	292°	30'
	N.W. by W.	303°	45'
	N.W.	315°	0'
	N.W. by N.	326°	15'
	N.N.W.	337°	30'
	N. by W.	348°	45'
North		360°	0'

See table 13 for compass conversions to bearings.

TABLE 13 — COMPASS CONVERSIONS: CARDINAL TO BEARINGS

CARDINAL POINTS	INTERCARDINAL POINTS	BEARINGS
North		0°
	N.E. by E.	N. 11° 15' E.
	N.N.E.	N. 22° 30' E.
	N.E. by N.	N. 33° 45' E.
	N.E.	N. 45° 00' E.
	N.E. by E.	N. 56° 15' E.
	E.N.E.	N. 67° 30' E.
	E. by N.	N. 78° 45' E.
	East	90°
	E. by S.	S. 78° 45' E.
	E.S.E.	S. 67° 30' E.
	S.E. by E.	S. 56° 15' E.
	S.E.	S. 45° 00' E.
	S.E. by S.	S. 33° 45' E.
	S.S.E.	S. 22° 30' E.
	S. by E.	S. 11° 15' E.
South		0°
	S. by W.	S. 11° 15' W.
	S.S.W.	S. 22° 30' W.
	S.W. by S.	S. 33° 45' W.
	S.W. ,	S. 45° 00' W.
	S.W. by W.	S. 56° 15' W.
	W.S.W.	S. 67° 30' W.
	W. by S.	S. 78° 45' W.
West		90°
	W. by N.	N. 78° 45' W.
	W.N.W.	N. 67° 30' W.
	N.W. by W.	N. 56° 15' W.
	N.W.	N. 45° 00' W.
	N.W. by N.	N. 33° 45' W.
	N.N.W.	N. 22° 30' W.
	N. by W.	N. 11° 15' W.

See table 12 for compass conversions to angular measure.

TABLE 14 — DEGREE OF CURVE TO RADII

0° to 2.25°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
0.05	0	03	114,591.599
0.10	0	06	57,295.780
0.15	0	09	38,197.186
0.20	0	12	28,647.890
0.25	0	15	22,918.312
0.30	0	18	19,098.593
0.35	0	21	16,370.223
0.40	0	24	14,323.945
0.45	0	27	12,732.395
0.50	0	30	11,459.156
0.55	0	33	10,417.414
0.60	0	36	9,549.297
0.65	0	39	8,814.735
0.70	0	42	8,185.111
0.75	0	45	7,639.437
0.80	0	48	7,161.972
0.85	0	51	6,740.680
0.90	0	54	6,366.198
0.95	0	57	6,031.135
1.00	1	00	5,729.578
1.05	1	03	5,456.741
1.10	1	06	5,208.707
1.15	1	09	4,982.242
1.20	1	12	4,774.648
1.25	1	15	4,583.662
1.30	1	18	4,407.368
1.35	1	21	4,244.132
1.40	1	24	4,092.556
1.45	1	27	3,951.433
1.50	1	30	3,819.719
1.55	1	33	3,696.502
1.60	1	36	3,580.936
1.65	1	39	3,472.471
1.70	1	42	3,370.340
1.75	1	45	3,274.045
1.80	1	48	3,183.099
1.85	1	51	3,097.069
1.90	1	54	3,015.567
1.95	1	57	2,938.245
2.00	2	00	2,864.789
2.05	2	03	2,794.916
2.10	2	06	2,728.370
2.15	2	09	2,664.920
2.20	2	12	2,604.354
2.25	2	15	2,546.479

2.30° to 6.50°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
2.30	2	18	2,491.121
2.35	2	21	2,438.118
2.40	2	24	2,387.324
2.45	2	27	2,338.603
2.50	2	30	2,291.831
2.55	2	33	2,246.893
2.60	2	36	2,203.684
2.65	2	39	2,162.105
2.70	2	42	2,122.066
2.75	2	45	2,083.483
2.80	2	48	2,046.278
2.85	2	51	2,010.378
2.90	2	54	1,975.717
2.95	2	57	1,942.230
3.00	3	00	1,909.859
3.05	3	03	1,878.550
3.10	3	06	1,848.1-51
3.15	3	09	1,818.914
3.20	3	12	1,790.493
3.25	3	15	1,762.947
3.30	3	18	1,736.236
3.35	3	21	1,710.322
3.40	3	24	1,685.170
3.45	3	27	1,660.747
3.50	3	30	1,637.022
3.55	3	33	1,613.966
3.60	3	36	1,591.549
3.65	3	39	1,569.747
3.70	3	42	1,548.535
3.75	3	45	1,527.887
3.80	3	48	1,507.784
3.85	3	51	1,488.202
3.90	3	54	1,469.123
3.95	3	57	1,450.526
4.00	4	00	1,432.394
4.25	4	15	1,348.136
4.50	4	30	1,273.240
4.75	4	45	1,206.227
5.00	5	00	1,145.916
5.25	5	15	1,091.348
5.50	5	30	1,041.741
5.75	5	45	996.448
6.00	6	00	954.930
6.25	6	15	916.732
6.50	6	30	881.474

TABLE 14 — DEGREE OF CURVE TO RADII (Continued)

6.75° to 17.75°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
6.75	6	45	848.826
7.00	7	00	818.511
7.25	7	15	790.287
7.50	7	30	763.944
7.75	7	45	739.300
8.00	8	00	716.197
8.25	8	15	694.494
8.50	8	30	674.068
8.75	8	45	654.809
9.00	9	00	636.620
9.25	9	15	619.414
9.50	9	30	603.113
9.75	9	45	587.649
10.00	10	00	572.958
10.25	10	15	558.983
10.50	10	30	545.674
10.75	10	45	532.984
11.00	11	00	520.871
11.25	11	15	509.296
11.50	11	30	498.224
11.75	11	45	487.624
12.00	12	00	477.465
12.25	12	15	467.721
12.50	12	30	458.366
12.75	12	45	449.379
13.00	13	00	440.737
13.25	13	15	432.421
13.50	13	30	424.413
13.75	13	45	416.697
14.00	14	00	409.256
14.25	14	15	402.076
14.50	14	30	395.143
14.75	14	45	388.446
15.00	15	00	381.972
15.25	15	15	375.710
15.50	15	30	369.650
15.75	15	45	363.783
16.00	16	00	358.099
16.25	16	15	352.589
16.50	16	30	347.247
16.75	16	45	342.064
17.00	17	00	337.034
17.25	17	15	332.149
17.50	17	30	327.404
17.75	17	45	322.793

18° to 29°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
18.00	18	00	318.310
18.25	18	15	313.949
18.50	18	30	309.707
18.75	18	45	305.577
19.00	19	00	301.557
19.25	19	15	297.640
19.50	19	30	293.825
19.75	19	45	290.105
20.00	20	00	286.479
20.25	20	15	282.942
20.50	20	30	279.492
20.75	20	45	276.124
21.00	21	00	272.837
21.25	21	15	269.627
21.50	21	30	266.492
21.75	21	45	263.429
22.00	22	00	260.435
22.25	22	15	257.509
22.50	22	30	254.648
22.75	22	45	251.850
23.00	23	00	249.112
23.25	23	15	246.433
23.50	23	30	243.812
23.75	23	45	241.245
24.00	24	00	238.732
24.25	24	15	236.271
24.50	24	30	233.860
24.75	24	45	231.498
25.00	25	00	229.183
25.25	25	15	226.914
25.50	25	30	224.689
25.75	25	45	222.508
26.00	26	00	220.368
26.25	26	15	218.270
26.50	26	30	216.210
26.75	26	45	214.190
27.00	27	00	212.207
27.25	27	15	210.260
27.50	27	30	208.348
27.75	27	45	206.471
28.00	28	00	204.628
28.25	28	15	202.817
28.50	28	30	201.038
28.75	28	45	199.290
29.00	29	00	197.572

TABLE 14 — DEGREE OF CURVE TO RADII (Continued)

29.25° to 40.25°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
29.25	29	15	195.883
29.50	29	30	194.223
29.75	29	45	192.591
30.00	30	00	190.986
30.25	30	15	189.408
30.50	30	30	187.855
30.75	30	45	186.328
31.00	31	00	184.825
31.25	31	15	183.346
31.50	31	30	181.891
31.75	31	45	180.459
32.00	32	00	179.049
32.25	32	15	177.661
32.50	32	30	176.295
32.75	32	45	174.949
33.00	33	00	173.624
33.25	33	15	172.318
33.50	33	30	171.032
33.75	33	45	169.765
34.00	34	00	168.517
34.25	34	15	167.287
34.50	34	30	166.075
34.75	34	45	164.880
35.00	35	00	163.702
35.25	35	15	162.541
35.50	35	30	161.397
35.75	35	45	160.268
36.00	36	00	159.155
36.25	36	15	158.057
36.50	36	30	156.975
36.75	36	45	155.907
37.00	37	00	154.853
37.25	37	15	153.814
37.50	37	30	152.789
37.75	37	45	151.777
38.00	38	00	150.778
38.25	38	15	149.793
38.50	38	30	148.820
38.75	38	45	147.860
39.00	39	00	146.912
39.25	39	15	145.977
39.50	39	30	145.053
39.75	39	45	144.140
40.00	40	00	143.239
40.25	40	15	142.350

40.50° to 51.50°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
40.50	40	30	141.471
40.75	40	45	140.603
41.00	41	00	139.746
41.25	41	15	138.899
41.50	41	30	138.062
41.75	41	45	137.235
42.00	42	00	136.419
42.25	42	15	135.611
42.50	42	30	134.814
42.75	42	45	134.025
43.00	43	00	133.246
43.25	43	15	132.476
43.50	43	30	131.714
43.75	43	45	130.962
44.00	44	00	130.218
44.25	44	15	129.482
44.50	44	30	128.755
44.75	44	45	128.035
45.00	45	00	127.324
45.25	45	15	126.621
45.50	45	30	125.925
45.75	45	45	125.237
46.00	46	00	124.556
46.25	46	15	123.883
46.50	46	30	123.217
46.75	46	45	122.558
47.00	47	00	121.906
47.25	47	15	121.261
47.50	47	30	120.623
47.75	47	45	119.991
48.00	48	00	119.366
48.25	48	15	118.748
48.50	48	30	118.136
48.75	48	45	117.530
49.00	49	00	116.930
49.25	49	15	116.337
49.50	49	30	115.749
49.75	49	45	115.167
50.00	50	00	114.592
50.25	50	15	114.021
50.50	50	30	113.457
50.75	50	45	112.898
51.00	51	00	112.345
51.25	51	15	111.797
51.50	51	30	111.254

TABLE 14 — DEGREE OF CURVE TO RADII (Continued)

51.75° to 62.75°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
51.75	51	45	110.716
52.00	52	00	110.184
52.25	52	15	109.657
52.50	52	30	109.135
52.75	52	45	108.618
53.00	53	00	108.105
53.25	53	15	107.598
53.50	53	30	107.095
53.75	53	45	106.597
54.00	54	00	106.103
54.25	54	15	105.614
54.50	54	30	105.130
54.75	54	45	104.650
55.00	55	00	104.175
55.25	55	15	103.703
55.50	55	30	103.236
55.75	55	45	102.773
56.00	56	00	102.314
56.25	56	15	101.859
56.50	56	30	101.408
56.75	56	45	100.962
57.00	57	00	100.519
57.25	57	15	100.080
57.50	57	30	99.645
57.75	57	45	99.213
58.00	58	00	98.786
58.25	58	15	98.362
58.50	58	30	97.942
58.75	58	45	97.525
59.00	59	00	97.111
59.25	59	15	96.702
59.50	59	30	96.295
59.75	59	45	95.893
60.00	60	00	95.493
60.25	60	15	95.097
60.50	60	30	94.704
60.75	60	45	94.314
61.00	61	00	93.928
61.25	61	15	93.544
61.50	61	30	93.164
61.75	61	45	92.787
62.00	62	00	92.413
62.25	62	15	92.041
62.50	62	30	91.673
62.75	62	45	91.308

63° to 74°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
63.00	63	00	90.946
63.25	63	15	90.586
63.50	63	30	90.230
63.75	63	45	89.876
64.00	64	00	89.525
64.25	64	15	89.176
64.50	64	30	88.831
64.75	64	45	88.488
65.00	65	00	88.147
65.25	65	15	87.810
65.50	65	30	87.474
65.75	65	45	87.142
66.00	66	00	86.812
66.25	66	15	86.484
66.50	66	30	86.159
66.75	66	45	85.836
67.00	67	00	85.516
67.25	67	15	85.198
67.50	67	30	84.883
67.75	67	45	84.569
68.00	68	00	84.258
68.25	68	15	83.950
68.50	68	30	83.643
68.75	68	45	83.339
69.00	69	00	83.037
69.25	69	15	82.738
69.50	69	30	82.440
69.75	69	45	82.144
70.00	70	00	81.851
70.25	70	15	81.560
70.50	70	30	81.271
70.75	70	45	80.983
71.00	71	00	80.698
71.25	71	15	80.415
71.50	71	30	80.134
71.75	71	45	79.855
72.00	72	00	79.577
72.25	72	15	79.302
72.50	72	30	79.029
72.75	72	45	78.757
73.00	73	00	78.487
73.25	73	15	78.219
73.50	73	30	77.953
73.75	73	45	77.689
74.00	74	00	77.427

TABLE 14 — DEGREE OF CURVE TO RADII (Continued)

74.25° to 85.25°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
74.25	74	15	77.166
74.50	74	30	76.907
74.75	74	45	76.650
75.00	75	00	76.394
75.25	75	15	76.141
75.50	75	30	75.888
75.75	75	45	75.638
76.00	76	00	75.389
76.25	76	15	75.142
76.50	76	30	74.896
76.75	76	45	74.652
77.00	77	00	74.410
77.25	77	15	74.169
77.50	77	30	73.930
77.75	77	45	73.692
78.00	78	00	73.456
78.25	78	15	73.221
78.50	78	30	72.988
78.75	78	45	72.757
79.00	79	00	72.526
79.25	79	15	72.298
79.50	79	30	72.070
79.75	79	45	71.844
80.00	80	00	71.620
80.25	80	15	71.397
80.50	80	30	71.175
80.75	80	45	70.955
81.00	81	00	70.736
81.25	81	15	70.518
81.50	81	30	70.302
81.75	81	45	70.087
82.00	82	00	69.873
82.25	82	15	69.661
82.50	82	30	69.449
82.75	82	45	69.240
83.00	83	00	69.031
83.25	83	15	68.824
83.50	83	30	68.618
83.75	83	45	68.413
84.00	84	00	68.209
84.25	84	15	68.007
84.50	84	30	67.806
84.75	84	45	67.606
85.00	85	00	67.407
85.25	85	15	67.209

85.50° to 96.50°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
85.50	85	30	67.013
85.75	85	45	66.817
86.00	86	00	66.623
86.25	86	15	66.430
86.50	86	30	66.238
86.75	86	45	66.047
87.00	87	00	65.857
87-25	87	15	65.669
87.50	87	30	65.481
87.75	87	45	65.294
88.00	88	00	65.109
88.25	88	15	64.924
88.50	88	30	64.741
88.75	88	45	64.559
89.00	89	00	64.377
89.25	89	15	64.197
89.50	89	30	64.018
89.75	89	45	63.839
90.00	90	00	63.662
90-25	90	15	63.486
90.50	90	30	63.310
90.75	90	45	63.136
91.00	91	00	62.962
91.25	91	15	62.790
91.50	91	30	62.618
91.75	91	45	62.448
92.00	92	00	62.278
92.25	92	15	62.109
92.50	92	30	61.941
92.75	92	45	61.774
93.00	93	00	61.608
93.25	92	15	61.443
93.50	93	30	61.279
93.75	93	45	61.115
94.00	94	00	60.953
94.25	94	15	60.791
94.50	94	30	60.630
94.75	94	45	60.470
95.00	95	00	60.311
95.25	95	Is	60.153
95.50	95	30	59.996
95.75	95	45	59.839
96.00	96	00	59.683
96.25	96	15	59.928
96.50	96	30	59.374

TABLE 14 — DEGREE OF CURVE TO RADII (Continued)

96.75° to 98.25°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
98.50	98	30	58.168
98.75	98	45	58.021
99.00	99	00	57.875
99.25	99	15	57.729
99.50	99	30	57.583
99.75	99	45	57.439
100.00	100	00	57.296

98.50° to 100°

CURVE DEFINED IN DECIMALS OF DEGREES	CURVE DEFINED IN		RADII (in feet)
	DEGREES	MINUTES	
96.75	96	45	59.220
97.00	97	00	59.068
97.25	97	15	58.916
97.50	97	30	58.765
97.75	97	45	58.615
98.00	98	00	58.465
98.25	98	15	58.316

RADII FORMULA

The radius of a one degree curve is 5, 729.57795+ feet. To find radii for other degree curves, divide the foregoing radius by the desired degree of curve.

**TABLE 15 — LAMBERT CONFORMAL PROJECTION
OREGON NORTH ZONE**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
43° 40'	21,383,852.48	0	101.27783	6219	1.0002340
41'	21,377,775.81	6,076.67	101.27733		1.0002265
42'	21,371,699.17	12,153.31	101.27683		1.0002191
43'	21,365,622.56	18,229.92	101.27650		1.0002118
44'	21,359,545.97	24,306.51	101.27600		1.0002046
43° 45'	21,353,469.41	30,383.07	101.27550		1.0001975
46'	21,347,392.88	36,459.60	101.27517		1.0001904
47'	21,341,316.37	42,536.11	101.27483		1.0001834
48'	21,335,239.88	48,612.60	101.27433		1.0001766
49'	21,329,163.42	34,689.06	101.27400		1.0001698
43° 50'	21,323,086.98	60,765.50	101.27367	6202	1.0001631
51'	21,317,010.56	66,841.92	101.27333		1.0001565
52'	21,310,934.16	72,518.32	101.27283		1.0001499
53'	21,304,857.79	78,994.69	101.27267		1.0001434
54'	21,298,781.43	85,071.05	101.27217		1.0001370
43° 55'	21,292,705.10	91,147.38	101.27183		1.0001307
56'	21,286,628.78	97,223.69	101.27167		1.0001245
57'	21,280,552.49	103,299.99	101.27117		1.0001184
58'	21,274,476.22	109,376.26	101.27100		1.0001123
59'	21,268,399.96	115,452.52	101.27050		1.0001064
44° 00'	21,262,323.73	121,528.75	101.27033	6184	1.0001005
01'	21,256,247.51	127,604.97	101.27017		1.0000947
02'	21,250,171.30	133,681.18	101.26983		1.0000889
03'	21,244,095.11	139,757.37	101.26950		1.0000833
04'	21,238,018.94	145,833.54	101.26917		1.0000777
44° 05'	21,231,942.79	151,909.69	101.26900		1.0000722
06'	21,225,866.65	157,985.83	101.26883		1.0000668
07'	21,219,790.52	164,061.96	101.26850		1.0000615
08'	21,213,714.41	170,138.07	101.26817		1.0000563
09'	21,207,638.32	176,214.16	101.26817		1.0000511
44° 10'	21,201,562.23	182,290.25	101.26783	6167	1.0000461
11'	21,195,486.16	188,366.32	101.26767		1.0000411
12'	21,189,410.10	194,442.38	101.26750		1.0000362
13'	21,183,334.05	200,518.43	101.26733		1.0000314
14'	21,177,258.01	206,594.47	101.26717		1.0000267
44° 15'	21,171,181.98	212,670.50	101.26683		1.0000220
16'	21,165,105.97	218,746.51	101.26683		1.0000174
17'	21,159,029.96	224,822.52	101.26667		1.0000130
18'	21,152,953.96	230,898.52	101.26650		1.0000086
19'	21,146,877.97	236,974.51	101.26633		1.0000042
44° 20'	21,140,801.99	243,050.49	101.26633	6149	1.0000000
21'	21,134,726.01	249,126.47	101.26617		0.9999959
22'	21,128,650.04	255,202.44	101.26600		0.9999918
23'	21,122,574.08	261,278.40	101.26583		0.9999878
24'	21,116,498.13	267,354.35	101.26583		0.9999839

**TABLE 15 — LAMBERT CONFORMAL PROJECTION
OREGON NORTH ZONE (Continued)**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
44° 25'	21,110,422.18	273,430.30	101.26583		0.9999801
26'	21,104,346.23	279,506.25	101.26567		0.9999763
27'	21,098,270.29	285,582.19	101.26550		0.9999726
28'	21,092,194.36	291,658.12	101.26550		0.9999691
29'	21,086,118.43	297,734.05	101.26550		0.9999656
44° 30'	21,080,042.50	303,809.98	101.26550	6132	0.9999622
31'	21,073,966.57	309,885.91	101.26550		0.9999589
32'	21,067,890.64	315,961.84	101.26533		0.9999556
33'	21,061,814.72	322,037.76	101.26550		0.9999525
34'	21,055,738.79	328,113.69	101.26533		0.9999494
44° 35'	21,049,662.87	334,189.61	101.26533		0.9999464
36'	21,043,586.95	340,265.53	101.26550		0.9999435
37'	21,037,511.02	346,341.46	101.26533		0.9999407
38'	21,031,435.10	352,417.38	101.26550		0.9999379
39'	21,025,359.17	358,493.31	101.26550		0.9999353
44° 40'	21,019,283.24	364,569.24	101.26550	6115	0.9999327
41'	21,013,207.31	370,645.17	101.26550		0.9999302
42'	21,007,131.38	376,721.10	101.26567		0.9999278
43'	21,001,055.44	382,797.04	101.26567		0.9999253
44'	20,994,979.50	388,872.98	101.26583		0.9999233
44° 45'	20,988,903.55	394,948.93	101.26583		0.9999211
46'	20,982,827.60	401,024.88	101.26600		0.9999191
47'	20,976,751.64	407,100.84	101.26600		0.9999171
48'	20,970,675.68	413,176.80	101.26617		0.9999152
49'	20,964,599.71	419,252.77	101.26633		0.9999134
44° 50'	20,958,523.73	425,328.75	101.26650	6097	0.9999116
51'	20,952,447.74	431,404.74	101.26650		0.9999100
52'	20,946,371.75	437,480.73	101.26667		0.9999084
53'	20,940,295.75	443,556.73	101.26683		0.9999069
54'	20,934,219.74	449,632.74	101.26700		0.9999055
44° 55'	20,928,143.72	455,708.76	101.26733		0.9999042
56'	20,922,067.68	461,784.80	101.26733		0.9999030
57'	20,915,991.64	467,860.84	101.26750		0.9999018
58'	20,909,915.59	473,936.89	101.26783		0.9999008
59'	20,903,839.52	480,012.93	101.26800		0.9998998
45° 00'	20,897,763.44	486,089.04	101.26817	6080	0.9998989
01'	20,891,687.35	492,165.13	101.26833		0.9998981
02'	20,885,611.25	498,241.23	101.26867		0.9998974
03'	20,879,535.13	504,317.35	101.26883		0.9998967
04'	20,873,459.00	510,393.48	101.26917		0.9998962
45° 05'	20,867,382.85	516,469.63	101.26933		0.9998957
06'	20,861,306.69	522,545.79	101.26967		0.9998953
07'	20,855,230.51	528,621.97	101.26983		0.9998950
08'	20,849,154.32	534,698.16	101.27033		0.9998948
09'	20,843,078.10	540,774.38	101.27050		0.9998946

**TABLE 15 — LAMBERT CONFORMAL PROJECTION
OREGON NORTH ZONE (Continued)**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
45° 10'	20,837,001.87	546,850.61	101.27067	6062	0.9998946
11'	20,830,925.63	552,926.85	101.27117		0.9998946
12'	20,824,849.36	559,003.12	101.27133		0.9998947
13'	20,818,773.08	565,079.40	101.27183		0.9998949
14'	20,812,696.77	571,155.71	101.27200		0.9998952
45° 15'	20,806,620.45	577,232.03	101.27250		0.9998956
16'	20,800,544.10	583,308.38	101.27267		0.9998960
17'	20,794,467.74	589,384.74	101.27317		0.9998966
18'	20,788,391.35	595,461.13	101.27350		0.9998972
19'	20,782,314.94	601,537.54	101.27383		0.9998979
45° 20'	20,776,238.51	607,613.97	101.27417	6044	0.9998987
21'	20,770,162.06	613,690.42	101.27467		0.9998996
22'	20,764,085.58	619,766.90	101.27517		0.9999005
23'	20,758,009.07	625,843.41	101.27533		0.9999016
24'	20,751,932.55	631,919.93	101.27600		0.9999027
45° 25'	20,745,855.99	637,996.49	101.27617		0.9999039
26'	20,739,779.42	644,073.06	101.27683		0.9999052
27'	20,733,702.81	650,149.67	101.27717		0.9999066
28'	20,727,626.18	656,226.30	101.27767		0.9999081
29'	20,721,549.52	662,302.96	101.27800		0.9999096
45° 30'	20,715,472.84	668,379.64	101.27867	6026	0.9999113
31'	20,709,396.12	674,456.36	101.27900		0.9999130
32'	20,703,319.38	680,533.10	101.27950		0.9999148
33'	20,697,242.61	686,609.87	101.28000		0.9999167
34'	20,691,165.81	692,686.67	101.28050		0.9999187
45° 35'	20,685,088.98	698,763.50	101.28117		0.9999207
36'	20,679,012.11	704,840.37	101.28150		0.9999229
37'	20,672,935.22	710,917.26	101.28217		0.9999251
38'	20,666,858.29	716,994.19	101.28267		0.9999274
39'	20,660,781.33	723,071.15	101.28317		0.9999298
45° 40'	20,654,704.34	729,148.14	101.28367	6008	0.9999323
41'	20,648,627.32	735,225.16	101.28433		0.9999349
42'	20,642,550.26	741,302.22	101.28483		0.9999376
43'	20,636,473.17	747,379.31	101.28550		0.9999403
44'	20,630,396.04	753,456.44	101.28600		0.9999431
45° 45'	20,624,318.88	759,533.60	101.28667		0.9999461
46'	20,618,241.68	765,610.80	101.28733		0.9999490
47'	20,612,164.44	771,688.04	101.28783		0.9999521
48'	20,606,087.17	777,765.31	101.28850		0.9999553
49'	20,600,009.86	783,842.62	101.28917		0.9999586
45° 50'	20,593,932.51	789,919.97	101.28983	5991	0.9999619
51'	20,587,855.12	795,997.36	101.29033		0.9999653
52'	20,581,777.70	802,074.78	101.29117		0.9999688
53'	20,575,700.23	808,152.25	101.29167		0.9999724
54'	20,569,622.73	814,229.75	101.29250		0.9999761

**TABLE 15 — LAMBERT CONFORMAL PROJECTION
OREGON NORTH ZONE (Continued)**

LATITUDE	R (feet)	Y ' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
45° 55'	20,563,545.18	820,307.30	101.29317		0.9999799
56'	20,557,467.59	826,384.89	101.29383		0.9999837
57'	20,551,389.96	832,462.52	101.29450		0.9999877
58'	20,545,312.29	838,540.19	101.29517		0.9999917
59'	20,539,234.58	844,617.90	101.29600		0.9999958
46° 00'	20,533,156.82	850,695.66	101.29667	5973	1.0000000
01'	20,527,079.02	856,773.46	101.29733		1.0000043
02'	20,521,001.18	862,851.30	101.29817		1.0000086
03'	20,514,923.29	868,929.19	101.29900		1.0000131
04'	20,508,845.35	875,007.13	101.29967		1.0000176
46° 05'	20,502,767.37	881,085.11	101.30050		1.0000223
06'	20,496,689.34	887,163.14	101.30117		1.0000270
07'	20,490,611.27	893,241.21	101.30217		1.0000318
08'	20,484,533.14	899,319.34	101.30267		1.0000366
09'	20,478,454.98	905,397.50	101.30367		1.0000416
46° 10'	20,472,376.76	911,475.72	101.30450	5955	1.0000467
11'	20,466,298.49	917,553.99	101.30533		1.0000518
12'	20,460,220.17	923,632.31	101.30600		1.0000570
13'	20,454,141.81	929,710.67	101.30700		1.0000623
14'	20,448,063.39	935,789.09	101.30783		1.0000677
46° 15'	20,441,984.92	941,867.56	101.30867		1.0000732
16'	20,435,906.40	947,946.08	101.30950		1.0000788
17'	20,429,827.83	954,024.65	101.31050		1.0000844
18'	20,423,749.20	960,103.28	101.31117		1.0000902
19'	20,417,670.53	966,181.95	101.31217		1.0000960
46° 20'	20,411,591.80	972,260.68	101.31317	5937	1.0001019
21'	20,405,513.01	978,339.47	101.31400		1.0001079
22'	20,399,434.17	984,418.31	101.31483		1.0001140
23'	20,393,355.28	990,497.20	101.31600		1.0001201
24'	20,387,276.32	996,576.16	101.31667		1.0001264
46° 25'	20,381,197.32	1,002,655.16	101.31783		1.0001328
26'	20,375,118.25	1,008,734.23	101.31867		1.0001392
27'	20,369,039.13	1,014,813.35	101.31967		1.0001457
28'	20,362,959.95	1,020,892.53	101.32067		1.0001523
29'	20,356,880.71	1,026,971.77	101.32150		1.0001590
30'	20,350,801.42	1,033,051.06		5919	1.0001658

R = The radius for the latitude of the station.

TABLE 16 — LAMBERT CONFORMAL PROJECTION - OREGON NORTH ZONEFor 1" of LONGITUDE = 0."70918602 of θ

Long.	θ	Long.	θ	Long.	θ
116° 00'	+3° 11' 2".8135	116° 46'	+2° 38' 51".4601	117° 31'	+2° 06' 56".6579
01'	+3° 10' 46".2624	47'	+2° 38' 08".9089	32'	+2° 06' 14".1067
02'	+3° 10' 03".7112	48'	+2° 37' 26".3578	33'	+2° 05' 31".5555
03'	+3° 09' 21".1600	49'	+2° 36' 43".8066	34'	+2° 04' 49".0044
04'	+3° 08' 38".6089	50'	+2° 36' 01".2555	35'	+2° 04' 06".4532
05'	+3° 07' 56".0577				
		116° 51'	+2° 35' 18".7043	117° 36'	+2° 03' 23".9020
116° 06'	+3° 07' 13".5066	52'	+2° 34' 36".1531	37'	+2° 02' 41".3509
07'	+3° 06' 30".9544	53'	+2° 33' 53".6020	38'	+2° 01' 58".7997
08'	+3° 05' 48".4042	54'	+2° 33' 11".0508	39'	+2° 01' 16".2486
09'	+3° 05' 05".8531	55'	+2° 32' 28".4997	40'	+2° 00' 33".6974
10'	+3° 04' 23".3019				
		116° 56'	+2° 31' 45".9485	117° 41'	+1° 59' 51".1462
116° 11'	+3° 03' 40".7508	57"	+2° 31' 03".3973	42'	+1° 59' 08".5951
12'	+3° 02' 58".1996	58'	+2° 30' 20".8462	43'	+1° 58' 26".0439
13'	+3° 02' 15".6484	59'	+2° 29' 38".2950	44'	+1° 57' 43".4928
14'	+3° 01' 33".0973			45'	+1° 57' 00".9416
15'	+3° 00' 50".5461	117° 00'	+2° 28' 55".7439		
		01'	+2° 28' 13".1927	117° 46'	+1° 56' 18".3904
116° 16'	+3° 00' 07".9949	02'	+2° 27' 30".6415	47'	+1° 55' 35".8393
17'	+2° 59' 25".4438	03'	+2° 26' 48".0904	48'	+1° 54' 53".2881
18'	+2° 58' 42".8926	04'	+2° 26' 05".5392	49'	+1° 54' 10".7370
19'	+2° 58' 00".3415	05,	+2° 25' 22".9880	50'	+1° 53' 28".1858
20'	+2° 57' 17".7903				
		117° 06'	+2° 24' 40".4369	117° 51'	+1° 52' 45".6346
116° 21'	+2° 56' 35".2391	07'	+2° 23' 57".8857	52'	+1° 52' 03".0835
19'	+2° 55' 52".6880	08'	+2° 23' 15".3346	53'	+1° 51' 20".5323
23'	+2° 55' 10".1368	09'	+2° 22' 32".7834	54'	+1° 50' 37".9811
24'	+2° 54' 27".5857	10'	+2° 21' 50".2322	55,	+1° 49' 55".4300
25'	+2° 53' 45".0345				
		117° 11'	+2° 21' 07".6811	117° 56'	+1° 49' 12".8788
116° 26'	+2° 53' 02".4833	12'	+2° 20' 25".1299	57'	+1° 48' 30".3277
27'	+2° 52' 19".9322	13'	+2° 19' 42".5788	58'	+1° 47' 47".7765
28'	+2° 51' 37".3810	14'	+2° 19' 00".0276	59'	+1° 47' 05".2253
29'	+2° 50' 54".8298	15'	+2° 18' 17".4764		
30'	+2° 50' 12".2787			118° 00'	+1° 46' 22".6742
		117° 16'	+2° 17' 34".9253	01'	+1° 45' 40".1230
116° 31'	+2° 49' 29".7275	17'	+2° 16' 52".3741	02'	+1° 44' 57".5719
32'	+2° 48' 47".1764	18'	+2° 16' 09".8230	03'	+1° 44' 15".0207
33'	+2° 48' 04".6252	19'	+2° 15' 27".2718	04'	+1° 43' 32".4695
34'	+2° 47' 22".0740	20'	+2° 14' 44".7206	05'	+1° 42' 49".9184
35'	+2° 46' 39".5229				
		117° 21'	+2° 14' 02".1695	118° 06'	+1° 42' 07".3672
116° 36'	+2° 45' 56".9717	22'	+2° 13' 19".6183	07'	+1° 41' 24".8161
37'	+2° 45' 14".4206	23'	+2° 12' 31".0671	08'	+1° 40' 42".2649
38'	+2° 44' 31".8694	24'	+2° 11' 54".5160	09'	+1° 39' 59".7137
39'	+2° 43' 49".3182	25'	+2° 11' 11".9648	10'	+1° 39' 17".1626
40'	+2° 43' 06".7671				
		117° 26'	+2° 10' 29".4137	118° 11'	+1° 38' 34".6114
116° 41'	+2° 42' 24".2159	27'	+2° 09' 46".8625	12'	+1° 37' 52".0602
42'	+2° 41' 41".6648	28'	+2° 09' 04".3113	13'	+1° 37' 09".5091
43'	+2° 40' 59".1136	29'	+2° 08' 21".7602	14'	+1° 36' 26".9579
44'	+2° 40' 16".5624	30'	+2° 07' 39".2090	15'	+1° 35' 44".4068
45'	+2° 39' 34".0113				

TABLE 16 — LAMBERT CONFORMAL PROJECTION - OREGON NORTH ZONEFor 1" of LONGITUDE = 0."70918602 of θ (Continued)

Long.	θ	Long.	θ	Long.	θ
118° 16'	+1° 35' 01".8556	119° 00'	+1° 03' 49".6045	119° 46'	+0° 31' 12".2511
17'	+1° 34' 19".3044	01'	+1° 03' 07".0533	47'	+0° 30' 29".6999
18'	+1° 33' 36".7533	02'	+1° 02' 24".5022	48'	+0° 29' 47".1488
19'	+1° 32' 54".2021	03'	+1° 01' 41".9510	49'	+0° 29' 04".5976
20'	+1° 32' 11".6510	04'	+1° 00' 59".3999	50'	+0° 28' 22".0464
		05'	+1° 00' 16".8487		
118° 21'	+1° 31' 29".0998	119° 51'	+0° 27' 39".4953		
22'	+1° 30' 46".5486	119° 06'	+0° 59' 34".2975	52'	+0° 26' 56".9441
23'	+1° 30' 03".9975	07'	+0° 58' 51".7464	53'	+0° 26' 14".3930
24'	+1° 29' 21".4463	08'	+0° 58' 09".1952	54'	+0° 25' 31".8418
25'	+1° 28' 38".8952	09'	+0° 57' 26".6441	55'	+0° 24' 49".2906
		10'	+0° 56' 44".0209		
118° 26'	+1° 27' 56".3440	119° 56'	+0° 24' 06".7395		
27'	+1° 27' 13".7928	119° 11'	+0° 56' 01".5417	57'	+0° 23' 24".1883
28'	+1° 26' 31".2417	12'	+0° 55' 18".9906	58'	+0° 22' 41".6372
29'	+1° 25' 48".6905	13'	+0° 54' 36".4394	59'	+0° 21' 59".0860
30'	+1° 25' 06".1393	14'	+0° 53' 53".8883		
		15'	+0° 53' 11".3371	120° 00'	+0° 21' 16".5348
118° 31'	+1° 24' 25".5882			01'	+0° 20' 33".9837
32'	+1° 23' 41".0370	119° 16'	+0° 52' 28".7859	02'	+0° 19' 51".4325
33'	+1° 22' 58".4859	17'	+0° 51' 46".2348	03'	+0° 19' 08".8814
34'	+1° 22' 15".9347	18'	+0° 51' 03".6836	04'	+0° 18' 26".3302
35'	+1° 21' 33".3835	19'	+0° 50' 21".1324	05'	+0° 17' 43".7790
		20'	+0° 49' 38".5813		
118° 36'	+1° 20' 50".8324			120° 06'	+0° 17' 01".2279
37'	+1° 20' 08".2812	119° 21'	+0° 48' 56".0301	07'	+0° 16' 18".6767
38'	+1° 19' 25".7301	22'	+0° 48' 13".4790	08'	+0° 15' 36".1255
39'	+1° 18' 43".1789	23'	+0° 47' 30".9278	09'	+0° 14' 53".5744
40'	+1° 18' 00".6277	24'	+0° 46' 48".3766	10'	+0° 14' 11".0232
		25'	+0° 46' 05".8255		
118° 41'	+1° 17' 18".0766			120° 11'	+0° 13' 28".4721
42'	+1° 16' 35".5254	119° 26'	+0° 45' 23".2743	12'	+0° 12' 45".9209
43'	+1° 15' 52".9742	27'	+0° 44' 40".7232	13'	+0° 12' 03".3697
44'	+1° 15' 10".4231	28'	+0° 43' 58".1720	14'	+0° 11' 20".8186
45'	+1° 14' 27".8719	29'	+0° 43' 15".6208	15'	+0° 10' 38".2674
		30'	+0° 42' 33".0697		
118° 46'	+1° 13' 45".3208			120° 16'	+0° 09' 55".7163
47'	+1° 13' 02".7696	119° 31'	+0° 41' 50".5185	17'	+0° 09' 13".1651
48'	+1° 12' 20".2184	32'	+0° 41' 07".9673	18'	+0° 08' 30".6139
49'	+1° 11' 37".6673	33'	+0° 40' 25".4162	19'	+0° 07' 48".0628
50'	+1° 10' 55".1161	34'	+0° 39' 42".8650	20'	+0° 07' 05".5116
		35'	+0° 39' 00".3139		
118° 51'	+1° 10' 12".5650			120° 21'	+0° 06' 22".9605
52'	+1° 09' 30".0138	119° 36'	+0° 38' 17".7627	22'	+0° 05' 40".4093
53'	+1° 08' 47".4626	37'	+0° 37' 35".2115	23'	+0° 04' 57".8581
54'	+1° 08' 04".9115	38'	+0° 36' 52".6604	24'	+0° 04' 15".3070
55'	+1° 07' 22".3603	39'	+0° 36' 10".1092	25'	+0° 03' 32".7558
		40'	+0° 35' 27".5581		
118° 56'	+1° 06' 39".8092			120° 26'	+0° 02' 50".2046
57'	+1° 05' 57".2580	119° 41'	+0° 34' 45".0069	27'	+0° 02' 07".6535
58'	+1° 05' 14".7068	42'	+0° 34' 02".4557	28'	+0° 01' 25".1023
59'	+1° 04' 32".1557	43'	+0° 33' 19".9046	29'	+0° 00' 42".5512
		44'	+0° 32' 37".3534	C.M. 30'	+0° 00' 00".0000
		45'	+0° 31' 54".8023		

TABLE 16 — LAMBERT CONFORMAL PROJECTION - OREGON NORTH ZONEFor 1" of LONGITUDE = 0."70918602 of θ (Continued)

Long.	θ	Long.	θ	Long.	θ
120° 31'	-0° 00' 42".5512	121° 16'	-0° 32' 37".3534	122° 00'	-1° 03' 49".6045
32'	-0° 01' 25".1023	17'	-0° 33' 19".9046	01'	-1° 04' 32".1557
33'	-0° 02' 07".6535	18'	-0° 34' 02".4557	02'	-1° 05' 14".7068
34'	-0° 02' 50".2046	19'	-0° 34' 45".0069	03'	-1° 05' 57".2580
35'	-0° 03' 32".7558	20'	-0° 35' 27".5581	04'	-1° 06' 39".8092
				05'	-1° 07' 22".3603
120° 36'	-0° 04' 15".3070	121° 21'	-0° 36' 10".1092	122° 06'	-1° 08' 04".9115
37'	-0° 04' 57".8581	22'	-0° 36' 52".6604	07'	-1° 08' 47".4626
38'	-0° 05' 40".4093	23'	-0° 37' 35".2115	08'	-1° 09' 30".0138
39'	-0° 06' 22".9605	24'	-0° 38' 17".7627	09'	-1° 10' 12".5650
40'	-0° 07' 05".5116	25'	-0° 39' 00".3139	10'	-1° 10' 55".1161
120° 41'	-0° 07' 48".0628	121° 26'	-0° 39' 42".8650	122° 11'	-1° 11' 37".6673
42'	-0° 08' 30".6139	27'	-0° 40' 25".4162	12'	-1° 12' 20".2184
43'	-0° 09' 13".1651	28'	-0° 41' 07".9673	13'	-1° 13' 01".7696
44'	-0° 09' 55".7163	29'	-0° 41' 50".5185	14'	-1° 13' 45".3208
45'	-0° 10' 38".2674	30'	-0° 42' 33".0697	15'	-1° 14' 27".8719
120° 46'	-0° 11' 20".8186	121° 31'	-0° 43' 15".6208	122° 16'	-1° 15' 10".4231
47'	-0° 12' 03".3697	32'	-0° 43' 59".1720	17'	-1° 15' 52".9742
48'	-0° 12' 45".9209	33'	-0° 44' 40".7232	18'	-1° 16' 35".5254
49'	-0° 13' 28".4721	34'	-0° 45' 23".2743	19'	-1° 17' 18".0766
50'	-0° 14' 11".0232	35'	-0° 46' 05".8255	20'	-1° 18' 00".6277
120° 51'	-0° 14' 53".5744	121° 36'	-0° 46' 48".3766	122° 21'	-1° 18' 43".1789
52'	-0° 15' 36".1255	37'	-0° 47' 30".9278	22'	-1° 19' 25".7301
53'	-0° 16' 18".6767	38'	-0° 48' 13".4790	23'	-1° 20' 09".2812
54'	-0° 17' 01".2279	39'	-0° 48' 56".0301	24'	-1° 20' 50".8324
55'	-0° 17' 43".7790	40'	-0° 49' 38".5813	25'	-1° 21' 33".3835
120° 56'	-0° 18' 26".3302	121° 41'	-0° 50' 21".1324	122° 26'	-1° 22' 15".9347
57'	-0° 19' 08".8814	42'	-0° 51' 03".6836	27'	-1° 22' 58".4859
58'	-0° 19' 51".4325	43'	-0° 51' 46".2348	28'	-1° 23' 41".0370
59'	-0° 20' 33".9837	44'	-0° 52' 28".7859	29'	-1° 24' 23".5882
121° 00'	-0° 21' 16".5348	45'	-0° 53' 11".3371	30'	-1° 25' 06".1393
01'	-0° 21' 59".0860	121° 46'	-0° 53' 53".8883	122° 31'	-1° 25' 48".6905
02'	-0° 22' 41".6372	47'	-0° 54' 36".4394	32'	-1° 26' 31".2417
03'	-0° 23' 24".1883	48'	-0° 55' 18".9906	33'	-1° 27' 13".7928
04'	-0° 24' 06".7395	49'	-0° 56' 01".5417	34'	-1° 27' 56".3440
05'	-0° 24' 49".2906	50'	-0° 56' 44".0929	35'	-1° 28' 38".8952
121° 06'	-0° 25' 31".8418	121° 51'	-0° 57' 26".6441	122° 36'	-1° 29' 21".4463
07'	-0° 26' 14".3930	52'	-0° 58' 09".1952	37'	-1° 30' 03".9975
08'	-0° 26' 56".9441	53'	-0° 58' 51".7464	38'	-1° 30' 46".5486
09'	-0° 27' 39".4953	54'	-0° 59' 34".2975	39'	-1° 31' 29".0998
10'	-0° 28' 22".0464	55'	-1° 00' 16".8487	40'	-1° 32' 11".6510
121° 11'	-0° 29' 04".5976	121° 56'	-1° 00' 59".3999	122° 41'	-1° 32' 54".2021
12'	-0° 29' 47".1488	57'	-1° 01' 41".9510	42'	-1° 33' 36".7533
13'	-0° 30' 29".6999	58'	-1° 02' 24".5022	43'	-1° 34' 19".3044
14'	-0° 31' 12".2511	59'	-1° 03' 07".0533	44'	-1° 35' 01".8556
15'	-0° 31' 54".8023			45'	-1° 35' 44".4068

TABLE 16 — LAMBERT CONFORMAL PROJECTION - OREGON NORTH ZONEFor 1" of LONGITUDE = 0."70918602 of θ (Continued)

Long.	θ	Long.	θ	Long.	θ
122° 46'	-1° 36' 26".9579	123° 31'	-2° 08' 21".7602	124° 16'	-2° 40' 16".5624
47'	-1° 37' 09".5091	32'	-2° 09' 04".3113	17'	-2° 40' 59".1136
48'	-1° 37' 52".0602	33'	-2° 09' 46".8625	18'	-2° 41' 41".6648
49'	-1° 38' 34".6114	34'	-2° 10' 29".4137	19'	-2° 42' 24".2159
50'	-1° 39' 17".1626	35'	-2° 11' 11".9648	20'	-2° 43' 06".7671
122° 51'	-1° 39' 59".7137	123° 36'	-2° 11' 54".5160	124° 21'	-2° 43' 49".3182
52'	-1° 40' 42".2649	37'	-2° 12' 37".0671	22'	-2° 44' 31".8694
53'	-1° 41' 24".8161	38'	-2° 13' 19".6183	23'	-2° 45' 14".4206
54'	-1° 42' 07".3672	39'	-2° 14' 02".1695	24'	-2° 45' 56".9717
55'	-1° 42' 49".9184	40'	-2° 14' 44".7206	25'	-2° 46' 39".5229
122° 56'	-1° 43' 32".4695	123° 41'	-2° 15' 27".2718	124° 26'	-2° 47' 22".0740
57'	-1° 44' 15".0207	42'	-2° 16' 09".8230	27'	-2° 48' 04".6252
58'	-1° 44' 57".5719	43'	-2° 16' 52".3741	28'	-2° 48' 47".1764
59'	-1° 45' 40".1230	44'	-2° 17' 34".9253	29'	-2° 49' 29".7275
		45'	-2° 18' 17".4764	30'	-2° 50' 12".2787
123° 00'	-1° 46' 22".6742	123° 46'	-2° 19' 00".0276	124° 31'	-2° 50' 54".8298
01'	-1° 47' 05".2253	47'	-2° 19' 42".5788	32'	-2° 51' 37".3810
02'	-1° 47' 47".7765	48'	-2° 20' 25".1299	33'	-2° 52' 19".9322
03'	-1° 48' 30".3277	49'	-2° 21' 07".6811	34'	-2° 53' 02".4833
04'	-1° 49' 12".8788	50'	-2° 21' 50".2322	35'	-2° 53' 45".0345
05'	-1° 49' 55".4300				
123° 06'	-1° 50' 37".9811	123° 51'	-2° 22' 32".7834	124° 36'	-2° 54' 27".5857
07'	-1° 51' 20".5323	52'	-2° 23' 15".3346	37'	-2° 55' 10".1368
08'	-1° 52' 03".0835	53'	-2° 23' 57".8857	38'	-2° 55' 52".6880
09'	-1° 52' 45".6346	54'	-2° 24' 40".4369	39'	-2° 56' 35".2391
10'	-1° 53' 28".1858	55'	-2° 25' 22".9880	40'	-2° 57' 17".7903
123° 11'	-1° 54' 10".7370	123° 56'	-2° 26' 05".5392	124° 41'	-2° 58' 00".3415
12'	-1° 54' 53".2881	57'	-2° 26' 48".0904	42'	-2° 58' 42".8926
13'	-1° 55' 35".8393	58'	-2° 27' 30".6415	43'	-2° 59' 25".4438
14'	-1° 56' 18".3904	59'	-2° 28' 13".1927	44'	-3° 00' 07".9949
15'	-1° 57' 00".9416			45'	-3° 00' 50".5461
		124° 00'	-2° 28' 55".7439		
123° 16'	-1° 57' 43".4928	01'	-2° 29' 38".2950	124° 46'	-3° 01' 33".0973
17'	-1° 58' 26".0439	02'	-2° 30' 20".8462	47'	-3° 02' 15".6484
18'	-1° 59' 08".5951	03'	-2° 31' 03".3973	48'	-3° 02' 58".1996
19'	-1° 59' 51".1462	04'	-2° 31' 45".9485	49'	-3° 03' 40".7508
20'	-2° 00' 33".6974	05'	-2° 32' 28".4997	50'	-3° 04' 23".3019
123° 21'	-2° 01' 16".2486	124° 06'	-2° 33' 11".0508	124° 51'	-3° 05' 05".8351
22'	-2° 01' 58".7997	07'	-2° 33' 53".6020	52'	-3° 05' 48".4042
23'	-2° 02' 41".3509	08'	-2° 34' 36".1531	53'	-3° 06' 30".9554
24'	-2° 03' 23".9020	09'	-2° 35' 18".7043	54'	-3° 07' 13".5066
25'	-2° 04' 06".4532	10'	-2° 36' 01".2555	55'	-3° 07' 56".0577
123° 26'	-2° 04' 49".0044	124° 11'	-2° 36' 43".8066	124° 56'	-3° 08' 38".6089
27'	-2° 05' 31".5555	12'	-2° 37' 26".3578	57'	-3° 09' 21".1600
28'	-2° 06' 14".1067	13'	-2° 38' 08".9089	58'	-3° 10' 03".7112
29'	-2° 06' 56".6579	14'	-2° 38' 51".4601	59'	-3° 10' 46".2624
30'	-2° 07' 39".2090	15'	-2° 39' 34".0113		
θ is the mapping angle (theta) for the longitude of the station.				125° 00'	-3° 11' 28".8135

**TABLE 17 — LAMBERT CONFORMAL PROJECTION
OREGON SOUTH ZONE**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
41°40'	22,888,667.15	0	101.24167	6656	1.0002341
41'	22,882,592.64	6,074.51	101.24167		1.0002266
42'	22,876,518.15	12,149.00	101.24100		1.0002192
43'	22,870,443.69	18,223.46	101.24067		1.0002119
44'	22,864,369.25	24,297.90	101.24017		1.0002047
45'	22,858,294.84	30,372.31	101.23967	6639	1.0001976
41°46'	22,852,220.46	36,446.69	101.23933		1.0001905
47'	22,846,146.10	42,521.05	101.23833		1.0001836
48'	22,840,071.77	48,595.38	101.23850		1.0001767
49'	22,833,997.46	54,669.69	101.23817		1.0001699
50'	22,827,923.17	60,743.98	101.23783		1.0001631
41°51'	22,821,848.90	66,818.25	101.23733		1.0001565
52'	22,815,774.66	72,892.49	101.23700		1.0001500
53'	22,809,700.44	78,966.71	101.23667		1.0001435
54'	22,803,626.24	85,040.91	101.23633		1.0001371
55'	22,797,552.06	91,115.09	101.23600		1.0001308
41°56'	22,791,477.90	97,189.25	101.23567		1.0001246
57'	22,785,403.76	103,263.39	101.23533		1.0001184
58'	22,779,329.64	109,337.51	101.23500		1.0001124
59'	22,773,255.54	115,411.61	101.23483		1.0001064
42°00'	22,767,181.45	121,485.70	101.23433	6622	1.0001005
01'	22,761,107.39	127,559.76	101.23417		1.0000947
02'	22,755,033.34	133,633.81	101.23383		1.0000889
03'	22,748,959.31	139,707.84	101.23367		1.0000833
04'	22,742,885.29	145,781.86	101.23333		1.0000777
42°05'	22,736,811.29	151,855.86	101.23317		1.0000723
06'	22,730,737.30	157,929.85	101.23283		1.0000669
07'	22,724,663.33	164,003.82	101.23267		1.0000615
08'	22,718,589.37	170,077.78	101.23233		1.0000563
09'	22,712,515.43	176,151.72	101.23217		1.0000512
42°10'	22,706,441.50	182,225.65	101.23183	6605	1.0000461
11'	22,700,367.59	188,299.56	101.23183		1.0000411
12'	22,694,293.68	194,373.47	101.23150		1.0000362
13'	22,688,219.79	200,447.36	101.23150		1.0000314
14'	22,682,145.90	206,521.25	101.23117		1.0000267
42°15'	22,676,072.03	212,595.12	101.23100		1.0000220
16'	22,669,998.17	218,668.98	101.23083		1.0000175
17'	22,663,924.32	224,742.83	101.23067		1.0000130
18'	22,657,850.48	230,816.67	101.23067		1.0000086
19'	22,651,776.64	236,890.51	101.23033		1.0000042
20'	22,645,702.82	242,964.33	101.23033	6587	1.0000000
42°21'	22,639,629.00	249,038.15	101.23033		0.9999959
22'	22,633,555.18	255,111.97	101.23000		0.9999918
23'	22,627,481.38	261,185.77	101.23000		0.9999878
24'	22,621,407.58	267,259.57	101.22983		0.9999839
25'	22,615,333.79	273,333.36	101.22983		0.9999801

**TABLE 17 — LAMBERT CONFORMAL PROJECTION
OREGON SOUTH ZONE (Continued)**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
42°26'	22,609,260.00	279,407.15	101.22983	6570	0.9999763
27'	22,603,186.21	285,480.94	101.22967		0.9990727
28'	22,597,112.43	291,554.72	101.22967		0.9999691
29'	22,591,038.65	297,628.50	101.22950		0.9999656
30'	22,584,964.88	303,702.27	101.22950		0.9999622
42°31'	22,578,891.11	309,776.04	101.22950		0.9999589
32'	22,572,817.34	315,849.81	101.22933		0.9999556
33'	22,566,743.58	321,923.57	101.22950		0.9999525
34'	22,560,669.81	327,997.34	101.22950		0.9999494
35'	22,554,596.04	334,071.11	101.22933		0.9999464
42°36'	22,548,522.28	340,144.87	101.22950	6552	0.9999435
37'	22,542,448.51	346,218.64	101.22950		0.9999407
38'	22,536,374.74	352,292.41	101.22950		0.9999379
39'	22,530,300.97	358,366.18	101.22950		0.9999353
40'	22,524,227.20	364,439.95	101.22950		0.9999327
42°41'	22,518,153.43	370,513.72	101.22967		0.9999302
42'	22,512,079.65	376,587.50	101.22967		0.9999278
43'	22,506,005.87	382,661.28	101.22967		0.9999255
44'	22,499,932.09	388,735.06	101.22983		0.9999233
45'	22,493,858.30	394,808.85	101.23000		0.9999211
42°46'	22,487,784.50	400,882.65	101.23000	6535	0.9999191
47'	22,481,710.70	406,956.45	101.23017		0.9999171
48'	22,475,636.89	413,030.26	101.23017		0.9999152
49'	22,469,563.08	419,104.07	101.23033		0.9999133
50'	22,463,489.26	425,177.89	101.23050		0.9999116
42°51'	22,457,415.43	431,251.72	101.23050		0.9999100
52'	22,451,341.60	437,325.55	101.23083		0.9999084
53'	22,445,267.75	443,399.40	101.23083		0.9999069
54'	22,439,193.90	449,473.25	101.23100		0.9999055
55'	22,433,120.04	455,547.11	101.23133		0.9999042
42°56'	22,427,046.16	461,620.99	101.23133		0.9999030
57'	22,420,972.28	467,694.87	101.23167		0.9999018
58'	22,414,898.38	473,768.77	101.23183		0.9999008
59'	22,408,824.47	479,842.68	101.23200		0.9998998
43°00'	22,402,750.55	485,916.60	101.23217	6518	0.9998989
01'	22,396,676.62	491,990.53	101.23233		0.9998981
02'	22,390,602.68	498,064.47	101.23267		0.9998974
03'	22,384,528.72	504,138.43	101.23300		0.9998967
04'	22,378,454.74	510,212.41	101.23317		0.9998962
05'	22,372,380.75	516,286.40	101.23333	6500	0.9998957
43°06'	22,366,306.75	522,360.40	101.23367		0.9998953
07'	22,360,232.73	528,434.42	101.23400		0.9998950
08'	22,354,158.69	534,508.46	101.23417		0.9998948
09'	22,348,084.64	540,582.51	101.23450		0.9998947
10'	22,342,010.57	546,656.58	101.23483		0.9998946

**TABLE 17 — LAMBERT CONFORMAL PROJECTION
OREGON SOUTH ZONE (Continued)**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
43°11'	22,335,936.48	552,730.67	101.23517	6482	0.9998946
12'	22,329,862.37	558,804.78	101.23533		0.9998947
13'	22,323,788.25	564,878.90	101.23583		0.9998950
14'	22,317,714.10	570,953.05	101.23600		0.9998952
15'	22,311,639.94	577,027.21	101.23650		0.9998956
43°16'	22,305,565.75	583,101.40	101.23683		0.9998961
17'	22,299,491.54	589,175.61	101.23700		0.9998966
18'	22,293,417.32	595,249.83	101.23750		0.9998972
19'	22,287,343.07	601,324.08	101.23800		0.9998979
20'	22,281,268.79	607,398.36	101.23817		0.9998987
43°21'	22,275,194.50	613,472.65	101.23867	6464	0.9998996
22'	22,269,120.18	619,546.97	101.23917		0.9999006
23'	22,263,045.83	625,621.32	101.23933		0.9999016
24'	22,256,971.47	631,695.68	101.24000		0.9999040
25'	22,250,897.07	637,770.08	101.24033		0.9999000
43°26'	22,244,822.65	643,844.50	101.24067		0.9999052
27'	22,238,748.21	649,918.94	101.24133		0.9999066
28'	22,232,673.73	655,993.42	101.24167		0.9999081
29'	22,226,599.23	662,067.92	101.24200		0.9999097
30'	22,220,524.71	668,142.44	101.24250		0.9999113
43°31'	22,214,450.16	674,216.99	101.24300	6446	0.9999130
32'	22,208,375.58	680,291.57	101.24367		0.9999149
33'	22,202,300.96	686,366.19	101.24400		0.9999167
34'	22,196,226.32	692,440.83	101.24450		0.9999187
35'	22,190,151.65	698,515.50	101.24500		0.9999208
43°36'	22,184,076.95	704,590.20	101.24567		0.9999229
37'	22,178,002.21	710,664.94	101.24600		0.9999251
38'	22,171,927.45	716,739.70	101.24667		0.9999275
39'	22,165,852.65	722,814.50	101.24717		0.9999299
40'	22,159,777.82	728,889.33	101.24783		0.9999324
43°41'	22,153,702.95	734,964.20	101.24833	6428	0.9999349
42'	22,147,628.05	741,039.10	101.24883		0.9999376
43'	22,141,553.12	747,114.03	101.24950		0.9999403
44'	22,135,478.15	753,189.00	101.25000		0.9999432
45'	22,129,403.15	759,264.00	101.25067		0.9999461
43°46'	22,123,328.11	765,339.04	101.25133		0.9999491
47'	22,117,253.03	771,414.12	101.25183		0.9999522
48'	22,111,177.92	777,489.23	101.25250		0.9999553
49'	22,105,102.77	783,564.38	101.25317		0.9999586
50'	22,099,027.58	789,639.57	101.25383		0.9999619
43°51'	22,092,952.35	795,714.80	101.25433		0.9999653
52'	22,086,877.09	801,790.06	101.25500		0.9999688
53'	22,080,801.79	807,865.36	101.25583		0.9999724
54'	22,074,726.44	813,940.71	101.25633		0.9999761
55'	22,068,651.06	820,016.09	101.25717		0.9999799

**TABLE 17 — LAMBERT CONFORMAL PROJECTION
OREGON SOUTH ZONE (Continued)**

LATITUDE	R (feet)	Y ' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
43°56'	22,062,575.63	826,091.52	101.25783	6410	0.9999837
57'	22,056,500.16	832,166.99	101.25850		0.9999877
58'	22,050,424.65	838,242.50	101.25933		0.9999917
59'	22,044,349.09	844,318.06	101.25983		0.9999958
43°00'	22,038,273.50	850,393.65	101.26067	6410	1.0000000
01'	22,032,197.86	856,469.29	101.26150		1.0000043
02'	22,026,122.17	862,544.98	101.26217		1.0000086
03'	22,020,046.44	868,620.71	101.26283		1.0000131
04'	22,013,970.67	874,696.48	101.26367		1.0000176
05'	22,007,894.85	880,772.30	101.26450		1.0000222
44°06'	22,001,818.98	886,848.17	101.26517	6393	1.0000269
07'	21,995,743.07	892,924.08	101.26617		1.0000317
08'	21,989,667.10	899,000.05	101.26667		1.0000366
09'	21,983,591.10	905,076.05	101.26767		1.0000416
10'	21,977,515.04	911,152.11	101.26850		1.0000466
44°11'	21,971,438.93	917,228.22	101.26917	6375	1.0000518
12'	21,965,362.78	923,304.37	101.27017		1.0000570
13'	21,959,286.57	929,380.58	101.27083		1.0000623
14'	21,953,210.32	935,456.83	101.27183		1.0000677
15'	21,947,134.01	941,533.14	101.27267		1.0000732
44°16'	21,941,057.65	947,609.50	101.27350		1.0000787
17'	21,934,981.24	953,685.91	101.27450		1.0000844
18'	21,928,904.77	959,762.38	101.27517		1.0000901
19'	21,922,828.26	965,838.89	101.27617		1.0000959
20'	21,916,751.69	971,915.46	101.27717		1.0001018
44°21'	21,910,675.06	977,992.09	101.27800	6356	1.0001078
22'	21,904,598.38	984,068.77	101.27883		1.0001139
23'	21,898,521.65	990,145.50	101.27983		1.0001201
24'	21,892,444.86	996,222.29	101.28067		1.0001263
25'	21,886,368.02	1,002,299.13	101.28183		1.0001327
44°26'	21,880,291.11	1,008,376.04	101.28267		1.0001391
27'	21,874,214.15	1,014,453.00	101.28367		1.0001456
28'	21,868,137.13	1,020,530.02	101.28450		1.0001522
29'	21,862,060.06	1,026,607.09	101.28567		1.0001589
30'	21,855,982.92	1,032,684.23	101.28650		1.0001656
44°31'	21,849,905.73	1,038,761.42	101.28767	6338	1.0001725
32'	21,843,828.47	1,044,838.68	101.28850		1.0001794
33'	21,837,751.16	1,050,915.99	101.28967		1.0001865
34'	21,831,673.78	1,056,993.37	101.29050		1.0001936
35'	21,825,596.35	1,063,070.80	101.29167		1.0002008
44°36'	21,819,518.85	1,069,148.30	101.29283		1.0002081
37'	21,813,441.28	1,075,225.87	101.29367		1.0002154
38'	21,807,363.66	1,081,303.49	101.29483		1.0002229
39'	21,801,285.97	1,087,381.18	101.29583		1.0002304
40'	21,795,208.22	1,093,458.93	101.29700		1.0002381

**TABLE 17 — LAMBERT CONFORMAL PROJECTION
OREGON SOUTH ZONE (Continued)**

LATITUDE	R (feet)	Y' Y VALUE ON CENTRAL MERIDIAN (feet)	TABULAR DIFFERENCE FOR 1 SECOND OF LATITUDE (feet)	1 MINUTE OF θ IN FEET (Approx.)	SCALE EXPRESSED AS A RATIO
44°41'	21,789,130.40	1,099,536.75	101.29800	6320	1.0002458
42'	21,783,052.52	1,105,614.63	101.29917		1.0002536
43'	21,776,974.57	1,111,692.58	101.30017		1.0002615
44'	21,770,896.56	1,117,770.59	101.30133		1.0002694
45'	21,764,818.48	1,123,848.67	101.30250		1.0002775
44°46'	21,758,740.33	1,129,926.82	101.30367		1.0002857
47'	21,752,662.11	1,136,005.04	101.30467		1.0002939
48'	21,746,583.83	1,142,083.32	101.30600		1.0003022
49'	21,740,505.47	1,148,161.68	101.30700		1.0003106
50'	21,734,427.05	1,154,240.10	101.30817		1.0003191
44°51'	21,728,348.56	1,160,318.59	101.30950	6302	1.0003277
52'	21,722,269.99	1,166,397.16	101.31050		1.0003364
53'	21,716,191.36	1,172,475.79	101.31167		1.0003451
54'	21,710,112.66	1,178,554.49	101.31300		1.0003540
55'	21,704,033.88	1,184,633.27	101.31417		1.0003629
44°56'	21,697,955.03	1,190,712.12	101.31550		1.0003719
57'	21,691,876.10	1,196,791.05	101.31650		1.0003810
58'	21,685,797.11	1,202,870.04	101.31783		1.0003902
59'	21,679,718.04	1,208,949.11	101.31917		1.0003995
45°00'	21,673,638.89	1,215,028.26			1.0004088

R = The radius for the latitude of the station

TABLE 18 — LAMBERT CONFORMAL PROJECTION - OREGON SOUTH ZONEFor 1" of LONGITUDE = 0".68414738 of θ

Long.	θ	Long.	θ	Long.	θ
116° 00'	+3° 04' 43".1876	116° 46'	+2° 33' 14".9408	117° 31'	+2° 02' 27".7429
01'	+3° 04' 02".1388	47'	+2° 32' 33".8920	32'	+2° 01' 46".6941
02'	+3° 03' 21".0899	48'	+2° 31' 52".8431	33'	+2° 02' 05".6452
03'	+3° 02' 40".0411	49'	+2° 31' 11".7943	34'	+2° 00' 24".5964
04'	+3° 01' 58".9921	50'	+2° 30' 30".7455	35'	+1° 59' 43".5475
05'	+3° 01' 17".9434				
		116° 51'	+2° 29' 49".6966	117° 36'	+1° 59' 02".4987
116° 06'	+3° 00' 36".8946	52'	+2° 29' 08".6478	37'	+1° 58' 21".4498
07'	+2° 59' 55".8457	53'	+2° 28' 27".5989	38'	+1° 57' 40".4010
08'	+2° 59' 14".7969	54'	+2° 27' 46".5501	39'	+1° 56' 59".3522
09'	+2° 58' 33".7480	55'	+2° 27' 05".5012	40'	+1° 56' 18".3033
10'	+2° 57' 52".6992				
		116° 56'	+2° 26' 24".4524	117° 41'	+1° 55' 37".2545
116° 11'	+2° 57' 11".6503	57'	+2° 25' 43".4036	42'	+1° 54' 56".2056
12'	+2° 56' 30".6015	58'	+2° 25' 02".3547	43'	+1° 54' 15".1568
13'	+2° 55' 49".5527	59'	+2° 24' 21".3059	44'	+1° 53' 34".1079
14'	+2° 55' 08".5038			45'	+1° 52' 53".0591
15'	+2° 54' 27".4550	117° 00'	+2° 23' 40".2570		
		01'	+2° 22' 59".2082	117° 46'	+1° 52' 52".0103
116° 16'	+2° 53' 46".4061	02'	+2° 22' 18".1593	47'	+1° 51' 30".9614
17'	+2° 53' 05".3573	03'	+2° 21' 37".1105	48'	+1° 50' 49".9126
18'	+2° 52' 24".3084	04'	+2° 20' 56".0617	49'	+1° 50' 08".863
19'	+2° 51' 43".2596	05'	+2° 20' 15".0128	50'	+1° 49' 27".8149
20'	+2° 51' 02".2108				
		117° 06'	+2° 19' 33".9640	117° 51'	+1° 48' 46".7660
116° 21'	+2° 50' 21".1619	07'	+2° 18' 52".9151	52'	+1° 48' 05".7172
22'	+2° 49' 40".1131	08'	+2° 18' 11".8663	53'	+1° 47' 24".6684
23'	+2° 48' 50".0642	09'	+2° 17' 30".8174	54'	+1° 46' 43".6195
24'	+2° 48' 18".0154	10'	+2° 16' 49".7686	55'	+1° 46' 02".5707
25'	+2° 47' 36".9665				
		117° 11'	+2° 16' 08".7198	117° 56'	+1° 45' 21".218
116° 26'	+2° 46' 55".9177	12'	+2° 15' 27".6709	57'	+1° 44' 40".4730
27'	+2° 46' 14.8688	13'	+2° 14' 46".6221	58'	+1° 43' 59".4241
28'	+2° 45' 33".8200	14'	+2° 14' 05".5732	59'	+1° 43' 18".3753
29'	+2° 44' 52".7712	15'	+2° 13' 24".5244		
30'	+2° 44' 11".7223			118° 00'	+1° 42' 37".3264
		117° 16'	+2° 12' 43".4755	01'	+1° 41' 56".2776
116° 31'	+2° 43' 30".6735	17'	+2° 12' 02".4267	02'	+1° 41' 16".2288
32'	+2° 42' 49".6246	18'	+2° 11' 21".3779	03'	+1° 40' 34".1799
33'	+2° 42' 08".5758	19'	+2° 10' 40".3290	04'	+1° 39' 53".1311
34'	+2° 41' 27".5269	20'	+2° 09' 59".2802	05'	+1° 39' 12".0822
35'	+2° 40' 46".4781				
		117° 21'	+2° 09' 18".2313	118° 06'	+1° 38' 31".0334
116° 36'	+2° 40' 05".4293	22'	+2° 08' 37".1825	07'	+1° 37' 49".9845
37'	+2° 39' 24".3804	23'	+2° 07' 56".1336	08'	+1° 37' 08".9357
38'	+2° 38' 43".3316	24'	+2° 07' 15".0848	09'	+1° 36' 27".8869
39'	+2° 38' 02".2827	25'	+2° 06' 34".0360	10'	+1° 35' 46".8380
40'	+2° 37' 21".2339				
		117° 26'	+2° 05' 52".9871	118° 11'	+1° 35' 05".7892
116° 41'	+2° 36' 46".1850	27'	+2° 05' 11".9383	12'	+1° 34' 24".7403
42'	+2° 35' 59".1362	28'	+2° 04' 30".8894	13'	+1° 33' 43".6915
43'	+2° 35' 18".0874	29'	+2° 03' 49".8406	14'	+1° 33' 02".6426
44'	+2° 34' 37".0385	30'	+2° 03' 08".7917	15'	+1° 32' 21".5938
45'	+2° 33' 55".9897				

TABLE 18 — LAMBERT CONFORMAL PROJECTION - OREGON SOUTH ZONEFor 1" of LONGITUDE = 0".68414738 of θ (Continued)

Long.	θ	Long.	θ	Long.	θ
118° 16'	+1° 31' 40".5450	119° 00'	+1° 01' 34".3959	119° 46'	+0° 30' 06".1491
17'	+1° 30' 59".4961	01'	+1° 00' 53".3470	47'	+0° 29' 25".1002
18'	+1° 30' 18".4473	02'	+1° 00' 12".2982	48'	+0° 28' 44".0514
19'	+1° 29' 37".3984	03'	+0° 59' 31".2493	49'	+0° 28' 03".0026
20'	+1° 28' 56".3496	04'	+0° 58' 50".2005	50'	+0° 27' 21".9537
		05'	+0° 58' 09".1517		
118° 21'	+1° 28' 15".3007			119° 51'	+0° 26' 40".9049
22'	+1° 27' 34".2519	119° 06'	+0° 57' 28".1028	52'	+0° 25' 59".8560
23'	+1° 26' 53".2031	07'	+0° 56' 47".0540	53'	+0° 25' 18".8072
24'	+1° 26' 12".1542	08'	+0° 56' 06".0051	54'	+0° 24' 37".7583
25'	+1° 25' 31".1054	09'	+0° 55' 24".9563	55'	+0° 23' 56".7095
		10'	+0° 54' 43".9074		
118° 26'	+1° 24' 50".0565			119° 56'	+0° 23' 15".6607
27'	+1° 24' 09".0077	119° 11'	+0° 54' 02".8586	57'	+0° 22' 34".6118
28'	+1° 23' 27".9588	12'	+0° 53' 21".8098	58'	+0° 21' 53".5630
29'	+1° 22' 41".9100	13'	+0° 52' 40".7609	59'	+0° 21' 12".5141
30'	+1° 22' 05".8612	14'	+0° 51' 59".7121		
		15'	+0° 51' 18".6632	120° 00'	+0° 20' 31".4653
118° 31'	+1° 21' 24".8123			01'	+0° 19' 50".4164
32'	+1° 20' 43".7635	119° 16'	+0° 50' 37".6144	02'	+0° 19' 09".3676
33'	+1° 20' 02".7146	17'	+0° 49' 56".5655	03'	+0° 18' 28".3188
34'	+1° 19' 21".6658	18'	+0° 49' 15".5167	04'	+0° 17' 47".2699
35'	+1° 18' 40".6169	19'	+0° 48' 34".4679	05'	+0° 17' 06".2211
		20'	+0° 47' 53".4190		
118° 36'	+1° 17' 59".5681			120° 06'	+0° 16' 25".1722
37'	+1° 17' 18".5193	119° 21'	+0° 47' 12".3702	07'	+0° 15' 44".1234
38'	+1° 16' 37".4704	22'	+0° 46' 31".3213	08'	+0° 15' 03".0745
39'	+1° 15' 56".4216	23'	+0° 45' 50".2725	09'	+0° 14' 22".0257
40'	+1° 15' 15".3727	24'	+0° 45' 09".2236	10'	+0° 13' 40".9769
		25'	+0° 44' 28".1748		
118° 41'	+1° 14' 34".3239			120° 11'	+0° 12' 59".9280
42'	+1° 13' 53".2750	119° 26'	+0° 43' 47".1260	12'	+0° 12' 18".8792
43'	+1° 13' 12".2262	27'	+0° 43' 06".0771	13'	+0° 11' 37".8303
44'	+1° 12' 31".1774	28'	+0° 42' 25".0283	14'	+0° 10' 56".7815
45'	+1° 11' 50".1285	29'	+0° 41' 43".9794	15'	+0° 10' 15".7326
		30'	+0° 41' 02".9306		
118° 46'	+1° 11' 09".0797			120° 16'	+0° 09' 34".6838
47'	+1° 10' 28".0308	119° 31'	+0° 40' 21".8817	17'	+0° 08' 53".6350
48'	+1° 09' 46".9820	32'	+0° 39' 40".8329	18'	+0° 08' 12".5861
49'	+1° 09' 05".9331	33'	+0° 38' 59".7841	19'	+0° 07' 31".5373
50'	+1° 08' 24".8843	34'	+0° 38' 18".7352	20'	+0° 06' 50".4884
118° 51'	+1° 07' 43".8355	119° 36'	+0° 36' 56".6375	120° 21'	+0° 06' 09".4396
52'	+1° 07' 02".7866	37'	+0° 36' 15".5887	22'	+0° 05' 28".3907
53'	+1° 06' 21".7378	38'	+0° 35' 34".5398	23'	+0° 04' 47".3419
54'	+1° 05' 40".6889	39'	+0° 34' 53".4910	24'	+0° 04' 06".2931
55'	+1° 04' 59".6401	40'	+0° 34' 12".4422	25'	+0° 03' 25".2442
118° 56'	+1° 04' 18".5912	119° 41'	+0° 33' 31".3933	120° 26'	+0° 02' 44".1954
57'	+1° 03' 37".5424	42'	+0° 32' 50".3445	27'	+0° 02' 03".1465
58'	+1° 02' 56".4936	43'	+0° 32' 09".2956	28'	+0° 01' 22".0977
59'	+1° 02' 15".4447	44'	+0° 31' 28".2468	29'	+0° 00' 41".0488
		45'	+0° 30' 47".1979	30'	0° 00' 00".0000

TABLE 18 — LAMBERT CONFORMAL PROJECTION - OREGON SOUTH ZONEFor 1" of LONGITUDE = 0".68414738 of θ (Continued)

Long.	θ	Long.	θ	Long.	θ
120° 31'	-0° 00' 41".0488	121° 16'	-0° 31' 28".2468	122° 00'	-1° 01' 34".3959
32'	-0° 01' 22".0977	17'	-0° 32' 09".2956	01'	-1° 01' 15".4447
33'	-0° 02' 03".1465	18'	-0° 32' 50".3445	02'	-1° 02' 56".4936
34'	-0° 02' 44".1954	19'	-0° 33' 31".3933	03'	-1° 03' 37".5424
35'	-0° 03' 25".2442	20'	-0° 34' 12".4422	04'	-1° 04' 18".5912
				05'	-1° 04' 59".6401
120° 36'	-0° 04' 06".2931	121° 21'	-0° 34' 53".4910		
37'	-0° 04' 47".3419	22'	-0° 35' 34".5398	122° 06'	-1° 05' 40".6889
38'	-0° 05' 28".3907	23'	-0° 36' 15".5887	07'	-1° 06' 21".7378
39'	-0° 06' 09".4396	24'	-0° 36' 56".6375	08'	-1° 07' 02".7866
40'	-0° 06' 50".4884	25'	-0° 37' 37".6864	09'	-1° 07' 43".8355
				10'	-1° 08' 24".8843
120° 41'	-0° 07' 31".5373	121° 26'	-0° 38' 18".7352		
42'	-0° 08' 12".5861	27'	-0° 38' 59".7841	122° 11'	-1° 09' 05".9331
43'	-0° 08' 53".6350	28'	-0° 39' 40".8329	12'	-1° 09' 46".9820
44'	-0° 09' 34".6838	29'	-0° 40' 21".8817	13'	-1° 10' 28".0308
45'	-0° 10' 15".7326	30'	-0° 41' 02".9306	14'	-1° 11' 09".0797
				15'	-1° 11' 50".1285
120° 46'	-0° 10' 56".7815	121° 31'	-0° 41' 43".9794		
47'	-0° 11' 37".8303	32'	-0° 42' 25".0283	122° 16'	-1° 12' 31".1774
48'	-0° 12' 18".8792	33'	-0° 43' 06".0771	17'	-1° 13' 12".2262
49'	-0° 12' 59".9280	34'	-0° 43' 47".1260	18'	-1° 13' 53.2750
50'	-0° 13' 40".9769	35'	-0° 44' 28".1748	19'	-1° 14' 34".3239
				20'	-1° 15' 15".3727
120° 51'	-0° 14' 22".0257	121° 36'	-0° 45' 09".2236		
52'	-0° 15' 03".0745	37'	-0° 45' 50".2725	122° 21'	-1° 15' 56".4216
53'	-0° 15' 44".1234	38'	-0° 46' 31".3213	22'	-1° 16' 37".4704
54'	-0° 16' 25".1722	39'	-0° 47' 12".3702	23'	-1° 17' 18".5193
55'	-0° 17' 06".2211	40'	-0° 47' 53".4190	24'	-1° 17' 59".5681
				25'	-1° 18' 40".6169
120° 56'	-0° 17' 47".2699	121° 41'	-0° 48' 34".4679		
57'	-0° 18' 28".3188	42'	-0° 49' 15".5167	122° 26'	-1° 19' 21".6658
58'	-0° 19' 09".3676	43'	-0° 49' 56".5655	27'	-1° 20' 02".7146
59'	-0° 19' 50".4164	44'	-0° 50' 37".6144	28'	-1° 20' 43".7635
		45'	-0° 51' 18".6632	29'	-1° 21' 24".8123
121° 00'	-0° 20' 31".4653			30'	-1° 22' 05".8612
01'	-0° 21' 12".5141	121° 46'	-0° 51' 59".7121		
02'	-0° 21' 53".5630	47'	-0° 52' 40".7609	122° 31'	-1° 22' 46".9100
03'	-0° 22' 34".6118	48'	-0° 53' 21".8098	32'	-1° 23' 27".9588
04'	-0° 23' 15".6607	49'	-0° 54' 02".8586	33'	-1° 24' 09".0077
05'	-0° 23' 56".7095	50'	-0° 54' 43".9074	34'	-1° 24' 50".0565
		51'	-1° 25' 31".1054	35'	-1° 25' 31".1054
121° 06'	-0° 24' 37".7583	121° 51'	-0° 55' 24".9563		
07'	-0° 25' 18".8072	52'	-0° 56' 06".0051	122° 36'	-1° 26' 12".1542
08'	-0° 25' 59".8560	53'	-0° 56' 47".0540	37'	-1° 26' 53".2031
09'	-0° 26' 40".9049	54'	-0° 57' 29".1028	38'	-1° 27' 34".2519
10'	-0° 27' 21".9537	55'	-0° 58' 09".1517	39'	-1° 28' 15".3007
				40'	-1° 28' 56".3496
121° 11'	-0° 28' 03".0026	121° 56'	-0° 58' 50".2005		
12'	-0° 28' 44".0514	57'	-0° 59' 31".2493	122° 41'	-1° 29' 37".3984
13'	-0° 29' 25".1002	58'	-1° 00' 12".2982	42'	-1° 30' 18".4473
14'	-0° 30' 06".1491	59'	-1° 00' 53".3470	43'	-1° 30' 59".4961
15'	-0° 30' 47".1979			44'	-1° 31' 40".5450
				45'	-1° 32' 21".5938

TABLE 18 — LAMBERT CONFORMAL PROJECTION - OREGON SOUTH ZONEFor 1" of LONGITUDE = 0".68414738 of θ (Continued)

Long.	θ	Long.	θ	Long.	θ
122° 46'	-1° 33' 02".6426	123° 31'	-2° 03' 49".8406	124° 16'	-2° 34' 37".0385
47'	-1° 33' 43".6915	32'	-2° 04' 30".8894	17'	-2° 35' 18".0874
48'	-1° 34' 24".7403	33'	-2° 05' 11".9383	18'	-2° 35' 59".1362
49'	-1° 35' 05".7892	34'	-2° 05' 52".9871	19'	-2° 36' 46".1850
50'	-1° 35' 46".8380	35'	-2° 06' 34".0360	20'	-2° 37' 21".2339
122° 51'	-1° 36' 27".8869	123° 36'	-2° 07' 15".0848	124° 21'	-2° 38' 02".2827
52'	-1° 37' 08".9357	37'	-2° 07' 56".1336	22'	-2° 38' 43".3316
53'	-1° 37' 49".9845	38'	-2° 08' 37".1825	23'	-2° 39' 24".3804
54'	-1° 38' 31".0334	39'	-2° 09' 18".2313	24'	-2° 40' 05".4293
55'	-1° 39' 12".0822	40'	-2° 09' 59".2802	25'	-2° 40' 46".4781
122° 56'	-1° 39' 53".1311	123° 41'	-2° 10' 40".3290	124° 26'	-2° 41' 27".5269
57'	-1° 40' 34".1799	42'	-2° 11' 21".3779	27'	-2° 42' 09".5758
58'	-1° 41' 15".2288	43'	-2° 12' 02".4267	28'	-2° 42' 49".6246
59'	-1° 41' 56".2776	44'	-2° 12' 43".4755	29'	-2° 43' 30".6735
123° 00'	-1° 42' 37".3264	45'	-2° 13' 24".5244	30'	-2° 44' 11".7223
01'	-1° 43' 18".3753	123° 46'	-2° 14' 05".5732	124° 31'	-2° 44' 52".7712
02'	-1° 43' 59".4241	47'	-2° 14' 46".6221	32'	-2° 45' 33".8200
03'	-1° 44' 40".4730	48'	-2° 15' 27".6709	33'	-2° 46' 14".8688
04'	-1° 45' 21".5218	49'	-2° 16' 08".7198	34'	-2° 46' 55".9177
05'	-1° 46' 02".5707	50'	-2° 16' 49".7686	35'	-2° 47' 36".9665
123° 06'	-1° 46' 43".6195	123° 51'	-2° 17' 30".8174	124° 36'	-2° 48' 18".0154
07'	-1° 47' 24".6684	52'	-2° 18' 11".8663	37'	-2° 48' 59".0642
08'	-1° 48' 05".7172	53'	-2° 18' 52".9151	38'	-2° 49' 40".1131
09'	-1° 48' 46".7660	54'	-2° 19' 33".9640	39'	-2° 50' 21".1619
10'	-1° 49' 27".8149	55'	-2° 20' 15".0128	40'	-2° 51' 02".2108
123° 11'	-1° 50' 08".8637	123° 56'	-2° 20' 56".0617	124° 41'	-2° 51' 43".2596
12'	-1° 50' 49".9126	57'	-2° 21' 37".1105	42'	-2° 52' 24".3084
13'	-1° 51' 30".9614	58'	-2° 22' 18".1593	43'	-2° 53' 05".3573
14'	-1° 52' 12".0103	59'	-2° 22' 59".2082	44'	-2° 53' 46".4061
15'	-1° 52' 53".0591	124° 00'	-2° 23' 40".2570	45'	-2° 54' 27".4550
123° 16'	-1° 53' 34".1079	01'	-2° 24' 21".3059	124° 46'	-2° 55' 08".3038
17'	-1° 54' 15".1568	02'	-2° 25' 02".3547	47'	-2° 55' 49".5527
18'	-1° 54' 56".2056	03'	-2° 25' 43".4036	48'	-2° 56' 30".6015
19'	-1° 55' 37".2545	04'	-2° 26' 24".4524	49'	-2° 57' 11".6503
20'	-1° 56' 18".3033	05'	-2° 27' 05".5012	50'	-2° 57' 52".6992
123° 21'	-1° 56' 59".3522	124° 06'	-2° 27' 46".5501	124° 51'	-2° 58' 33".7480
22'	-1° 57' 40".4010	07'	-2° 28' 27".5989	52'	-2° 59' 14".7969
23'	-1° 58' 21".4498	08'	-2° 29' 08".6478	53'	-2° 59' 55".8457
24'	-1° 59' 02".4987	09'	-2° 29' 49".6966	54'	-3° 00' 36".8946
25'	-1° 59' 43".5475	10'	-2° 30' 30".7455	55'	-3° 01' 17".9434
123° 26'	-2° 00' 24".5964	124° 11'	-2° 31' 11".7943	124° 56'	-3° 01' 58".9922
27'	-2° 01' 05".6452	12'	-2° 31' 52".8431	57'	-3° 02' 40".0411
28'	-2° 01' 46".6941	13'	-2° 32' 33".8920	58'	-3° 03' 21".0899
29'	-2° 02' 27".7429	14'	-2° 33' 14".9408	59'	-3° 04' 02".1388
30'	-2° 03' 08".7917	15'	-2° 33' 55".9897	125° 00'	-3° 04' 43".1876

 θ is the mapping angle (theta) for the longitude of the station

**TABLE 19 — MERIDIAN CONVERGENCY
(SIX MILES LONG — SIX MILES APART)**

LAT.	CONVERGENCY		LONGITUDE DIFFERENCE Per Range		LATITUDE DIFFERENCE	
Degree	On Parallel	Angle	In Arc.	In Time	1 Mile	1 Tshp.
41°	63.1 Lks.	4′ 31″	6′ 53.15″	27.54 sec.	0.869	5.217
42°	65.4 Lks.	4′ 41″	6′ 59.56″	27.97 sec.	0.869	5.217
43°	67.7 Lks.	4′ 51″	7′ 06.29″	28.42 sec.	0.869	5.217
44°	70.1 Lks.	5′ 1″	7′ 13.39″	28.89 sec.	0.869	5.217
45°	72.6 Lks.	5′ 12″	7′ 20.86″	29.39 sec.	0.869	5.211
46°	75.2 Lks.	5′ 23″	7′ 28.74″	29.92 sec.	0.869	5.211
47°	77.8 Lks.	5′ 34″	7′ 37.04″	30.47 sec.	0.869	5.211

**TABLE 20 — CONSTANTS FOR OREGON
OREGON COORDINATE SYSTEM**

CONSTANT		NORTH ZONE	SOUTH ZONE
C	=	2,000,000.00 feet	2,000,000.00 feet
Central Meridian	=	120°30' 00".00	120° 30' 00".00
Rb	=	21,383,852.48 feet	22,888,667.15 feet
y°	=	547,601.54 feet	547,357.72 feet
ℓ	=	0.709 18602	0.684 14738
$\frac{1}{2}$	=	2.355×10^{-10}	2356×10^{-10}
$2p_\circ \sin 1''$			
$\log \frac{1}{2}$	=	0.372 0173-10	0372 2232-10
$2p_\circ \sin 1''$			
$\log \ell$	=	9.85076 01672-10	9.83514 96702-10
$\log k$	=	7.59008 31907	7.59638 31366

C = The value of "X" assigned to the central meridian for each zone.

R = Radius for the latitude of the station.

Rb = A constant for a zone.

ℓ = A constant for a zone.

TABLE 21 — CORRECTIONS TO NATURAL SCALE RATIOS
(in units of the 7th decimal place)

LAMBERT PROJECTION

Note: Scale ratio interpolated for mean latitude or mean X' of the ends of a line and corrected by the following table is a true mean value accurate to within one in the seventh decimal place.

$\Delta\theta^1$ = the difference in latitude in minutes of the ends of the line.

$\Delta\theta^1$	Correction (Plus)	$\Delta\theta^1$	Correction (Plus)
1	0	31	34
1	0	32	36
3	0	33	38
4	1	34	40
5	1	35	43
6	1	36	45
7	2	37	48
8	2	38	51
9	3	39	53
10	4	40	56
11	4	41	59
12	5	42	62
13	6	43	65
14	7	44	68
15	8	45	71
16	9	46	74
17	10	47	77
18	11	48	81
19	13	49	84
20	14	50	88
21	15	51	91
22	17	52	95
23	19	53	98
24	20	54	102
25	22	55	106
26	24	56	110
27	26	57	114
28	27	58	118
29	29	59	122
30	32	60	126

TABLE 22 — CORRECTIONS TO NATURAL SCALE RATIOS
(in units of the 7th decimal place)

LAMBERT OR TRANSVERSE MERCATOR PROJECTION

Note: Scale ratio interpolated for mean latitude or mean x^1 of the ends of a line and corrected by the following, table is a true mean value accurate to within one in the seventh decimal place.

Δy or Δx	Correction (plus)
10,000	0
20,000	0
30,000	1
40,000	2
50,000	2
60,000	3
70,000	5
80,000	6
90,000	8
100,000	10
110,000	11
120,000	14
130,000	16
140,000	19
150,000	21
160,000	24
170,000	27
180,000	31
190,000	34
200,000	38
210,000	42
220,000	46
230,000	50
240,000	55
250,000	59
260,000	64
270,000	69
280,000	74
290,000	80
300,000	86
310,000	91
320,000	97
330,000	103
340,000	110
350,000	116

TABLE 23 — PROBABLE ERROR FACTORS

n	:0.6745 n-1	:0.6745 n(n-1)
2	0.6745	0.4769
3	0.4769	0.2754
4	0.3894	0.1947
5	0.3372	0.1508
6	0.3016	0.1231
7	0.2754	0.1041
8	0.2549	0.0901
9	0.2385	0.0795
10	0.2248	0.0711
11	0.2133	0.0643
12	0.2034	0.0587
13.	0.1947	0.0540
14	0.1871	0.0500
15	0.1803	0.0465
16	0.1742	0.0435
17	0.1686	0.0409
18	0.1636	0.0386

n	:0.6745 n-1	:0.6745 n(n-1)
19	0.1590	0.0365
20	0.1547	0.0346
21	0.1508	0.0329
22	0.1472	0.0314
23	0.1438	0.0300
24	0.1406	0.0287
25	0.1377	0.0275
26	0.1349	0.0265
27	0.1323	0.0255
28	0.1298	0.0245
29	0.1275	0.0237
30	0.1252	0.0219
31	0.1231	0.0221
32	0.1211	0.0214
33	0.1192	0.0208
34	0.1174	0.0201
35	0.1157	0.0196

**TABLE 24 — CONVERSION - ACRES TO SQUARE FEET
AND SQUARE FEET TO ACRES**

0 to 19.9 ACRES				0 to 866,844 SQUARE FEET			
ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.
0.0	0	5.0	217,800	10.0	435,600	15.0	653,400
0.1	4,356	5.1	222,156	10.1	439,956	15.1	657,756
0.2	8,712	5.2	226,512	10.2	444,312	15.2	662,112
0.3	13,068	5.3	230,868	10.3	448,668	15.3	666,468
0.4	17,424	5.4	235,224	10.4	453,024	15.4	670,824
0.5	21,780	5.5	239,580	10.5	457,380	15.5	675,180
0.6	26,136	5.6	243,936	10.6	461,736	15.6	679,536
0.7	30,492	5.7	248,292	10.7	466,092	15.7	683,892
0.8	34,848	5.8	252,648	10.8	470,448	15.8	688,248
0.9	39,204	5.9	257,004	10.9	474,804	15.9	692,604
1.0	43,560	6.0	261,360	11.0	479,160	16.0	696,960
1.1	47,916	6.1	265,716	11.1	483,516	16.1	701,316
1.2	52,272	6.2	270,072	11.2	487,872	16.2	705,672
1.3	56,628	6.3	274,428	11.3	492,228	16.3	710,028
1.4	60,984	6.4	278,784	11.4	496,584	16.4	714,384
1.5	65,340	6.5	283,140	11.5	500,940	16.5	718,740
1.6	69,696	6.6	287,496	11.6	505,296	16.6	723,096
1.7	74,052	6.7	291,852	11.7	509,652	16.7	727,452
1.8	78,408	6.8	296,208	11.8	514,008	16.8	731,808
1.9	82,764	6.9	300,564	11.9	518,364	16.9	736,164
2.0	87,120	7.0	304,920	12.0	522,720	17.0	740,520
2.1	91,476	7.1	309,276	12.1	527,076	17.1	744,876
2.2	95,832	7.2	313,632	12.2	531,432	17.2	749,232
2.3	100,188	7.3	317,988	12.3	535,788	17.3	753,588
2.4	104,544	7.4	322,344	12.4	540,144	17.4	757,944
2.5	108,900	7.5	326,700	12.5	544,500	17.5	762,300
2.6	113,256	7.6	331,056	12.6	548,856	17.6	766,656
2.7	117,612	7.7	335,412	12.7	553,212	17.7	771,012
2.8	121,968	7.8	339,768	12.8	557,568	17.8	775,368
2.9	126,324	7.9	344,124	12.9	561,924	17.9	779,724
3.0	130,680	8.0	348,480	13.0	566,280	18.0	784,080
3.1	135,036	8.1	352,836	13.1	570,636	18.1	788,436
3.2	139,392	8.2	357,192	13.2	574,992	18.2	792,792
3.3	143,748	8.3	361,548	13.3	579,348	18.3	797,148
3.4	148,104	8.4	365,904	13.4	583,704	18.4	801,504
3.5	152,460	8.5	370,260	13.5	588,060	18.5	805,860
3.6	156,816	8.6	374,616	13.6	592,416	18.6	810,216
3.7	161,172	8.7	378,972	13.7	596,772	18.7	814,572
3.8	165,528	8.8	383,328	13.8	601,128	18.8	818,928
3.9	169,884	8.9	387,684	13.9	605,484	18.9	823,284
4.0	174,240	9.0	392,040	14.0	609,840	19.0	827,640
4.1	178,596	9.1	396,396	14.1	614,196	19.1	831,996
4.2	182,952	9.2	400,752	14.2	618,552	19.2	836,352
4.3	187,308	9.3	405,108	14.3	622,908	19.3	840,708
4.4	191,664	9.4	409,464	14.4	627,264	19.4	845,064
4.5	196,020	9.5	413,820	14.5	631,620	19.5	849,420
4.6	200,376	9.6	418,176	14.6	635,976	19.6	853,776
4.7	204,732	9.7	422,532	14.7	640,332	19.7	858,132
4.8	209,088	9.8	426,888	14.8	644,688	19.8	862,488
4.9	213,444	9.9	431,244	14.9	649,044	19.9	866,844

**TABLE 24 — CONVERSION - ACRES TO SQUARE FEET
AND SQUARE FEET TO ACRES (Continued)**

20 to 39.9 ACRES				871,200 to 1,738,044 SQUARE FEET			
ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.
20.0	871,200	25.0	1,089,000	30.0	1,306,800	35.0	1,524,600
20.1	875,556	25.1	1,093,356	30.1	1,311,156	35.1	1,528,956
20.2	879,912	25.2	1,097,712	30.2	1,315,512	35.2	1,533,312
20.3	884,268	25.3	1,102,068	30.3	1,319,868	35.3	1,537,668
20.4	888,624	25.4	1,106,424	30.4	1,324,224	35.4	1,542,024
20.5	892,980	25.5	1,110,780	30.5	1,328,580	35.5	1,546,380
20.6	897,336	25.6	1,115,136	30.6	1,332,936	35.6	1,550,736
20.7	901,692	25.7	1,119,492	30.7	1,337,292	35.7	1,555,092
20.8	906,048	25.8	1,123,848	30.8	1,341,648	35.8	1,559,448
20.9	910,404	25.9	1,128,204	30.9	1,346,004	35.9	1,563,804
21.0	914,760	26.0	1,132,560	31.0	1,350,360	36.0	1,568,160
21.1	919,116	26.1	1,136,916	31.1	1,354,716	36.1	1,572,516
21.2	923,472	26.2	1,141,272	31.2	1,359,072	36.2	1,576,872
21.3	927,828	26.3	1,145,628	31.3	1,363,428	36.3	1,581,228
21.4	932,184	26.4	1,149,984	31.4	1,367,784	36.4	1,585,584
21.5	936,540	26.5	1,154,340	31.5	1,372,140	36.5	1,589,940
21.6	940,896	26.6	1,158,696	31.6	1,376,496	36.6	1,594,296
21.7	945,252	26.7	1,163,052	31.7	1,380,852	36.7	1,598,652
21.8	949,608	26.8	1,167,408	31.8	1,385,208	36.8	1,603,008
21.9	953,964	26.9	1,171,764	31.9	1,389,564	36.9	1,607,364
22.0	958,320	27.0	1,176,120	32.0	1,393,920	37.0	1,611,720
22.1	962,676	27.1	1,180,476	32.1	1,398,276	37.1	1,616,076
22.2	967,032	27.2	1,184,832	32.2	1,402,632	37.2	1,620,432
22.3	971,388	27.3	1,189,188	32.3	1,406,988	37.3	1,624,788
22.4	975,744	27.4	1,193,544	32.4	1,411,344	37.4	1,629,144
22.5	980,100	27.5	1,197,900	32.5	1,415,700	37.5	1,633,500
22.6	984,456	27.6	1,202,256	32.6	1,420,056	37.6	1,637,856
22.7	988,812	27.7	1,206,612	32.7	1,424,412	37.7	1,642,212
22.8	993,168	27.8	1,210,968	32.8	1,428,768	37.8	1,646,568
22.9	997,524	27.9	1,215,324	32.9	1,433,124	37.9	1,650,924
23.0	1,001,880	28.0	1,219,680	33.0	1,437,480	38.0	1,655,280
23.1	1,006,236	28.1	1,224,036	33.1	1,441,836	38.1	1,659,636
23.2	1,010,592	28.2	1,228,392	33.2	1,446,192	38.2	1,663,992
23.3	1,014,948	28.3	1,232,748	33.3	1,450,548	38.3	1,668,348
23.4	1,019,304	28.4	1,237,104	33.4	1,454,904	38.4	1,672,704
23.5	1,023,660	28.5	1,241,460	33.5	1,459,260	38.5	1,677,060
23.6	1,028,016	28.6	1,245,816	33.6	1,463,616	38.6	1,681,416
23.7	1,032,372	28.7	1,250,172	33.7	1,467,972	38.7	1,685,772
23.8	1,036,728	28.8	1,254,528	33.8	1,472,328	38.8	1,690,128
23.9	1,041,084	28.9	1,258,884	33.9	1,476,684	38.9	1,694,484
24.0	1,045,440	29.0	1,263,240	34.0	1,481,040	39.0	1,698,840
24.1	1,049,796	29.1	1,267,596	34.1	1,485,396	39.1	1,703,196
24.2	1,054,152	29.2	1,271,952	34.2	1,489,752	39.2	1,707,552
24.3	1,058,508	29.3	1,276,308	34.3	1,494,108	39.3	1,711,908
24.4	1,062,864	29.4	1,280,664	34.4	1,498,464	39.4	1,716,264
24.5	1,067,220	29.5	1,285,020	34.5	1,502,820	39.5	1,720,620
24.6	1,071,576	29.6	1,289,376	34.6	1,507,176	39.6	1,724,976
24.7	1,075,932	29.7	1,293,732	34.7	1,511,532	39.7	1,729,332
24.8	1,080,288	29.8	1,298,088	34.8	1,515,888	39.8	1,733,688
24.9	1,084,644	29.9	1,302,444	34.9	1,520,244	39.9	1,738,044

**TABLE 24 — CONVERSION - ACRES TO SQUARE FEET
AND SQUARE FEET TO ACRES (Continued)**

40 to 59.9 ACRES				1,742,400 to 2,609,244 SQUARE FEET			
ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.
40.0	1,742,400	45.0	1,960,200	50.0	2,178,000	55.0	2,395,800
40.1	1,746,756	45.1	1,964,556	50.1	2,182,356	55.1	2,400,156
40.2	1,751,112	45.2	1,968,912	50.2	2,186,712	55.2	2,404,512
40.3	1,755,468	45.3	1,973,268	50.3	2,191,068	55.3	2,408,868
40.4	1,759,824	45.4	1,977,624	50.4	2,195,424	55.4	2,413,224
40.5	1,764,180	45.5	1,981,980	50.5	2,199,780	55.5	2,417,580
40.6	1,768,536	45.6	1,986,336	50.6	2,204,136	55.6	2,421,936
40.7	1,772,892	45.7	1,990,692	50.7	2,208,492	55.7	2,426,292
40.8	1,777,248	45.8	1,995,048	50.8	2,212,848	55.8	2,430,648
40.9	1,781,604	45.9	1,999,404	50.9	2,217,204	55.9	2,435,004
41.0	1,785,960	46.0	2,003,760	51.0	2,221,506	56.0	2,439,360
41.1	1,790,316	46.1	2,008,116	51.1	2,225,916	56.1	2,443,716
41.2	1,794,672	46.2	2,012,472	51.2	2,230,272	56.2	2,448,072
41.3	1,799,028	46.3	2,016,828	51.3	1,234,628	56.3	2,452,428
41.4	1,803,384	46.4	2,021,184	51.4	2,238,984	56.4	2,456,784
41.5	1,807,740	46.5	2,025,540	51.5	2,243,340	56.5	2,461,140
41.6	1,812,096	46.6	2,029,896	51.6	2,247,696	56.6	2,465,496
41.7	1,816,452	46.7	2,034,252	51.7	2,252,052	56.7	2,469,852
41.8	1,820,808	46.8	2,038,608	51.8	2,256,408	56.8	2,474,208
41.9	1,825,164	46.9	2,042,964	51.9	2,260,764	56.9	2,478,564
42.0	1,829,520	47.0	2,047,320	52.0	2,265,120	57.0	2,482,920
42.1	1,833,876	47.1	2,051,676	52.1	2,269,476	57.1	2,487,276
42.2	1,838,232	47.2	2,056,032	52.2	2,273,832	57.2	2,491,632
42.3	1,842,588	47.3	2,060,388	52.3	2,278,188	57.3	2,495,988
42.4	1,846,944	47.4	2,064,744	52.4	2,282,544	57.4	2,500,344
42.5	1,851,300	47.5	2,069,100	52.5	2,286,900	57.5	2,504,700
42.6	1,855,656	47.6	2,073,456	52.6	2,291,256	57.6	2,509,056
42.7	1,860,012	47.7	2,077,812	52.7	2,295,612	57.7	2,513,412
42.8	1,864,368	47.8	2,082,168	52.8	2,299,968	57.8	2,517,768
42.9	1,868,724	47.9	2,086,524	52.9	2,304,324	57.9	2,522,124
43.0	1,873,080	48.0	2,090,880	53.0	2,308,680	58.0	2,526,480
43.1	1,877,436	48.1	2,095,236	53.1	2,313,036	58.1	2,530,836
43.2	1,881,792	48.2	2,099,592	53.2	2,317,392	58.2	2,535,192
43.3	1,886,148	48.3	2,103,948	53.3	2,321,748	58.3	2,539,548
43.4	1,890,504	48.4	2,108,304	53.4	2,326,104	58.4	2,543,904
43.5	1,894,860	48.5	2,112,660	53.5	2,330,460	58.5	2,548,260
43.6	1,899,216	48.6	2,117,016	53.6	2,334,816	58.6	2,552,616
43.7	1,903,572	48.7	2,121,372	53.7	2,339,172	58.7	2,556,972
43.8	1,907,928	48.8	2,125,728	53.8	2,343,528	58.8	2,561,328
43.9	1,912,284	48.9	2,130,084	53.9	2,347,884	58.9	2,565,684
44.0	1,916,640	49.0	2,134,440	54.0	2,352,240	59.0	2,570,040
44.1	1,920,996	49.1	2,138,796	54.1	2,356,596	59.1	2,574,396
44.2	1,925,352	49.2	2,143,152	54.2	2,360,952	59.2	2,578,752
44.3	1,929,708	49.3	2,147,508	54.3	2,365,308	59.3	2,583,108
44.4	1,934,064	49.4	2,151,864	54.4	2,369,664	59.4	2,587,464
44.5	1,938,420	49.5	2,156,220	54.5	2,374,020	59.5	2,591,820
44.6	1,942,776	49.6	2,160,576	54.6	2,378,376	59.6	2,596,176
44.7	1,947,132	49.7	2,164,932	54.7	2,382,732	59.7	2,600,532
44.8	1,951,488	49.8	2,169,288	54.8	2,387,088	59.8	2,604,888
44.9	1,955,844	49.9	2,173,644	54.9	2,391,444	59.9	2,609,244

**TABLE 24 — CONVERSION - ACRES TO SQUARE FEET
AND SQUARE FEET TO ACRES (Continued)**

60 to 79.9 ACRES				2,613,600 to 3,480,444 SQUARE FEET			
ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.
60.0	2,613,600	65.0	2,831,400	70.0	3,049,200	75.0	3,267,000
60.1	2,617,956	65.1	2,835,756	70.1	3,053,556	75.1	3,271,356
60.2	2,622,312	65.2	2,840,112	70.2	3,057,912	75.2	3,275,712
60.3	2,626,668	65.3	2,844,468	70.3	3,062,268	75.3	3,280,068
60.4	2,631,024	65.4	2,848,824	70.4	3,066,624	75.4	3,284,424
60.5	2,635,380	65.5	2,853,180	70.5	3,070,980	75.5	3,288,780
60.6	2,639,736	65.6	2,857,536	70.6	3,075,336	75.6	3,293,136
60.7	2,644,092	65.7	2,861,892	70.7	3,079,692	75.7	3,297,492
60.8	2,648,448	65.8	2,866,248	70.8	3,084,048	75.8	3,301,848
60.9	2,652,804	65.9	2,870,604	70.9	3,088,404	75.9	3,306,204
61.0	2,657,160	66.0	2,874,960	71.0	3,092,760	76.0	3,310,560
61.1	2,661,516	66.1	2,879,316	71.1	3,097,116	76.1	3,314,916
61.2	2,665,872	66.2	2,883,672	71.2	3,101,472	76.2	3,319,272
61.3	2,670,228	66.3	2,888,028	71.3	3,105,828	76.3	3,323,628
61.4	2,674,584	66.4	2,892,384	71.4	3,110,184	76.4	3,327,984
61.5	2,678,940	66.5	2,896,740	71.5	3,114,540	76.5	3,332,340
61.6	2,683,296	66.6	2,901,096	71.6	3,118,896	76.6	3,336,696
61.7	2,687,652	66.7	2,905,452	71.7	3,123,252	76.7	3,341,052
61.8	2,692,008	66.8	2,909,808	71.8	3,127,608	76.8	3,345,408
61.9	2,696,364	66.9	2,914,164	71.9	3,131,964	76.9	3,349,764
62.0	2,700,720	67.0	2,918,520	72.0	3,136,320	77.0	3,354,120
62.1	2,705,076	67.1	2,922,876	72.1	3,140,676	77.1	3,358,476
62.2	2,709,432	67.2	2,927,232	72.2	3,145,032	77.2	3,362,832
62.3	2,713,788	67.3	2,931,588	72.3	3,149,388	77.3	3,367,188
62.4	2,718,144	67.4	2,935,944	72.4	3,153,744	77.4	3,371,544
62.5	2,722,500	67.5	2,940,300	72.5	3,158,100	77.5	3,375,900
62.6	2,726,856	67.6	2,944,656	72.6	3,162,456	77.6	3,380,256
62.7	2,731,212	67.7	2,949,012	72.7	3,166,812	77.7	3,384,612
62.8	2,735,568	67.8	2,953,368	72.8	3,171,168	77.8	3,388,968
62.9	2,739,924	67.9	2,957,724	72.9	3,175,524	77.9	3,393,324
63.0	2,744,280	68.0	2,962,080	73.0	3,179,880	78.0	3,397,680
63.1	2,748,636	68.1	2,966,436	73.1	3,184,236	78.1	3,402,036
63.2	2,752,992	68.2	2,970,792	73.2	3,188,592	78.2	3,406,392
63.3	2,757,348	68.3	2,975,148	73.3	3,192,948	78.3	3,410,748
63.4	2,761,704	68.4	2,979,504	73.4	3,197,304	78.4	3,415,104
63.5	2,766,060	68.5	2,983,860	73.5	3,201,660	78.5	3,419,460
63.6	2,770,416	68.6	2,988,216	73.6	3,206,016	78.6	3,423,816
63.7	2,774,772	68.7	2,992,572	73.7	3,210,372	78.7	3,428,172
63.8	2,779,128	68.8	2,996,928	73.8	3,214,728	78.8	3,432,528
63.9	2,783,484	68.9	3,001,284	73.9	3,219,084	78.9	3,436,884
64.0	2,787,840	69.0	3,005,640	74.0	3,223,440	79.0	3,441,240
64.1	2,792,196	69.1	3,009,996	74.1	3,227,796	79.1	3,445,596
64.2	2,796,552	69.2	3,014,352	74.2	3,232,152	79.2	3,449,952
64.3	2,800,908	69.3	3,018,708	74.3	3,236,508	79.3	3,454,308
64.4	2,805,264	69.4	3,023,064	74.4	3,240,864	79.4	3,458,664
64.5	2,809,620	69.5	3,027,420	74.5	3,245,220	79.5	3,463,020
64.6	2,813,976	69.6	3,031,776	74.6	3,249,576	79.6	3,467,376
64.7	2,818,332	69.7	3,036,132	74.7	3,253,932	79.7	3,471,732
64.8	2,822,688	69.8	3,040,488	74.8	3,258,288	79.8	3,476,088
64.9	2,827,044	69.9	3,044,844	74.9	3,262,644	79.9	3,480,444

**TABLE 24 — CONVERSION - ACRES TO SQUARE FEET
AND SQUARE FEET TO ACRES (Continued)**

80 to 99.9 ACRES				3,484,800 to 4,351,644 SQUARE FEET			
ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.	ACRES	SQ. FT.
80.0	3,484,800	85.0	3,702,600	90.0	3,920,400	95.0	4,138,200
80.1	3,489,156	85.1	3,706,956	90.1	3,924,756	95.1	4,142,556
80.2	3,493,512	85.2	3,711,312	90.2	3,929,112	95.2	4,146,912
80.3	3,497,868	85.3	3,715,668	90.3	3,933,468	95.3	4,151,268
80.4	3,502,224	85.4	3,720,024	90.4	3,937,824	95.4	4,155,624
80.5	3,506,580	85.5	3,724,380	90.5	3,942,180	95.5	4,159,980
80.6	3,510,936	85.6	3,728,736	90.6	3,946,536	95.6	4,164,336
80.7	3,515,292	85.7	3,733,092	90.7	3,950,892	95.7	4,168,692
80.8	3,519,648	85.8	3,737,448	90.8	3,955,248	95.8	4,173,048
80.9	3,524,004	85.9	3,741,804	90.9	3,959,604	95.9	4,177,404
81.0	3,528,360	86.0	3,746,160	91.0	3,963,960	96.0	4,181,760
81.1	3,532,716	86.1	3,750,516	91.1	3,968,316	96.1	4,186,116
81.2	3,537,072	86.2	3,754,872	91.2	3,972,672	96.2	4,190,472
81.3	3,541,428	86.3	3,759,228	91.3	3,977,028	96.3	4,194,828
81.4	3,545,784	86.4	3,763,584	91.4	3,981,384	96.4	4,199,184
81.5	3,550,140	86.5	3,767,940	91.5	3,985,740	96.5	4,203,540
81.6	3,554,496	86.6	3,772,296	91.6	3,990,096	96.6	4,207,896
81.7	3,558,852	86.7	3,776,652	91.7	3,994,452	96.7	4,212,252
81.8	3,563,208	86.8	3,781,008	91.8	3,998,808	96.8	4,216,608
81.9	3,567,564	86.9	3,785,364	91.9	4,003,164	96.9	4,220,964
82.0	3,571,920	87.0	3,789,720	92.0	4,007,520	97.0	4,225,320
82.1	3,576,276	87.1	3,794,076	92.1	4,011,876	97.1	4,229,676
82.2	3,580,632	87.2	3,798,432	92.2	4,016,232	97.2	4,234,032
82.3	3,584,988	87.3	3,802,788	92.3	4,020,588	97.3	4,238,388
82.4	3,589,344	87.4	3,807,144	92.4	4,024,944	97.4	4,242,744
82.5	3,593,700	87.5	3,811,500	92.5	4,029,300	97.5	4,247,100
82.6	3,598,056	87.6	3,815,856	92.6	4,033,656	97.6	4,251,456
82.7	3,602,412	87.7	3,820,212	92.7	4,038,012	97.7	4,255,812
82.8	3,606,768	87.8	3,824,568	92.8	4,042,368	97.8	4,260,168
82.9	3,611,124	87.9	3,828,924	92.9	4,046,724	97.9	4,264,524
83.0	3,615,480	88.0	3,833,280	93.0	4,051,030	98.0	4,268,880
83.1	3,619,836	88.1	3,837,636	93.1	4,055,436	98.1	4,273,236
83.2	3,624,192	88.2	3,841,992	93.2	4,059,792	98.2	4,277,592
83.3	3,628,548	88.3	3,846,348	93.3	4,064,148	98.3	4,281,948
83.4	3,632,904	88.4	3,850,704	93.4	4,068,504	98.4	4,286,304
83.5	3,637,260	88.5	3,855,060	93.5	4,072,860	98.5	4,290,660
83.6	3,641,616	88.6	3,859,412	93.6	4,077,216	98.6	4,295,016
83.7	3,645,972	88.7	3,863,772	93.7	4,081,572	98.7	4,299,372
83.8	3,650,328	88.8	3,868,123	93.8	4,085,928	98.8	4,303,728
83.9	3,654,684	88.9	3,872,434	93.9	4,090,284	98.9	4,308,084
84.0	3,659,040	89.0	3,876,840	94.0	4,094,640	99.0	4,312,440
84.1	3,663,396	89.1	3,881,196	94.1	4,098,996	99.1	4,316,796
84.2	3,667,752	89.2	3,835,552	94.2	4,103,352	99.2	4,321,152
84.3	3,672,108	89.3	3,889,908	94.3	4,107,708	99.3	4,325,508
84.4	3,676,464	89.4	3,894,264	94.4	4,112,064	99.4	4,329,864
84.5	3,680,820	89.5	3,898,620	94.5	4,116,420	99.5	4,334,220
84.6	3,685,176	89.6	3,902,976	94.6	4,120,776	99.6	4,338,576
84.7	3,689,532	89.7	3,907,332	94.7	4,125,132	99.7	4,342,932
84.8	3,693,888	89.8	3,911,688	94.8	4,129,488	99.8	4,347,288
84.9	3,698,244	89.9	3,916,044	94.9	4,133,844	99.9	4,351,644

TABLE 25 — RIGHT-OF-WAY ACREAGES

ACRES PER VARIOUS WIDTHS AND LENGTHS OF RIGHT-OF-WAY

R/W WIDTH	PER 100 FT.	PER 1/4 MI. 1320'	PER 1/2 MI. 2640'	P ER I MI. 5280'
5	0.012	0.152	0.303	0.606
10	0.023	0.303	0.606	1.212
15	0.034	0.454	0.909	1.818
20	0.046	0.606	1.212	2.424
25	0.057	0.758	1.515	3.030
30	0.069	0.909	1.818	3.636
35	0.080	1.061	2.121	4.242
40	0.092	1.212	2.424	4.848
45	0.103	1.364	2.727	5.454
50	0.114	1.515	3.030	6.060
55	0.126	1.667	3.333	6.667
60	0.138	1.818	3.636	7.273
65	0.149	1.970	3.939	7.879
70	0.161	2.121	4.242	8.485
75	0.172	2.273	4.545	9.091
80	0.184	2.424	4.848	9.697
85	0.195	2.576	5.152	10.303
90	0.207	2.727	5.454	10.909
95	0.218	2.879	5.758	11.515
100	0.230	3.030	6.061	12.121
105	0.241	3.182	6.364	12.727
110	0.252	3.333	6.667	13.333
115	0.264	3.485	6.970	13.939
120	0.275	3.636	7.273	14.545
125	0.287	3.788	7.576	15.152
130	0.298	3.939	7.879	15.758
135	0.310	4.091	8.182	16.364
140	0.321	4.242	8.485	16.970
145	0.333	4.394	8.788	17.576
150	0.344	4.545	9.091	18.182

MISCELLANEOUS R/W ACREAGES

R/W WIDTH	RIGHT-OF-WAY LENGTH									
	40'	50'	60'	70'	80'	90'	100'	200'	300'	400'
6'	.01	.01	.01	.01	.01	.01	.01	.03	.04	.06
11'	.01	.01	.02	.02	.02	.02	.02	.05	.08	.10
12'	.01	.01	.02	.02	.02	.02	.03	.06	.08	.11
16'	.02	.02	.02	.03	.03	.03	.04	.07	.11	.15
18'	.02	.02	.02	.03	.03	.04	.04	.08	.12	.16
24'	.02	.03	.03	.04	.04	.05	.06	.11	.16	.22

TABLE 26 — RIGHT-OF-WAY ACREAGES

ACRES PER TENTH OF HUNDRED FOOT STATIONS

		WIDTHS									
		10'	20'	30'	40'	50'	60'	70'	80'	90'	100'
Lengths in Tenths	0.1	.002	.005	.01	.01	.01	.01	.02	.02	.02	.02
	0.2	.005	.01	.02	.02	.02	.03	.04	.04	.04	.02
	0.3	.01	.01	.02	.03	.04	.04	.05	.06	.06	.05
	0.4	.01	.02	.03	.04	.05	.06	.06	.07	.08	.09
	0.5	.01	.02	.03	.05	.06	.07	.08	.09	.10	.12
	0.6	.01	.03	.04	.06	.07	.08	.10	.11	.12	.14
	0.7	.02	.03	.05	.07	.08	.10	.11	.13	.15	.16
	0.8	.02	.04	.06	.07	.09	.11	.13	.15	.17	.18
	0.9	.02	.04	.06	.08	.10	.12	.15	.17	.19	.21
	1.0	.02	.05	.07	.09	.12	.14	.16	.18	.21	.23

ACRES PER HUNDRED FOOT STATIONS

		WIDTHS									
		10'	20'	30'	40'	50'	60'	70'	80'	90'	100'
Lengths in Hundred Feet	1.0	.02	.05	.07	.09	.12	.14	.16	.18	.21	.23
	2.0	.05	.09	.14	.18	.23	.28	.32	.39	.41	.46
	3.0	.07	.14	.21	.28	.35	.41	.48	.55	.62	.69
	4.0	.09	.18	.28	.36	.46	.55	.64	.74	.83	.92
	5.0	.12	.23	.35	.46	.58	.69	.81	.92	1.04	1.15
	6.0	.14	.28	.41	.55	.69	.83	.97	1.10	.24	1.38
	7.0	.16	.32	.48	.65	.81	.97	1.13	1.29	1.45	1.61
	8.0	.18	.39	.56	.74	.92	1.10	1.29	1.47	1.66	1.84
	9.0	.21	.41	.62	.83	1.04	1.24	1.45	1.66	1.86	2.07
	10.0	.23	.46	.70	.92	1.15	1.38	1.61	1.84	2.07	2.30

See Table 25 for acreages of various widths and lengths of right-of-way.

TABLE 27 — STANDARD HIGHWAY SPIRAL

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a = 0.1

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
10	0°00.6'	0°00.03'	5.00	0.00	10.00'	0.00'	10.00'	6.67'	3.13'
20	0°01.2'	0°00.12'	10.00	0.00	20.00	0.00	20.00	13.33	6.67
30	0°01.8'	0°00.27'	15.00	0.00	30.00	0.00	30.00	20.00	10.00
40	0°02.4'	0°00.48'	20.00	0.00	40.00	0.00	40.00	26.67	13.33
50	0°03.0'	0°00.75'	25.00	0.00	50.00	0.00	50.00	33.33	16.67
60	0°03.6'	0°01.08'	30.00	0.00	60.00	0.01	60.00	40.00	20.00
70	0°04.2'	0°01.47'	35.00	0.00	70.00	0.01	70.00	46.67	23.33
80	0°04.8'	0°01.92'	40.00	0.00	80.00	0.01	80.00	53.33	26.67
90	0°05.4'	0°02.43'	45.00	0.00	90.00	0.02	90.00	60.00	30.00
100	0°06.0'	0°03.00'	50.00	0.01	100.00	0.03	100.00	66.67	33.33
110	0°06.6'	0°03.63'	55.00	0.01	110.00	0.04	110.00	73.33	36.67
120	0°07.2'	0°04.32'	60.00	0.01	120.00	0.05	120.00	80.00	40.00
130	0°07.8'	0°05.07'	65.00	0.02	130.00	0.06	130.00	86.67	43.33
140	0°08.4'	0°05.88'	70.00	0.02	140.00	0.08	140.00	93.33	46.67
150	0°09.0'	0°06.75'	75.00	0.02	150.00	0.10	150.00	100.00	50.00
160	0°09.6'	0°07.68'	80.00	0.03	160.00	0.12	160.00	106.67	53.33
170	0°10.2'	0°08.67'	85.00	0.04	170.00	0.14	170.00	113.33	56.61
180	0°10.8'	0°09.72'	90.00	0.04	180.00	0.17	180.00	120.00	60.00
190	0°11.4'	0°10.83'	95.00	0.05	190.00	0.20	190.00	126.67	63.33
200	0°12.0'	0°12.00'	100.00	0.06	200.00	0.23	200.00	133.33	66.67
210	0°12.6'	0°13.23'	105.00	0.07	210.00	0.27	210.00	140.00	70.00
220	0°13.2'	0°14.52'	110.00	0.08	220.00	0.31	220.00	146.67	73.33
230	0°13.8'	0°15.87'	115.00	0.09	230.00	0.35	230.00	153.33	76.67
240	0°14.4'	0°17.28'	120.00	0.10	240.00	0.40	240.00	160.00	80.00
250	0°15.0'	0°18.75'	125.00	0.11	250.00	0.45	250.00	166.67	83.33
260	0°15.6'	0°20.28'	130.00	0.13	260.00	0.51	260.00	173.33	86.67
270	0°16.2'	0°21.87'	135.00	0.14	270.00	0.57	270.00	180.00	90.00
280	0°16.8'	0°23.52'	140.00	0.16	280.00	0.64	280.00	186.67	93.33
290	0°17.4'	0°25.23'	145.00	0.18	290.00	0.71	290.00	193.33	96.67
300	0°18.0'	0°27.00'	150.00	0.20	300.00	0.79	300.00	200.00	100.00
310	0°18.6'	0°28.83'	155.00	0.22	310.00	0.87	310.00	206.67	103.33
320	0°19.2'	0°30.72'	160.00	0.24	320.00	0.95	320.00	213.33	106.67
330	0°19.8'	0°32.67'	165.00	0.26	330.00	1.05	330.00	220.00	110.00
340	0°20.4'	0°34.68'	170.00	0.29	340.00	1.14	340.00	226.67	113.33
350	0°21.0'	0°36.75'	175.00	0.31	350.00	1.25	350.00	233.33	116.67
360	0°21.6'	0°38.88'	180.00	0.34	360.00	1.36	360.00	240.00	120.00
370	0°22.2'	0°41.07'	185.00	0.37	369.99	1.47	370.00	246.67	123.34
380	0°22.8'	0°43.32'	190.00	0.40	379.99	1.60	380.00	253.34	126.67
390	0°23.4'	0°45.63'	195.00	0.43	389.99	1.73	390.00	260.00	130.00
400	0°24.0'	0°48.00	200.00	0.47	399.99	1.86	400.00	266.67	133.34
410	0°24.6'	0°50.43'	205.00	0.50	409.99	2.00	410.00	273.34	136.67
420	0°25.2'	0°52.92'	210.00	0.54	419.99	2.16	420.00	280.00	140.00
430	0°25.8'	0°55.47'	215.00	0.58	429.99	2.31	430.00	286.67	143.34
440	0°26.4'	0°58.08'	220.00	0.62	439.99	2.48	439.99	293.34	146.67
450	0°27.0'	1°00.75'	225.10	0.66	449.99	2.65	449.99	300.00	150.00
460	0°27.6'	1°03.48'	230.00	0.71	459.98	2.83	459.99	306.67	153.34
470	0°28.2'	1°06.27'	235.00	0.75	469.98	3.02	469.99	313.34	156.67
480	0°28.8'	1°09.12'	240.00	0.80	479.98	3.22	479.99	320.01	160.01
490	0°29.4'	1°12.03'	245.00	0.86	489.98	3.42	489.99	326.67	163.34
500	0°30.0'	1°15.00'	250.00	0.91	499.98	3.64	499.99	333.34	166.67
See Appendix for spiral curve nomenclature									

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.1

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
510	0°30.6'	1°18.03'	255.00'	0.96'	509.97'	3.86'	509.99'	340.01'	170.01'
520	0°31.2'	1°21.12'	260.00	1.02	519.97	4.09	519.99	346.68	173.34
530	0°31.8'	1°24.27'	264.99	1.08	529.97	4.33	529.99	353.34	176.68
540	0°32.4'	1°27.48'	269.99	1.15	539.97	4.58	539.98	360.01	180.01
550	0°33.0'	1°30.75'	274.99	1.21	549.96	4.84	549.98	366.68	183.35
560	0°33.6'	1°34.08'	279.99	1.28	559.96	5.11	559.98	373.35	186.68
570	0°34.2'	1°37.47'	284.99	1.35	569.95	5.39	569.98	380.02	190.01
580	0°34.8'	1°40.92'	289.99	1.42	579.95	5.68	579.98	386.68	193.35
590	0°35.4'	1°44.43'	294.99	1.49	589.95	5.97	589.98	393.35	196.68
600	0°36.0'	1°48.00'	299.99	1.57	599.94	6.28	599.97	400.02	200.02
610	0°36.6'	1°51.63'	304.99	1.65	609.94	6.60	609.97	406.69	203.35
620	0°37.2'	1°55.32'	309.99	1.73	619.93	6.93	619.97	413.36	206.69
630	0°37.8'	1°59.07'	314.99	1.82	629.92	7.27	629.97	420.03	210.02
640	0°38.4'	2°02.88'	319.99	1.91	639.92	7.62	639.96	426.70	213.36
650	0°39.0'	2°06.75'	324.99	2.00	649.91	7.99	649.96	433.36	216.69
660	0°39.6'	2°10.68'	329.98	2.09	659.90	8.36	659.96	440.03	220.03
670	0°40.2'	2°14.67'	334.98	2.19	669.90	8.75	669.95	446.70	223.37
680	0°40.8'	2°18.72'	339.98	2.29	679.89	9.15	679.95	453.37	226.70
690	0°41.4'	2°22.83'	344.98	2.39	689.88	9.55	689.95	460.04	230.04
700	0°42.0'	2°27.00'	349.98	2.49	699.87	9.98	699.94	466.71	233.37
710	0°42.6'	2°31.23'	354.98	2.60	709.86	10.41	709.94	473.38	236.71
720	0°43.2'	2°35.52'	359.98	2.71	719.85	10.86	719.93	480.05	240.05
730	0°43.8'	2°39.87'	364.97	2.83	729.84	11.31	729.93	486.72	243.38
740	0°44.4'	2°44.28'	369.97	2.95	739.83	11.79	739.92	493.39	246.72
750	0°45.0'	2°48.75'	374.97	3.07	749.82	12.27	749.92	500.06	250.06
760	0°45.6'	2°53.26'	379.97	3.19	759.81	12.77	759.91	506.73	253.39
770	0°46.2'	2°57.87'	384.97	3.32	769.79	13.28	769.91	513.41	256.73
780	0°46.8'	3°02.52'	389.96	3.45	779.78	13.80	779.90	520.08	260.07
790	0°47.4'	3°07.23'	394.96	3.59	789.77	14.34	789.90	526.75	263.41
800	0°48.0'	3°12.00'	399.96	3.72	799.75	14.89	799.89	533.42	266.75
810	0°48.6'	3°16.85'	404.96	3.86	809.73	15.46	809.88	540.09	270.08
820	0°49.2'	3°21.72'	409.95	4.01	819.72	16.03	819.87	546.77	273.42
830	0°49.8'	3°26.67'	414.95	4.16	829.70	16.63	829.87	553.44	276.76
840	0°50.4'	3°31.68'	419.95	4.31	839.68	17.24	839.86	560.11	280.10
850	0°51.0'	3°36.75'	424.94	4.47	849.66	17.86	849.85	566.78	283.44
860	0°51.6'	3°41.88'	429.94	4.62	859.64	18.50	859.84	573.46	286.78
870	0°52.2'	3°47.07	434.94	4.79	869.62	19.15	869.83	580.13	290.12
880	0°52.8'	3°52.32'	439.93	4.95	879.60	19.82	879.82	586.81	293.46
890	0°53.4'	3°57.63'	444.93	5.13	889.57	20.50	889.81	593.48	296.80
900	0°54.0'	4°03.00'	449.93	5.30	899.55	21.20	899.80	600.16	300.14
910	0°54.6'	4°08.43'	454.92	5.48	909.52	21.91	909.79	606.83	303.48
920	0°55.2'	4°13.92'	459.92	5.66	919.50	22.64	919.78	613.51	306.83
930	0°55.8'	4°19.47'	464.91	5.85	929.47	23.39	929.76	620.19	310.17
940	0°56.4'	4°25.08'	469.91	6.04	939.44	24.15	939.75	626.86	313.51
950	0°57.0'	4°30.75'	474.90	6.23	949.41	24.93	949.74	633.54	316.85
960	0°57.6'	4°36.48'	479.90	6.43	959.38	25.72	959.72	640.22	320.20
970	0°58.2'	4°42.27'	484.89	6.64	969.35	26.54	969.71	646.90	323.54
980	0°58.8'	4°48.12'	489.89	6.84	979.31	27.36	979.69	653.57	326.89
990	0°59.4'	4°54.03'	494.88	7.05	989.28	28.21	989.68	660.25	330.23
1000	1°00.0'	5°00.00'	499.87	7.27	999.24	29.07	999.66	666.93	333.58

See Appendix for graphic illustration of spiral curve elements

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.2

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
10	0°01.2'	0°00.06'	5.00	0.00	10.00	0.00	10.00	6.67	3.33
20	0°02.4'	0°00.24'	10.00	0.00	20.00	0.00	20.00	13.33	6.67
30	0°03.6'	0°00.54'	15.00	0.00	30.00	0.00	30.00	20.00	10.00
40	0°04.8'	0°00.96'	20.00	0.00	40.00	0.00	40.00	26.67	13.33
so	0°06.0'	0°01.50'	25.00	0.00	50.00	0.01	50.00	33.33	16.67
60	0°07.2'	0°02.16'	30.00	0.00	60.00	0.01	60.00	40.00	20.00
70	0°08.4'	0°02.94'	35.00	0.00	70.00	0.02	70.00	46.67	23.33
80	0°09.6'	0°03.84'	40.00	0.01	80.00	0.03	80.00	53.33	26.67
90	0°10.8'	0°04.86'	45.00	0.01	90.00	0.04	90.00	60.00	30.00
100	0°12.0'	0°06.00'	50.00	0.01	100.00	0.06	100.00	66.67	33.33
110	0°13.2'	0°07.26'	55.00	0.02	110.00	0.08	110.00	73.33	36.67
120	0°14.4'	0°08.64'	60.00	0.03	120.00	0.10	120.00	80.00	40.00
130	0°15.6'	0°10.14'	65.00	0.03	130.00	0.13	130.00	86.67	43.33
140	0°16.8'	0°11.76'	70.00	0.04	140.00	0.16	140.00	93.33	46.67
156	0°18.0'	0°13.50'	75.00	0.05	150.00	0.20	150.00	100.00	50.00
160	0° 19.2'	0°153.6'	80.00	0.06	160.00	0.24	160.00	106.67	53.33
170	0°20.4'	0°17.34'	85.00	0.07	170.00	0.29	170.00	113.33	56.67
180	0°21.6'	0°19.44'	90.00	0.08	180.00	0.34	180.00	120.00	60.00
190	0°22.8'	0° 21.66'	95.00	0.10	190.00	0.40	190.00	126.67	63.33
200	0°24.0'	0° 24.00'	100.00	0.12	200.00	0.47	200.00	133.33	66.67
210	0°25.2'	0°26.46'	105.00	0.13	210.00	0.54	210.00	140.00	70.00
220	0°26.4'	0°29.04'	110.00	0.15	220.00	0.62	220.00	146.67	73.33
230	0°27.6'	0°31.74'	115.00	0.18	230.00	0.71	230.00	153.33	76.67
240	0°28.8'	0°34.56'	120.00	0.20	240.00	0.80	240.00	160.00	80.00
250	0°30.0'	0°37.50'	125.00	0.23	250.00	0.91	250.00	166.67	83.33
260	0°31.2'	0°40.56'	130.00	0.26	260.00	1.02	260.00	173.33	86.67
270,	0°32.4'	0°43.74'	135.00	0.29	270.00	1.15	270.00	180.00	90.00
280	0°33.6'	0°47.04'	140.00	0.32	279.99	1.28	280.00	186.67	93.34
290	0°34.8'	0°50.46'	145.00	0.35	289.99	1.42	290.00	193.34	96.67
300	0°36.0'	0°54.00'	150.00	0.39	299.99	1.57	300.00	200.00	100.00
310	0°37.2'	0°57.66'	155.00	0.43	309.99	1.73	310.00	206.67	103.34
320	0°38.4'	1°01.44'	160.00	0.48	319.99	1.91	320.00	213.34	106.67
330	0°39.6'	1°05.34'	165.00	0.52	329.99	2.09	329.99	220.00	110.00
340	0°40.8'	1°09.36'	170.00	0.57	339.99	2.29	339.99	226.67	113.34
350	0°42.0'	1°13.50'	175.00	0.62	349.98	2.49	349.99	233.34	116.67
360	0°43.2'	1°17.76'	180.00	0.68	359.98	2.71	359.99	240.01	120.01
370	0°44.4'	1°22.14'	185.00	0.74	369.98	2.95	369.99	246.67	123.34
380	0°45.6'	1°26.64'	190.00	0.80	379.98	3.19	379.99	253.34	126.67
390	0°46.8'	1°31.26'	195.00	0.86	389.97	3.45	389.99	260.01	130.01
400	0°48.0'	1°36.00'	199.99	0.93	399.97	3.72	399.99	266.68	133.34
410	0°49.2'	1°40.86'	204.99	1.00	409.96	4.01	409.98	273.35	136.68
420	0°50.4'	1°45.84'	209.99	1.08	419.96	4.31	419.98	280.01	140.01
430	0°51.6'	1°50.94'	214.99	1.16	429.96	4.63	429.98	286.68	143.35
440	0°52.8'	1°56.16'	219.99	1.24	439.95	4.96	439.98	293.35	146.68
450	0°54.0'	2°01.50'	224.99	1.33	449.94	5.30	449.98	300.02	150.02
460	0°55.2'	2°06.96'	229.99	1.42	439.94	5.66	459.97	306.69	153.35
470	0°56.4'	2°12.54'	234.99	1.51	469.93	6.04	469.97	313.36	156.69
480	0°57.6'	2°18.24'	239.99	1.61	479.92	6.43	479.97	320.03	160.02
490	0°58.8'	2°24.06'	244.99	1.71	489.91	6.84	489.96	226.70	163.36
500	1°00.0'	2°30.00'	249.98	1.82	499.90	7.27	499.96	333.37	166.70

See Appendix for spiral curve nomenclature

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.2

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
510	1°01.2'	2°36.06'	254.98	1.93	509.89	7.72	509.95	340.04	170.03
520	1°02.4'	2°42.24'	259.98	2.04	519.88	8.18	519.95	346.71	173.37
530	1°03.6'	2°48.54'	264.98	2.17	529.87	8.66	529.94	353.38	176.71
540	1°04.8'	2°54.96'	269.98	2.29	539.86	9.16	539.94	360.05	180.04
550	1°06.0'	3°01.50'	274.97	2.42	549.85	9.68	549.93	366.72	183.38
560	1°07.2'	3°08.16'	279.97	2.55	559.83	10.21	559.93	373.39	186.72
570	1°08.4'	3°14.94'	284.97	2.69	569.82	10.77	569.92	380.06	190.06
580	1°09.6'	3°21.84'	289.97	2.84	579.80	11.35	579.91	386.74	193.40
590	1°10.8'	3°28.86'	294.96	2.99	589.78	11.95	589.90	393.41	196.74
600	1°12.0'	3°36.00'	299.96	3.14	599.76	12.56	599.89	400.08	200.08
610	1°13.2'	3°43.26'	304.96	3.30	609.74	13.20	609.89	406.76	203.42
620	1°14.4'	3°50.64'	309.95	3.47	610.72	13.86	619.88	413.43	206.76
630	1°15.6'	3°58.14'	314.95	3.64	629.70	14.54	629.87	420.11	210.10
640	1°16.8'	4°05.76'	319.95	3.81	639.67	15.25	639.85	426.78	213.44
650	1°18.0'	4°13.50'	324.94	3.99	649.65	15.97	649.84	433.46	216.78
660	1°19.2'	4°21.36'	329.94	4.18	659.62	16.72	659.83	440.13	220.12
670	1°20.4'	4°29.34'	334.93	4.37	669.59	17.49	669.82	446.81	223.46
680	1°21.6'	4°37.44'	339.93	4.57	679.56	18.28	679.80	453.49	226.81
690	1°22.8'	4°45.66'	344.92	4.78	689.52	19.10	689.79	460.17	230.15
700	1°24.0'	4°54.00'	349.91	4.99	699.49	19.94	699.77	466.85	233.50
710	1°25.2'	5°02.46'	354.91	5.20	709.45	20.81	709.76	473.53	236.84
720	1°26.4'	5°11.04'	359.90	5.43	719.41	21.70	719.74	480.21	240.19
730	1°27.6'	5°19.74'	364.89	5.66	729.37	22.62	729.72	486.89	243.53
740	1°28.8'	5°28.56'	369.89	5.89	739.32	23.56	739.70	493.57	246.88
750	1°30.0'	5°37.50'	374.88	6.13	749.28	24.53	749.68	500.25	250.23
760	1°31.2'	5°46.56'	379.87	6.38	759.23	25.52	759.66	506.94	253.58
770	1°32.4'	5°55.74'	384.86	6.64	769.18	26.54	769.63	513.62	256.93
780	1°33.6'	6°05.04'	389.85	6.90	779.12	27.59	779.61	520.31	260.28
790	1°34.8'	6°14.46'	394.84	7.17	789.06	28.66	789.58	526.99	263.63
800	1°36.0'	6°24.00'	399.83	7.44	799.00	29.76	799.56	533.68	266.98
810	1°37.2'	6°33.66'	404.82	7.73	808.94	30.89	809.53	540.37	270.34
920	1°38.4'	6°43.44'	409.81	8.02	818.87	32.05	819.50	547.06	273.69
830	1°39.6'	6°53.34'	414.80	8.31	828.80	33.23	829.47	553.75	277.05
840	1°40.8'	7°03.36'	419.79	8.62	838.73	34.44	839.43	560.45	280.41
850	1°42.0'	7°13.50'	424.77	8.93	848.65	35.69	849.40	567.14	283.76
860	1°43.2'	7°23.76'	429.76	9.25	858.57	36.96	859.36	573.83	287.12
870	1°44.4'	7°34.14'	434.75	9.57	868.48	38.26	869.33	580.53	290.48
880	1°45.6'	7°44.64'	439.73	9.91	878.39	39.59	879.29	587.23	293.84
890	1°46.8'	7°55.26'	444.72	10.25	888.30	40.96	889.24	593.93	297.21
900	1°48.0'	8°06.00'	449.70	10.60	898.20	42.35	899.20	600.63	300.57
910	1°49.2'	8°16.86'	454.68	10.95	908.10	43.78	909.16	607.33	303.94
920	1°50.4'	8°27.84'	459.67	11.32	917.99	45.23	919.11	614.04	307.31
930	1°51.6'	8°38.94'	464.65	11.69	927.88	46.72	929.06	620.74	310.67
940	1°52.8'	8°50.16'	469.63	12.07	937.77	48.24	939.01	627.45	314.04
950	1°54.0'	9°01.50'	474.61	12.46	947.65	49.79	948.95	634.16	317.42
960	1°55.2'	9°12.96'	479.59	12.86	957.52	51.38	958.90	640.87	320.79
970	1°56.4'	9°24.54'	484.56	13.26	967.39	52.99	968.84	647.58	324.17
980	1°57.6'	9°36.24'	489.54	13.68	977.25	54.65	978.78	654.30	327.54
990	1°58.8'	9°48.06'	494.52	14.10	987.11	56.33	988.71	661.01	330.92
1000	2°00.0'	10°00.00'	499.49	14.53	996.96	58.05	998.65	667.73	334.30
See Appendix for graphic illustration of spiral curve elements									

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.25

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
10	0°01.5'	0°00.08'	5.00	0.00	10.00	0.00	10.00	6.67	3.33
20	0°03.0'	0°00.30'	10.00	0.00	20.00	0.00	20.00	13.33	6.67
30	0°04.5'	0°00.68'	15.00	0.00	30.00	0.00	30.00	20.00	10.00
40	0°06.0'	0°01.20'	20.00	0.00	40.00	0.00	40.00	26.67	13.33
50	0°07.5'	0°01.88'	25.00	0.00	50.00	0.01	50.00	33.33	16.67
60	0°09.0'	0°02.70'	30.00	0.00	60.00	0.02	60.00	40.00	20.00
70	0°10.5'	0°03.68'	35.00	0.01	70.00	0.02	70.00	46.67	23.33
80	0°12.0'	0°04.80'	40.00	0.01	80.00	0.04	80.00	53.33	26.67
90	0°13.5'	0°06.08'	45.00	0.01	90.00	0.05	90.00	60.00	30.00
100	0°15.0'	0°07.50'	50.00	0.02	100.00	0.07	100.00	66.67	33.33
110	0°16.5'	0°09.08'	55.00	0.02	110.00	0.10	110.00	73.33	36.67
120	0°18.0'	0°10.80'	60.00	0.03	120.00	0.13	120.00	80.00	40.00
130	0°19.5'	0°12.68'	65.00	0.04	130.00	0.16	130.00	86.67	43.33
140	0°21.0'	0°14.70'	70.00	0.05	140.00	0.20	140.00	93.33	46.67
150	0°22.5'	0°16.88'	75.00	0.06	150.00	0.25	150.00	100.00	50.00
160	0°24.0'	0°19.20'	80.00	0.07	160.00	0.30	160.00	106.67	53.33
170	0°25.5'	0°21.68'	85.00	0.09	170.00	0.36	170.00	113.33	56.67
180	0°27.0'	0°24.30'	90.00	0.11	180.00	0.42	180.00	120.00	60.00
190	0°28.5'	0°27.08'	95.00	0.12	190.00	0.50	190.00	126.67	63.33
200	0°30.0'	0°30.00'	100.00	0.15	200.00	0.58	200.00	133.33	66.67
210	0°31.5'	0°33.08'	105.00	0.17	210.00	0.67	210.00	140.00	70.00
220	0°33.0'	0°36.30'	110.00	0.19	220.00	0.77	220.00	146.67	73.33
230	0°34.5'	0°39.68'	115.00	0.22	230.00	0.88	230.00	153.33	76.67
240	0°36.0'	0°43.20	120.00	0.25	240.00	1.01	240.00	160.00	80.00
250	0°37.5'	0°46.88'	125.00	0.28	250.00	1.14	250.00	166.67	83.33
260	0°39.0'	0°50.70'	130.00	0.32	259.99	1.28	260.00	173.34	86.67
270	0°40.5'	0°54.68'	135.00	0.36	269.99	1.43	270.00	180.00	90.00
280	0°42.0'	0°58.80'	140.00	0.40	279.99	1.60	280.00	186.67	93.34
290	0°43.5'	1°03.08'	145.00	0.44	289.99	1.77	290.00	193.34	96.67
300	0°45.0'	1°07.50'	150.00	0.49	299.99	1.96	299.99	200.00	100.00
310	0°46.5'	1°12.08'	155.00	0.54	309.99	2.17	309.99	206.67	103.34
320	0°48.0'	1°16.80'	160.00	0.60	319.98	2.38	319.99	213.34	106.67
330	0°49.5'	1°21.68'	165.00	0.65	329.98	2.61	329.99	220.01	110.01
340	0°51.0'	1°26.70'	170.00	0.71	339.98	2.86	339.99	226.67	113.34
350	0°52.5'	1°31.88'	175.00	0.78	349.97	3.12	349.99	233.34	116.67
360	0°54.0'	1°37.20'	180.00	0.85	359.97	3.39	359.99	240.01	120.01
370	0°55.5'	1°42.68'	184.99	0.92	369.97	3.68	369.99	246.68	123.34
380	0°57.0'	1°48.30'	189.99	1.00	379.96	3.99	379.98	253.35	126.68
390	0°58.5'	1°54.08'	194.99	1.08	389.96	4.31	389.98	260.01	130.01
400	1°00.0'	2°00.00'	199.99	1.16	399.95	4.65	399.98	266.68	133.35
410	1°01.5'	2°06.08'	204.99	1.25	409.94	5.01	409.98	273.35	136.68
420	1°03.0'	2°12.30'	209.99	1.35	419.94	5339	41997	280.02	140.02
430	1°04.5'	2°18.68'	214.99	1.45	429.93	5.78	429.97	286.69	143.36
440	1°06.0'	2°25.20'	219.99	1.55	439.92	6.19	439.97	293.36	146.69
450	1°07.5'	2°31.88'	224.99	1.66	449.91	6.63	449.96	300.03	150.03
460	1°09.0'	2°38.70'	229.98	1.77	459.90	7.08	459.96	306.70	153.36
470	1°10.5'	2°45.68'	234.98	1.89	469.89	7.55	469.95	313.37	156.70
480	1°12.0'	2°52.80'	239.98	2.01	479.88	8.04	479.95	320.04	160.04
490	1°13.5'	3°00.08'	244.98	2.14	489.87	8.55	489.94	326.71	163.38
500	1°15.0'	3°07.50'	249.98	2.27	499.85	9.09	499.93	333.39	166.71

See Appendix for spiral curve nomenclature

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.25

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
510	1°16.5'	3°15.08'	254.97	2.41	509.84	9.64	509.93	340.06	170.05
520	1°18.0'	3°22.80'	259.97	2.56	519.82	10.22	519.92	346.73	173.39
530	1°19.5'	3°30.68'	264.97	2.71	529.80	10.82	529.91	353.40	176.73
540	1°21.0'	3°38.70'	269.96	2.86	539.78	11.45	539.90	360.08	180.07
550	1°22.5'	3°46.88'	274.96	3.02	549.76	12.10	549.89	366.75	183.41
560	1°24.0'	3°55.20'	279.96	3.19	559.74	12.77	559.88	373.42	186.75
570	1°25.5'	4°03.68'	284.95	3.37	569.71	13.46	569.87	380.10	190.09
580	1°27.0'	4°12.30'	289.95	3.55	579.69	14.18	579.86	386.78	193.43
590	1°28.5'	4°21.08'	294.94	3.73	589.66	14.93	589.85	393.45	196.77
600	1°30.0'	4°30.00'	299.94	3.93	599.63	15.70	599.84	400.13	200.12
610	1°31.5'	4°39.08'	304.93	4.13	609.60	16.50	609.82	406.81	203.46
620	1°33.0'	4°48.30'	309.93	4.33	619.56	17.32	619.81	413.49	206.81
630	1°34.5'	4°57.68'	314.92	4.54	629.53	18.17	629.79	420.17	210.15
640	1°36.0'	5°07.20'	319.91	4.76	639.49	19.05	639.77	426.85	213.50
650	1°37.5'	5°16.88'	324.91	4.99	649.45	19.96	649.75	433.53	216.84
660	1°39.0'	5°26.70'	329.90	5.23	659.40	20.89	659.74	440.21	220.19
670	1°40.5'	5°36.68'	334.89	5.47	669.36	21.86	669.71	446.89	223.54
680	1°42.0'	5°46.80'	339.88	5.71	679.31	22.85	679.69	453.58	226.89
690	1°43.5'	5°57.08'	344.88	5.97	689.26	23.87	689.67	460.26	230.24
700	1°45.0'	6°07.50'	349.87	6.23	699.20	24.92	699.64	466.95	233.59
710	1°46.5'	6°18.08'	354.86	6.50	709.14	26.01	709.62	473.63	236.94
720	1°48.0'	6°28.80'	359.85	6.78	719.08	27.12	719.59	480.32	240.29
730	1°49.5'	6°39.68'	364.84	7.07	729.01	28.26	729.56	487.01	243.65
740	1°51.0'	6° 50.70'	369.82	7.36	738.94	29.44	739.53	493.70	247.00
750	1°52.5'	7°01.88'	374.81	7.67	748.87	30.65	749.50	500.39	250.36
760	1°54.0'	7°13.20'	379.80	7.98	758.79	31.89	759.46	507.09	253.72
770	1°56.5'	7°24.68'	384.79	8.30	768.71	33.16	769.43	513.78	257.08
780	1°57.0'	7°36.30'	389.77	8.62	778.63	34.47	779.39	520.48	260.44
790	1°58.5'	7°48.08'	394.76	8.96	788.54	35.81	789.35	527.18	263.80
800	2°00.0'	8°00.00'	399.74	9.30	798.44	37.18	799.31	533.88	267.16
810	2°01.5'	8°12.08'	404.72	9.65	808.34	38.59	809.26	540.58	270.53
820	2°03.0'	8°24.30'	409.71	10.02	818.24	40.04	819.22	547.28	273.89
830	2°04.5'	8°36.68'	414.69	10.39	828.13	41.51	829.17	553.90	277.26
840	2°06.0'	8°49.20'	419.67	10.77	838.01	43.03	839.12	560.70	280.63
850	2°07.5'	9°01.88'	424.65	11.16	847.89	44.58	849.06	567.41	284.01
860	2°09.0'	9°14.70'	429.63	11.55	857.76	46.17	859.01	574.12	287.38
870	2°10.5'	9°27.68'	434.60	11.96	867.63	47.79	868.95	580.83	290.76
880	2°12.0'	9°40.80'	439.58	12.38	877.49	49.46	878.88	587.55	294.13
890	2°13.5'	9°54.08'	444.56	12.80	887.35	51.16	888.82	594.26	297.51
900	2°15.0'	10°07.50'	449.53	13.24	897.19	52.90	898.75	600.98	300.90
910	2°16.5'	10°21.08'	454.51	13.68	907.03	54.67	908.68	607.71	304.28
920	2°18.0'	10°34.80'	459.48	14.14	916.87	56.49	918.61	614.43	307.67
930	2°19.5'	10°48.68'	464.45	14.61	926.69	58.35	928.53	621.16	311.06
940	2°21.0'	11°02.70'	469.42	15.08	936.51	60.24	938.45	627.89	314.45
950	2°22.5'	11°16.88'	474.39	15.57	946.32	62.18	948.36	634.62	317.84
960	2°24.0'	11°31.20'	479.35	16.06	956.13	64.15	958.28	641.36	321.24
970	2°25.5'	11°45.68'	484.32	16.57	965.92	66.17	968.18	648.10	324.64
980	2°27.0'	12°00.30'	489.28	17.08	975.71	68.23	978.09	654.84	328.04
990	2°28.5'	12°15.08'	494.25	17.61	985.48	70.33	987.99	661.59	331.44
1000	2°30.0'	12°30.00'	499.21	18.15	995.25	72.48	997.89	668.34	334.85

See Appendix for graphic illustration of spiral curve elements

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

Printed By Permission of the Oregon Department of Transportation

a = 0.3

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
10	0°01.8'	0°00.09'	5.00	0.00	10.00	0.00	10.00	6.67	3.33
20	0°03.6'	0°00.36'	10.00	0.00	20.00	0.00	20.00	13.33	6.67
10	0°05.4'	0°00.81'	15.00	0.00	30.00	0.00	30.00	20.00	10.00
40	0°07.2'	0°01.44'	20.00	0.00	40.00	0.01	40.00	26.67	13.33
50	0°09.0'	0°02.25'	25.00	0.00	50.00	0.01	50.00	33.33	16.67
60	0°10.8'	0°03.24'	30.00	0.00	60.00	0.02	60.00	40.00	20.00
70	0°12.6'	0°04.41'	35.00	0.01	70.00	0.03	70.00	46.67	23.33
80	0°14.4'	0°05.76'	40.00	0.01	80.00	0.04	80.00	53.33	26.67
90	0°16.2'	0°07.29'	45.00	0.02	90.00	0.06	90.00	60.00	30.00
100	0°18.0'	0°09.00'	50.00	0.02	100.00	0.09	100.00	66.67	33.33
110	0°19.8'	0°10.89'	55.00	0.03	110.00	0.12	110.00	73.33	36.67
120	0°21.6'	0°12.96'	60.00	0.04	120.00	0.15	120.00	80.00	40.00
130	0°23.4'	0°15.21'	65.00	0.05	130.00	0.19	130.00	86.67	43.33
140	0°25.2'	0°17.64'	70.00	0.06	140.00	0.24	140.00	93.33	46.67
150	0°27.0'	0°20.25'	75.00	0.07	150.00	0.29	150.00	100.00	50.00
160	0°28.8'	0°23.04'	80.00	0.09	160.00	0.36	160.00	106.67	53.33
170	0°30.6'	0°26.01'	85.00	0.11	170.00	0.43	170.00	113.33	56.67
180	0°32.4'	0°29.16'	90.00	0.13	180.00	0.51	180.00	120.00	60.00
190	0°34.2'	0°32.49'	95.00	0.15	190.00	0.60	190.00	126.67	63.33
200	0°36.0'	0°36.00'	100.00	0.17	200.00	0.70	200.00	133.33	66.67
210	0°37.8'	0°39.69'	105.00	0.20	210.00	0.81	210.00	140.00	70.00
220	0°39.6'	0°43.56'	110.00	0.23	220.00	0.93	220.00	146.67	73.33
230	0°41.4'	0°47.61'	115.00	0.27	230.00	1.06	230.00	153.33	76.67
240	0°43.2'	0°51.84'	120.00	0.30	239.99	1.21	240.00	160.00	80.00
250	0°45.0'	0°56.25'	125.00	0.34	249.99	1.36	250.00	166.67	83.34
260	0°46.8'	1°00.84'	130.00	0.38	259.99	1.53	260.00	173.34	86.67
270	0°48.6'	1°05.61'	135.00	0.43	269.99	1.72	270.00	180.00	90.00
280	0°50.4'	1°10.56'	140.00	0.48	279.99	1.92	279.99	186.67	93.34
290	0°52.2'	1°15.69'	145.00	0.53	289.99	2.13	289.99	193.34	96.67
300	0°54.0'	1°21.00'	150.00	0.59	299.98	2.36	299.99	200.01	100.01
310	0°55.8'	1°26.49'	155.00	0.65	309.98	2.60	309.99	206.67	103.34
320	0°57.6'	1°32.16'	160.00	0.71	319.98	2.86	319.99	213.34	106.67
330	0°59.4'	1°38.01'	165.00	0.78	329.97	3.14	329.99	220.01	110.01
340	1°01.2'	1°44.04'	169.99	0.86	339.97	3.43	339.99	226.68	113.34
350	1°03.0'	1°50.25'	174.99	0.94	349.96	3.74	349.98	233.35	116.68
360	1°04.8'	1°56.64'	179.99	1.02	359.96	4.07	359.98	240.01	120.01
370	1°06.6'	2°03.21'	184.99	1.11	369.95	4.42	369.98	246.68	123.35
380	1°08.4'	2°09.96'	189.99	1.20	379.95	4.79	379.98	253.35	126.68
390	1°10.2'	2°16.89'	194.99	1.29	389.94	5.18	389.97	260.02	130.02
400	1°12.0'	2°24.00'	199.99	1.40	399.93	5.58	399.97	266.69	133.36
410	1°13.8'	2°31.29'	204.99	1.50	409.92	6.01	409.96	273.36	136.69
420	1°15.6'	2°38.76'	209.99	1.62	419.91	6.46	419.96	280.03	140.03
430	1°17.4'	2°46.41'	214.98	1.73	429.90	6.94	429.96	286.70	143.37
440	1°19.2'	2°54.24'	219.98	1.86	439.89	7.43	439.95	293.37	146.70
450	1°21.0'	3°02.25'	224.98	1.99	449.87	7.95	449.94	300.04	150.04
460	1°22.8'	3°10.44'	229.98	2.12	459.86	8.49	459.94	306.72	153.38
470	1°24.6'	3°18.81'	234.97	2.26	469.84	9.06	469.93	313.39	156.72
480	1°26.4'	3°27.36'	239.97	2.41	479.83	9.65	479.92	320.06	160.06
490	1°28.2'	3°36.09'	244.97	2.57	489.81	10.26	489.91	326.73	163.39
500	1°30.0'	3°45.00'	249.96	2.73	499.79	10.90	499.90	333.41	166.73

See Appendix for spiral curve nomenclature

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.3

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
510	1°31.8'	3°54.09'	254.96	2.89	509.76	11.57	509.89	340.08	170.08
520	1°33.6'	4°03.36'	259.96	3.07	519.74	12.27	519.88	346.76	173.42
530	1°35.4'	4°12.81'	264.95	3.25	529.71	12.99	529.87	353.43	176.76
540	1°37.2'	4°22.44'	269.95	3.43	539.69	13.74	539.86	360.11	180.10
550	1°39.0'	4°32.25'	274.94	3.63	549.66	14.51	549.85	366.79	183.44
560	1°40.8'	4°42.24'	279.94	3.83	559.62	15.32	559.83	373.47	186.79
570	1°42.6'	4°52.41'	284.93	4.04	569.59	16.15	569.82	380.14	190.13
580	1°44.4'	5°02.76'	289.93	4.26	579.55	17.02	579.80	386.82	193.48
590	1°46.2'	5°13.29'	294.92	4.48	589.51	17.91	589.78	393.50	196.82
600	1°48.0'	5°24.00'	299.91	4.71	599.47	18.84	599.76	400.19	200.17
610	1°49.8'	5°34.89'	304.90	4.95	609.42	19.79	609.74	406.87	203.52
620	1°51.6'	5°45.96'	309.90	5.20	619.37	20.78	619.72	413.55	206.87
630	1°53.4'	5°57.21'	314.89	5.45	629.32	21.80	629.70	420.24	210.22
640	1°55.2'	6°08.64'	319.88	5.72	639.26	22.86	639.67	426.92	213.57
650	1°57.0'	6°20.25'	324.87	5.99	649.21	23.94	649.65	433.61	216.92
660	1°58.8'	6°32.04'	329.86	6.27	659.14	25.07	659.62	440.30	220.27
670	2°00.6'	6°44.01'	334.85	6.56	669.08	26.22	669.59	446.99	223.63
680	2°02.4'	6°56.16'	339.83	6.86	679.00	27.41	679.56	453.68	226.98
690	2°04.2'	7°08.49'	344.82	7.16	688.93	28.64	689.52	460.37	230.34
700	2°06.0'	7°21.00'	349.81	7.48	698.85	29.90	699.49	467.07	233.70
710	2°07.8'	7°33.69'	354.79	7.80	708.76	31.19	709.45	473.77	237.06
720	2°09.6'	7°46.56'	359.78	8.14	718.67	32.53	719.41	480.46	240.42
730	2°11.4'	7°59.61'	364.76	8.48	728.58	33.90	729.37	487.16	243.79
740	2°13.2'	8°12.84'	369.75	8.83	738.48	35.31	739.32	493.87	247.15
750	2°15.0'	8°26.25'	374.73	9.20	748.38	36.76	749.28	500.57	250.52
760	2°16.8'	8°39.84'	379.71	9.57	758.26	38.25	759.23	507.27	253.89
770	2°18.6'	8°53.61'	384.69	9.95	768.15	39.77	769.18	513.98	257.26
780	2°20.4'	9°07.56'	389.67	10.34	778.02	41.34	779.12	520.69	260.63
790	2°22.2'	9°21.69'	394.65	10.75	787.89	42.94	789.06	527.41	264.00
800	2°24.0'	9°36.00'	399.63	11.16	797.76	44.59	799.00	534.12	267.38
810	2°25.8'	9°50.49'	404.60	11.58	807.61	46.28	808.94	540.84	270.76
820	2°27.6'	10°05.16'	409.58	12.02	817.46	48.01	818.87	547.56	274.14
830	2°29.4'	10°20.01'	414.55	12.46	827.30	49.78	828.80	554.28	277.53
840	2°31.2'	10°35.04'	419.52	12.92	837.14	51.60	838.73	561.00	280.91
850	2°33.0'	10°50.25'	424.49	13.38	846.96	53.46	848.65	567.73	284.30
860	2°34.8'	11°05.64'	429.46	13.86	856.78	55.36	858.57	574.46	287.69
870	2°36.6'	11°21.21'	434.43	14.35	866.59	57.30	868.48	581.20	291.09
880	2°38.4'	11°36.96'	439.40	14.85	876.39	59.30	878.39	587.93	294.49
890	2°40.2'	11°52.89'	444.36	15.36	886.18	61.33	888.30	594.68	297.89
900	2°42.0'	12°09.00'	449.33	15.88	895.96	63.41	899.20	601.42	301.29
910	2°43.8'	12°25.29'	454.29	16.41	905.73	65.54	908.10	608.17	304.70
920	2°45.6'	12°41.76'	459.25	16.96	915.49	67.72	917.99	614.92	308.11
930	2°47.4'	12°58.41'	464.21	17.52	925.24	69.94	927.88	621.67	311.52
940	2°49.2'	13°15.24'	469.16	18.09	934.98	72.21	937.77	628.43	314.94
950	2°51.0'	13°32.25'	474.12	18.67	944.71	74.52	947.64	635.20	318.36
960	2°52.8'	13°49.44'	479.07	19.26	954.43	76.89	957.52	641.96	321.78
970	2°54.6'	14°06.81'	484.02	19.87	964.13	79.30	967.39	648.73	325.21
980	2°56.4'	14°24.36'	488.97	20.49	973.82	81.76	977.25	655.51	328.65
990	2°58.2'	14°42.09'	493.92	21.12	983.50	84.28	987.11	662.29	332.08
1000	3°00.0'	15°00.00'	498.86	21.76	993.17	86.84	996.96	669.08	335.52

See Appendix for graphic illustration of spiral curve elements

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.4

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
10	0°02.4'	0°00.12'	5.00	0.00	10.00	0.00	10.00	6.67	3.33
20	0°04.8'	0°00.48'	10.00	0.00	20.00	0.00	20.00	13.33	6.67
30	0°07.2'	0°01.06'	15.00	0.00	30.00	0.00	30.00	20.00	10.00
40	0°09.6'	0°01.92'	20.00	0.00	40.00	0.01	40.00	26.67	13.33
50	0°12.0'	0°03.00'	25.00	0.00	50.00	0.01	50.00	33.33	16.67
60	0°14.4'	0°04.32'	30.00	0.01	60.00	0.03	60.00	40.00	20.00
70	0°16.8'	0°05.88'	35.00	0.01	70.00	0.04	70.00	46.67	23.33
80	0°19.2'	0°07.68'	40.00	0.01	80.00	0.06	80.00	53.33	26.67
90	0°21.6'	0°09.72'	45.00	0.02	90.00	0.08	90.00	60.00	30.00
100	0°24.0'	0°12.00'	50.00	0.03	100.00	0.12	100.00	66.67	33.33
110	0°26.4'	0°14.52'	55.00	0.04	110.00	0.15	110.00	73.33	36.67
120	0°28.8'	0°17.28'	60.00	0.05	120.00	0.20	120.00	80.00	40.00
130	0°31.2'	0°20.28'	65.00	0.06	130.00	0.26	130.00	86.67	43.33
140	0°33.6'	0°23.52'	70.00	0.08	140.00	0.32	140.00	93.33	46.67
150	0°36.0'	0°27.00'	75.00	0.10	150.00	0.39	150.00	100.00	50.00
160	0°38.4'	0°30.72'	80.00	0.12	160.00	0.48	160.00	106.67	53.33
170	0°40.8'	0°34.68'	85.00	0.14	170.00	0.57	170.00	113.33	56.67
180	0°43.2'	0°38.88'	90.00	0.17	180.00	0.68	180.00	120.00	60.00
190	0°45.6'	0°43.32'	95.00	0.20	190.00	0.80	190.00	126.67	63.33
200	0°48.0'	0°48.00'	100.00	0.23	200.00	0.93	200.00	133.33	66.67
210	0°50.4'	0°52.92'	105.00	0.27	210.00	1.08	210.00	140.00	70.00
220	0°52.8'	0°58.08'	110.00	0.31	219.99	1.24	220.00	146.67	73.34
230	0°55.2'	1°03.48'	115.00	0.35	229.99	1.42	230.00	153.34	76.67
240	0°57.6'	1°09.12'	120.00	0.40	239.99	1.61	240.00	160.00	80.00
250	1°00.0'	1°15.00'	125.00	0.45	249.99	1.82	249.99	166.67	83.34
260	1°02.4'	1°21.12'	130.00	0.51	259.99	2.04	259.99	173.34	86.67
270	1°04.8'	1°27.48'	135.00	0.57	269.98	2.29	269.99	180.01	90.01
280	1°07.2'	1°34.08'	140.00	0.64	279.98	2.55	279.99	186.67	93.34
290	1°09.6'	1°40.92'	145.00	0.71	289.98	2.84	289.99	193.34	96.67
300	1°12.0'	1°48.00'	150.00	0.79	299.97	3.14	299.99	200.01	100.01
310	1°14.4'	1°55.32'	154.99	0.87	309.97	3.47	309.98	206.68	103.34
320	1°16.8'	2°02.88'	159.99	0.95	319.96	3.81	319.98	213.35	106.68
330	1°19.2'	2°10.68'	164.99	1.05	329.95	4.18	329.98	220.02	110.02
340	1°21.6'	2°18.72'	169.99	1.14	339.94	4.57	339.98	226.69	113.35
350	1°24.0'	2°27.00'	174.99	1.25	349.94	4.99	349.97	233.36	116.69
360	1°26.4'	2°35.52'	179.99	1.36	359.93	5.43	359.97	240.03	120.02
370	1°28.8'	2°44.28'	184.99	1.47	369.92	5.89	369.96	246.70	123.36
380	1°31.2'	2°53.28'	189.98	1.60	379.90	6.38	379.96	253.37	126.70
390	1°33.6'	3°02.52'	194.98	1.73	389.89	6.90	389.95	260.04	130.03
400	1°36.0'	3°12.00'	199.98	1.86	399.88	7.45	399.94	266.71	133.37
410	1°38.4'	3°21.72'	204.98	2.00	409.86	8.02	409.94	273.38	136.71
420	1°40.8'	3°31.68'	209.97	2.15	419.84	8.62	419.93	280.06	140.05
430	1°43.2'	3°41.88'	214.97	2.31	429.82	9.25	429.92	286.73	143.39
440	1°45.6'	3°52.32'	219.97	2.48	439.80	9.91	439.91	293.40	146.73
450	1°48.0'	4°03.00'	224.96	2.65	449.78	10.60	449.90	300.08	150.07
460	1°50.4'	4°13.92'	229.96	2.83	459.75	11.32	459.89	306.75	153.41
470	1°52.8'	4°25.08'	234.95	3.02	469.72	12.08	469.88	313.43	156.76
480	1°55.2'	4°36.48'	239.95	3.22	479.69	12.86	479.86	320.11	160.10
490	1°57.6'	4°48.12'	244.94	3.42	489.66	13.68	489.85	326.79	163.44
500	2°00.0'	5°00.00'	249.94	3.64	499.62	14.54	499.83	333.47	166.79

See Appendix for spiral curve nomenclature

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.4

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
510	2°02.4'	5°12.12'	254.93	3.86	509.58	15.43	509.81	340.15	170.13
520	2°04.8'	5°24.48'	259.92	4.09	519.54	16.35	519.79	346.83	173.48
530	2°07.2'	5°37.08'	264.92	4.33	529.49	17.31	529.77	353.51	176.83
540	2°09.6'	5°49.92'	269.91	4.58	539.44	18.31	539.75	360.20	180.18
550	2°12.0'	6°03.00'	274.90	4.84	549.39	19.34	549.73	366.88	183.53
560	2°14.4'	6°16.32'	279.89	5.11	559.33	20.42	559.70	373.57	186.88
570	2°16.8'	6°29.88'	284.88	5.38	569.27	21.53	569.67	380.26	190.23
580	2°19.2"	6°43.68'	289.87	5.67	579.20	22.68	579.64	386.95	193.59
590	2°21.6'	6°57.72'	294.85	5.97	589.13	23.87	589.61	393.64	196.94
600	2°24.0'	7°12.00'	299.84	6.28	599.05	25.10	599.58	400.33	200.30
610	2°26.4'	7°26.52'	304.83	6.60	608.97	26.38	609.54	407.03	203.66
620	2°28.8'	7°41.28'	309.81	6.93	618.88	27.70	619.50	413.72	207.02
630	2°31.2'	7°56.28'	314.80	7.27	628.79	29.05	629.46	420.42	210.38
640	2°33.6'	8°11.52'	319.78	7.62	638.69	30.46	639.42	427.12	213.75
650	2°36.0'	8°27.00'	324.76	7.98	648.59	31.90	649.37	433.83	217.12
660	2°38.4'	8°42.72'	329.75	8.36	658.48	33.40	659.32	440.53	220.49
670	2°40.8'	8°58.68'	334.73	8.74	668.36	34.93	669.27	447.24	223.86
680	2°43.2'	9°14.88'	339.70	9.14	678.23	36.52	679.21	453.95	227.23
690	2°45.6'	9°31.32'	344.68	9.55	688.10	38.15	689.15	460.67	230.61
700	2°48.0'	9°48.00'	349.66	9.97	697.95	39.83	699.09	467.38	233.99
710	2°50.4'	10°04.92'	354.63	10.40	707.80	41.55	709.02	474.10	237.37
720	2°52.8'	10°22.08'	359.61	10.84	717.65	43.33	718.95	480.83	240.75
730	2°55.2'	10°39.48'	364.58	11.30	727.48	45.15	728.88	487.55	244.14
740	2°57.6'	10°57.12'	369.55	11.77	737.30	47.03	738.80	494.28	247.53
750	3°00.0'	11°15.00'	374.52	12.25	747.11	48.95	748.72	501.01	250.92
760	3°02.4'	11°33.12'	379.49	12.75	756.92	50.93	758.63	507.75	254.32
770	3°04.8'	11°51.48'	384.45	13.26	766.71	52.96	768.54	514.49	257.72
780	3°07.2'	12°10.08'	389.41	13.78	776.49	55.04	778.44	521.23	261.12
790	3°09.6'	12°28.92'	394.38	14.32	786.26	57.17	788.33	527.98	264.53
800	3°12.0'	12°48.00'	399.34	14.87	796.02	59.36	798.23	534.73	267.94
810	3°14.4'	13°07.32'	404.29	15.43	805.76	61.60	808.11	541.49	271.36
820	3°16.8'	13°26.88'	409.25	16.01	815.49	63.90	817.99	548.25	274.78
830	3°19.2'	13°46.68'	414.20	16.60	825.21	66.26	827.87	555.02	278.20
840	3°21.6'	14°06.72'	419.15	17.20	834.92	68.67	837.74	561.79	281.63
850	3°24.0'	14°27.00'	424.10	17.82	844.61	71.13	847.60	568.57	285.06
860	3°26.4'	14°47.52'	429.05	18.46	854.29	73.66	857.46	575.35	288.50
870	3°28.8'	15°08.28'	433.99	19.11	863.95	76.24	867.30	582.14	291.94
880	3°31.2'	15°29.28'	438.93	19.77	873.59	78.88	877.15	588.93	295.39
890	3°33.6'	15°50.52'	443.87	20.45	883.22	81.58	886.98	595.73	298.84
900	3°36.0'	16°12.00'	448.80	21.15	892.83	84.34	896.81	602.53	302.30
910	3°38.4'	16°33.72'	453.74	21.86	902.43	87.16	906.63	609.34	305.77
920	3°40.8'	16°55.68'	458.66	22.58	912.00	90.04	916.44	616.16	309.24
930	3°43.2'	17°17.88'	463.59	23.32	921.56	92.98	926.24	622.99	312.72
940	3°45.6'	17°40.32'	468.51	24.08	931.10	95.99	936.03	629.82	316.20
950	3°48.0'	18°03.00'	473.43	24.85	940.61	99.06	945.82	636.66	319.69
960	3°50.4'	18°25.92'	478.35	25.64	950.11	102.19	955.59	643.50	323.19
970	3°52.8'	18°49.08'	483.26	26.45	959.59	105.38	965.36	650.36	326.69
980	3°55.2'	19°12.48'	488.17	27.27	969.04	108.64	975.11	657.22	330.20
990	3°57.6'	19°36.12'	493.08	28.11	978.48	111.96	984.86	664.09	333.72
1000	4°00.0'	20°00.00'	497.98	28.96	987.88	115.35	994.60	670.97	337.25
See Appendix for graphic illustration of spiral curve elements									

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.5

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
10	0°03.0'	0°00.15'	5.00	0.00	10.00	0.00	10.00	6.67	3.33
20	0°06.0'	0°00.60'	10.00	0.00	20.00	0.00	20.00	13.33	6.67
30	0°09.0'	0°01.35'	15.00	0.00	30.00	0.00	30.00	20.00	10.00
40	0°12.0'	0°02.40'	20.00	0.00	40.00	0.01	40.00	26.67	13.33
50	0°15.0'	0°03.75'	25.00	0.00	50.00	0.02	50.00	33.33	16.67
60	0°18.0'	0°05.40'	30.00	0.01	60.00	0.03	60.00	40.00	20.00
70	0°21.0'	0°07.35'	35.00	0.01	70.00	0.05	70.00	46.67	23.00
80	0°24.0'	0°09.60'	40.00	0.02	80.00	0.07	80.00	53.33	26.67
90	0°27.0'	0°12.15'	45.00	0.03	90.00	0.11	90.00	60.00	30.00
100	0°30.0'	0°15.00'	50.00	0.04	100.00	0.15	100.00	66.67	33.00
110	0°33.0'	0°18.15'	55.00	0.05	110.00	0.19	110.00	73.33	36.67
120	0°36.0'	0°21.60'	60.00	0.06	120.00	0.25	120.00	80.00	40.00
130	0°39.0'	0°25.35'	65.00	0.08	130.00	0.32	130.00	86.67	43.33
140	0°42.0'	0°29.40'	70.00	0.10	140.00	0.40	140.00	93.33	46.67
150	0°45.0'	0°33.75'	75.00	0.12	150.00	0.49	150.00	100.00	50.00
160	0°48.0'	0°38.40'	80.00	0.15	160.00	0.60	160.00	106.67	53.33
170	0°51.0'	0°43.35'	85.00	0.18	170.00	0.71	170.00	113.33	56.67
180	0°54.0'	0°48.60'	90.00	0.21	180.00	0.85	180.00	120.00	60.00
190	0°57.0'	0°54.15'	95.00	0.25	190.00	1.00	190.00	126.67	63.33
200	1°00.0'	1°00.00'	100.00	0.29	199.99	1.16	200.00	133.34	66.67
210	1°03.0'	1°06.15'	105.00	0.34	209.99	1.35	210.00	140.00	70.00
220	1°06.0'	1°12.60'	110.00	0.39	219.99	1.55	220.00	146.67	73.34
230	1°09.0'	1°19.35'	115.00	0.44	229.99	1.77	229.99	153.34	76.67
240	1°12.0'	1°26.40'	120.00	0.50	239.98	2.01	239.99	160.01	80.00
250	1°15.0'	1°33.75'	125.00	0.57	249.98	2.27	249.99	166.67	83.34
260	1°18.0'	1°41.40'	130.00	0.64	259.98	2.56	259.99	173.34	86.67
270	1°21.0'	1°49.35'	135.00	0.72	269.97	2.86	269.99	180.01	90.01
280	1°24.0'	1°57.60'	139.99	0.80	279.97	3.19	279.99	186.68	93.34
290	1°27.0'	2°06.15'	144.99	0.89	289.96	3.55	289.98	193.35	96.68
300	1°30.0'	2°15.00'	149.99	0.98	299.95	3.93	299.98	200.02	100.01
310	1°33.0'	2°24.15'	154.99	1.08	309.95	4.33	309.98	206.69	103.35
320	1°36.0'	2°33.60'	159.99	1.19	319.94	4.77	319.97	213.36	106.69
330	1°39.0'	2°43.35'	164.99	1.31	329.93	5.23	329.97	220.03	110.02
340	1°42.0'	2°53.40'	169.99	1.43	339.91	5.72	339.96	226.70	113.36
350	1°45.0'	3°03.75'	174.98	1.56	349.90	6.23	349.96	233.37	116.70
360	1°48.0'	3°14.40'	179.98	1.70	359.88	6.78	359.95	240.04	120.04
370	1°51.0'	3°25.35'	184.98	1.84	369.87	7.37	369.94	246.71	123.38
380	1°54.0'	3°36.60'	189.97	1.99	379.85	7.98	379.93	253.39	126.71
390	1°57.0'	3°48.15'	194.97	2.16	389.83	8.62	389.92	260.06	130.05
400	2°00.0'	4°00.00'	199.97	2.33	399.81	9.31	399.91	266.73	133.40
410	2°03.0'	4°12.15'	204.96	2.51	409.78	10.02	409.90	273.41	136.74
420	2°06.0'	4°24.60'	209.96	2.69	419.75	10.77	419.89	280.09	140.08
430	2°09.0'	4°37.35'	214.95	2.89	429.72	11.56	429.88	286.76	143.42
440	2°12.0'	4°50.40'	219.95	3.10	439.69	12.38	439.86	293.44	146.77
450	2°15.0'	5°03.75'	224.94	3.31	449.65	13.25	449.84	300.12	150.11
460	2°18.0'	5°17.40'	229.93	3.54	459.61	14.15	459.83	306.80	153.46
470	2°21.0'	5°31.35'	234.93	3.77	469.56	15.09	469.81	313.49	156.81
480	2°24.0'	5°45.60'	239.92	4.02	479.52	16.07	479.78	320.17	160.15
490	2°27.0'	6°00.15'	244.91	4.28	489.46	17.10	489.76	326.85	163.50
500	2°30.0'	6°15.00'	249.90	4.54	499.41	18.17	499.74	333.54	166.86

See Appendix for spiral curve nomenclature

TABLE 27 — STANDARD HIGHWAY SPIRAL (Continued)

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a = 0.5

SPIRAL LENGTH	D	S	q in feet	p in feet	Y in feet	X in feet	C in feet	U in feet	V in feet
510	2°33.0'	6°30.15'	254.89	4.82	509.34	19.28	500.71	340.23	170.21
520	2°36.0'	6°45.60'	259.88	5.11	519.28	20.43	519.68	346.92	173.56
530	2°39.0'	7°01.35'	264.87	5.41	529.20	21.63	529.65	353.61	176.92
540	2°42.0'	7°17.40'	269.85	5.72	539.13	22.88	539.61	360.31	180.28
550	2°45.0'	7°33.75'	274.84	6.05	549.04	24.17	549.57	367.00	183.64
560	2°48.0'	7°50.40'	279.83	6.38	558.95	25.51	559.53	373.70	187.00
570	2°51.0'	8°07.35'	284.81	6.73	568.86	26.90	569.49	380.40	190.36
580	2°54.0'	8°24.60'	289.79	7.09	578.75	28.33	579.44	387.10	193.73
590	2°57.0'	8°42.15'	294.77	7.46	588.64	29.82	589.40	393.81	197.10
600	3°00.0'	9°00.00'	299.75	7.85	598.52	31.36	599.34	400.52	200.47
610	3°03.0'	9°18.15'	304.73	8.25	608.39	32.95	609.29	407.23	203.85
620	3°06.0'	9°36.60'	309.71	8.66	618.26	34.59	619.23	413.94	207.22
630	3°09.0'	9°55.35'	314.69	9.08	628.11	36.29	629.16	420.66	210.60
640	3°12.0'	10°14.40'	319.66	9.52	637.96	38.04	639.09	427.38	213.98
650	3°15.0'	10°33.75'	324.63	9.97	647.79	39.85	649.02	434.11	217.37
660	3°18.0'	10°53.40'	329.60	10.44	657.62	41.71	658.94	440.84	220.76
670	3°21.0'	11°13.35'	334.57	10.92	667.43	43.62	668.86	447.57	224.15
680	3°24.0'	11°33.60'	339.54	11.42	677.24	45.60	678.77	454.30	227.55
690	3°27.0'	11°54.15'	344.50	11.93	687.03	47.63	688.68	461.04	230.95
700	3°30.0'	12°15.00'	349.47	12.45	696.81	49.72	698.58	467.79	234.35
710	3°33.0'	12°36.15'	354.43	12.99	706.57	51.88	708.47	474.54	237.76
720	3°36.0'	12°57.60'	359.39	13.55	716.32	54.09	718.36	481.29	241.18
730	3°39.0'	13°19.35'	364.34	14.12	726.06	56.36	728.25	488.05	244.59
740	3°42.0'	13°41.40'	369.30	14.70	735.79	58.70	738.12	494.82	248.02
750	3°45.0'	14°03.75'	374.25	15.31	745.49	61.10	747.99	501.59	251.44
760	3°48.0'	14°26.40'	379.20	15.93	755.19	63.56	757.86	508.36	254.88
770	3°51.0'	14°49.35'	384.14	16.56	764.86	66.08	767.71	515.14	258.31
780	3°54.0'	15°12.60'	389.09	17.21	774.52	68.67	777.56	521.93	261.76
790	3°57.0'	15°36.15'	394.03	17.88	784.16	71.33	787.40	528.73	265.21
800	4°00.0'	16°00.00'	398.96	18.57	793.78	74.05	797.23	535.53	268.66
810	4°03.0'	16°24.15'	403.90	19.27	803.39	76.84	807.05	542.34	272.13
820	4°06.0'	16°48.60'	408.83	19.99	812.97	79.70	816.87	549.15	275.59
830	4°09.0'	17°13.35'	413.75	20.72	822.53	82.63	826.67	555.93	279.07
840	4°12.0'	17°38.40'	418.68	21.48	832.07	85.62	836.47	562.81	282.55
850	4°15.0'	18°03.75'	423.60	22.25	841.59	88.69	846.25	569.64	286.04
860	4°18.0'	18°29.40'	428.51	23.04	851.09	91.82	856.03	576.49	289.54
870	4°21.0'	18°55.35'	433.52	23.85	860.56	95.03	865.79	583.35	293.05
880	4°24.0'	19°21.60'	438.33	24.68	870.01	98.31	875.54	590.21	296.56
890	4°27.0'	19°48.15'	443.23	25.52	879.43	101.66	885.28	597.09	300.08
900	4°30.0'	20°15.00'	448.13	26.39	888.82	105.09	895.01	603.97	303.62
910	4°33.0'	20°42.15'	453.03	27.27	898.19	108.58	904.73	610.87	307.16
920	4°36.0'	21°09.60'	457.92	28.18	907.53	112.16	914.44	617.77	310.71
930	4°39.0'	21°37.35'	462.80	29.10	916.84	115.80	924.13	624.69	314.27
940	4°42.0'	22°05.40'	467.68	30.04	926.12	119.53	933.80	631.62	317.84
950	4°45.0'	22°33.75'	472.56	31.00	935.37	123.33	943.47	638.56	321.42
960	4°48.0'	23°02.40'	477.42	31.98	944.59	127.20	953.12	645.51	325.01
970	4°51.0'	23°31.35'	482.29	32.99	953.78	131.15	962.75	652.47	328.62
980	4°54.0'	24°00.60'	487.15	34.01	962.93	135.18	972.37	659.45	332.23
990	4°57.0'	24°30.15'	492.00	35.05	972.05	139.29	981.98	666.44	335.86
1000	5°00.0'	25°00.00'	496.84	36.11	981.13	143.48	991.56	673.44	339.50

See Appendix for graphic illustration of spiral curve elements

TABLE 28 — RAILROAD TAPER TABLES

T=1/2

Changing 15' for each 30 feet

See Chapter 8 for Explanation

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	30'	00°04'30"	00°02'15"	15.00	15.00	30.00	11.00	.004	11,549.18	30.00	.02
60	45'	00°13'30"	00°05'37"	35.00	25.00	60.00	30.00	.030	7,639.45	60	.10
90	1°	00°27'00"	00°10'30"	55.00	35.00	90.00	45.00	.098	5,729.69	90	.27
120	1°15'	00°45'00"	00°16'52"	75.00	45.00	120	60	.198	4,583.88	120	.59
150	1°30'	1°07'30"	00°24'45"	95.00	55.00	150	75	.344	3,820.09	150	1.08
180	1°45'	1°34'30"	00°36'07"	115.00	65.00	180	90	.550	3,274.68	179.98	1.79
210	2°	2°06'00"	00°45'00"	135.01	75.01	210	105	.825	2,865.65	209.97	2.75
240	2°15'	2°42'00"	00°57'27"	155.02	85.02	239.90	119.99	1.08	2,547.60	239.94	4.00
270	2°30'	3°22'30"	1°11'15"	175.04	95.04	269.96	134.98	1.67	2,293.55	269.90	5.59
300	2°45'	4°07'30"	1°26'37"	195.06	105.05	299.93	149.96	2.16	2,085.70	299.84	7.96
330	3°	4°57'00"	1°43'30"	215.00	115.08	329.89	164.94	2.81	1,912.72	329.74	9.93
360	3°15'	5°51'00"	2°01'52"	235.14	125.12	359.84	179.92	3.57	1,766.58	359.61	12.75
390	3°30'	6°49'30"	2°21'44"	255.20	135.10	389.76	194.88	4.64	1,641.56	389.43	16.06
420	3°45'	7°52'30"	2°43'06"	275.29	145.77	419.65	209.83	5.49	1,533.45	419.18	19.90
450	4°	9°	3°03'58"	295.40	155.37	449.51	224.77	6.67	1,439.14	448.85	24.30
480	4°15'	10°12'00"	3°30'19"	315.55	165.50	479.33	239.69	8	1,356.21	478.44	29.31
510	4°30'	11°28,30"	3°56'11"	335.14	175.67	509.10	254.58	4.50	1,282.82	507.90	34.95
540	4°45'	12°49'30"	4°23'31"	355.98	185.81	538.81	269.46	11.17	1,217.48	537.23	41.26
570	5°	14°15'00"	4°52'22"	376.27	196.16	568.45	284.30	13.07	1,159.03	566.40	48.28

T=2/3

Changing 20' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	00°40'	00°06'00"	00°03'00"	15.00	15.00	30.00	15.00	.013	8,594.39	30.00	.03
60	1°	00°18'00"	00°07'30"	35.00	25.00	60.00	30.00	.052	5,729.65	60.00	.13
90	1°20'	00°36'00"	00°14'00"	55.00	35.00	90.00	45.00	.131	4,287.34	90.00	.37
120	1°40'	1°	00°22'30"	75.00	45.00	120	60.00	.262	3,438.04	119.99	.78
150	2°	1°30'00"	00°33'00"	95.00	55.00	150	75.00	.458	2,865.32	149.99	1.44
180	2°20'	2°06'00"	00°45'30"	115.01	65.01	180	89.99	.733	2,456.31	179.97	2.38
210	2°40'	2°48'00"	1°	135.02	75.02	209.98	104.99	1.099	2,149.74	209.95	3.66
240	3°	3°36'00"	1°16'30"	155.04	85.03	239.96	119.98	1.570	1,911.48	239.90	5.34
270	3°20'	4°30'00"	1°35'00"	175.06	95.06	269.93	134.96	2.159	1,721.03	249.82	7.44
300	3°40'	5°30'00"	1°55'30"	195.10	105.09	299.88	149.94	2.878	1,565.56	299.71	10.07
330	4°	6°36'00"	2°17'59"	215.16	115.15	329.81	164.90	3.741	1,436.21	329.54	13.23
360	4°20'	7°48'00"	2°42'29"	235.24	125.22	359.71	179.85	4.761	1,327.03	358.31	16.99
390	4°40'	9°06'	3°08'58"	255.35	135.33	389.57	194.79	5.949	1,233.80	388.98	21.40
420	5°	10°30'	3°37'27"	275.51	145.47	419.38	209.70	7.319	1,153.33	418.54	26.51
450	5°20'	12°00'	4°07'55"	295.72	155.65	449.14	224.59	8.888	1,083.28	447.97	32.36
480	5°40'	13°36'	4°40'23"	315.98	165.89	478.81	239.44	10.66	1,021.86	477.22	39.01
510	6°	15°18,	5°14'50"	336.32	176.20	500.40	254.26	12.65	967.68	506.27	46.49
540	6°20'	17°06'	5°51'16"	356.74	186.59	537.59	269.04	14.87	919.65	535.08	54.86
570	6°40'	19°00"	6°29'40"	377.27	197.07	567.24	283.76	17.33	876.88	563.60	64.16

TABLE 28 — RAILROAD TAPER TABLES (Continued)

T=1

Changing 30' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	1°	00°09'	00°04'30"	15.00	15.00	30.00	15.00	.020	5,729.62	30.00	.04
60	1°30'	00°27'	00°11'15"	35.00	25.00	60.00	30.00	.078	3,819.82	60.00	.20
90	2°	00°54'	00°21'00"	55.00	35.00	90.00	45	.196	2,865.02	90.00	.55
120	2°30'	1°30'	00°33'45"	75.00	45.00	120.00	60	.393	2,292.27	119.99	1.18
150	3°	2°15'	00°49'30"	95.01	55.01	149.99	74.99	.687	1,910.60	149.97	2.16
180	3°30'	3°09'	1°08'15"	115.02	65.02	179.98	89.98	1.099	1,638.19	179.94	3.57
210	4°	4°12'	1°30'00"	135.04	75.04	209.95	104.97	1.649	1,434.12	209.88	5.50
240	4°30'	1°24'	1°54'45"	155.08	85.07	239.91	119.94	2.355	1,275.68	239.77	8.01
270	5°	6°45'	2°22'29"	175.14	95.13	269.84	134.91	3.237	1,149.24	269.61	11.18
300	5°30'	8°15'	2°53'14"	195.23	105.21	299.73	149.85	4.315	1,046.16	299.35	15.10
330	6°	9°54'	3°26'57"	215.36	115.33	329.57	164.78	5.607	960.65	328.07	19.83
360	6°30'	11°42'	4°03'41"	235.55	125.50	359.34	179.68	7.133	888.73	358.44	25.45
390	7°	13°39'	4°43'23"	255.81	135.74	389.03	194.52	8.911	827.55	387.71	32.03
420	7°30'	15°45'	5°26'04"	276.16	146.06	418.61	209.33	10.96	775.04	416.73	39.64
450	8°	18°	6°11'43"	296.62	156.48	448.06	224.08	13.29	729.64	445.44	48.35
480	8°30'	20°24'	7°00'21"	317.22	167.02	477.33	238.75	15.93	690.16	473.77	58.22
510	9°	22°57'	7°51'55"	337.99	177.73	506.41	253.35	18.90	655.68	501.65	69.30
540	9°30'	25°39'	8°46'26"	358.96	188.61	535.25	267.84	22.20	625.48	528.99	81.64
570	10°	28°30'	9°43'53"	380.18	199.72	563.82	282.22	25.85	598.98	555.70	95.30

T=1 1/2

Changing 00°45' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	1°30'	00°13'30"	00°04'30"	20.00	10.00	30.00	15.00	.029	3,819.75	30.00	0.059
60	2°15"	00°40'30"	00°13'30"	40.00	20.00	60.00	30.00	.118	2,546.64	59.999	0.295
90	3°	1°21'	00°27'30"	60.00	20.00	90.00	45.00	.294	1,910.21	89.994	0.825
120	3°45"	2°15'	00°45'00"	80.01	40.00	119.99	59.99	.589	1,528.54	119.98	1.767
150	4°30"	3°22'30"	01°07'30"	100.02	50.02	149.98	74.98	1.03	1,274.35	149.943	3.239
180	5°15"	4°43'30"	01°34'30"	120.04	60.04	179.95	89.96	1.65	1,093.09	179.869	5.358
210	6°	6°18'	02°05'59"	140.09	70.08	209.89	104.93	2.47	957.51	209.730	8.240
240	6°45"	8°06'	02°41'58"	160.17	80.15	239.79	119.88	3.53	852.48	239.493	12.000
270	7°30"	10°07'0"	03°22'27"	180.30	90.27	269.63	134.79	4.85	768.93	269.115	16.751
300	8°15"	12°22'30"	04°07'24"	200.49	100.45	299.20	149.67	6.46	701.11	298.538	22.604
330	9°	14°51'	04°56'50"	220.78	110.71	329.02	164.50	8.40	645.18	327.695	29.664

TABLE 28 — RAILROAD TAPER TABLES (Continued)

T=1 1/3

Changing 00°40' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	1°20'	00°12'	0°04'00"	20.00	10.00	30.00	15.00	.026	4,297.26	30	.05
60	2°	00°36'	0°12'00"	40.00	20.00	60.00	30.00	.105	2,864.94	60	.21
90	2°40'	1°12'	0°24'00"	60.00	30.00	90.00	45.00	.262	2,148.90	90	.63
120	3°20'	2°00'	0°40'00"	80.00	40.00	119.99	59.99	.524	1,719.46	119.98	1.40
150	4°	3°00'	1°00'00"	100.00	50.01	149.98	74.89	.916	1,433.38	149.96	2.62
180	4°40'	4°12'	1°24'00"	120.03	60.03	179.96	89.97	1.466	1,229.32	179.90	4.39
210	5°20'	5°36'	1°51'59"	140.07	70.06	209.91	104.94	2.197	1,076.59	209.80	6.83
240	6°	7°12'	2°23'59"	160.13	80.12	239.83	119.90	3.139	958.18	239.62	10.04
270	6°40'	9°00'	2°59'58"	182.33	90.21	269.70	134.84	4.314	863.69	269.33	14.11
300	7°20'	10°59'	3°39'36"	200.39	100.35	299.51	149.74	5.749	787.19	298.89	19.12
330	8°	13°12'	4°23'53"	220.61	110.56	329.22	164.60	7.469	723.81	328.25	25.25
360	8°40'	15°36'	5°11'48"	240.94	120.85	358.82	179.41	9.496	670.76	357.34	32.50
390	9°20'	18°12'	6°03'41"	261.39	131.26	388.25	194.15	11.86	625.91	386.08	41.00

T=2

Changing 1° for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	2°	00°18'	00°09'00"	15.00	15.00	30.00	15.00	.039	2,864.86	30.00	.08
60	3°	00°54'	00°22'30"	35.00	25.00	60.00	30.00	.157	1,910.07	60.00	.39
90	4°	01°48'	00°42'00"	55.00	35.00	90.00	45.00	.393	1,432.86	89.99	1.10
120	5°	03°	01°07'30"	75.01	45.01	120.00	59.99	.785	1,146.79	119.96	2.35
150	6°	04°30'	01°39'00"	95.03	55.03	149.96	74.97	1.37	956.41	149.90	4.32
180	7°	06°10'	02°16'30"	115.08	65.08	179.91	89.93	2.20	820.83	179.77	7.14
210	8°	08°24'	02°59'59"	135.17	75.16	209.81	104.87	3.29	719.64	209.52	10.98
240	9°	10°48'	03°49'27"	155.32	85.29	239.63	119.78	4.70	641.49	239.10	15.98
270	10°	13°30'	04°44'54"	175.56	95.51	269.35	134.63	6.46	579.60	268.43	22.30

T=2 1/2

Changing 1°30' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	3°00'	00°27'	00°13'35"	15.00	15.00	30.00	15.00	.051	1,909.97	30.00	.12
60	4°30'	01°21'	00°33'45"	35.00	25.00	60.00	30.00	.236	1,273.56	60.00	.59
90	6°00'	02°42'	01°03'00"	55.00	35.01	89.99	45.00	.589	955.63	90.00	1.65
120	7°30'	04°30'	01°41'15"	75.03	45.03	119.97	59.96	1.18	765.26	119.92	3.53
150	9°00'	06°45'	02°28'29"	95.08	55.08	149.91	74.93	2.06	638.84	149.77	6.47
180	10°30'	09°27'	03°24'43"	115.19	65.17	179.79	89.85	3.29	549.16	179.47	10.70
210	12°00'	12°36'	04°29'55"	135.38	75.35	209.57	104.72	4.93	482.62	208.92	16.44

TABLE 28 — RAILROAD TAPER TABLES (Continued)

T=2 1/4

Changing 1°15' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	2°30'	00°22'30"	00°07'30"	20.00	10.00	30.00	15.00	.049	2,291.92	30.00	0.09
60	3°45'	00°45'00"	00°15'00"	40.00	20.00	60.00	30.00	.197	1,528.15	60.00	0.49
90	5°	1°07'30"	00°22'30"	60.00	30.00	90.00	44.99	.491	1,146.50	89.98	1.37
120	6°15'	1°30'00"	00°30'00"	80.00	40.00	120.00	59.98	.981	917.83	119.94	2.94
150	7°30'	1°52'30"	00°37'30"	100.01	50.01	149.99	74.95	1.717	765.80	149.84	5.40
180	8°45'	2°15'00"	00°45'00"	120.01	60.01	179.99	89.90	2.745	657.71	179.64	8.92
210	10°	2°37'30"	00°52'20"	140.02	70.01	209.98	104.80	4.115	577.25	209.25	13.71

T=2 3/4

Changing 2° for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	4°	00°36'	00°18'00"	15.00	15.00	30.00	14.999	.078	1,432.55	30.00	.1571
60	6°	01°48'	00°45'00"	35.00	25.00	60.00	29.995	.314	953.35	59.99	.7854
90	8°	03°36'	01°24'00"	55.02	35.01	89.99	44.981	.785	717.13	89.96	2.198
120	10°	06°00'	02°15'00"	75.05	45.05	119.95	59.945	1.57	574.71	119.85	4.709
150	12°	09°00'	03°17'58"	95.14	55.03	149.85	74.872	2.74	480.43	149.60	8.625
180	14°	12°36'	04°32'55"	115.33	65.31	179.63	89.785	4.38	413.89	179.07	14.25
210	16°	16°48'	05°39'48"	135.68	75.63	209.23	104.50	6.56	364.95	208.08	21.84

T=3

Changing 2°30' for each 30 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
30	5°00'	00°45'	00°22'30"	15.00	15.00	30.00	15.00	.098	1,146.10	30.00	.1963
60	7°30'	02°15'	00°56'15"	35.00	25.00	60.00	29.99	.393	764.47	59.99	.9816
90	10°	04°30'	01°45'00"	55.02	35.02	89.98	44.97	.981	574.12	89.94	2.748
120	12°30'	07°30'	02°48'44"	75.08	45.08	119.92	59.91	1.96	460.35	119.77	5.884
150	15°	11°45'	04°07'27"	95.22	55.21	149.76	74.80	3.43	385.67	149.37	10.770
180	17°30'	15°45'	05°41'08"	115.52	65.48	179.43	89.59	5.47	333.19	178.54	17.774
210	20°	21°	07°29'38"	136.08	75.99	208.80	104.22	8.18	295.02	207.01	27.231

TABLE 28 — RAILROAD TAPER TABLES (Continued)

T=3 1/2

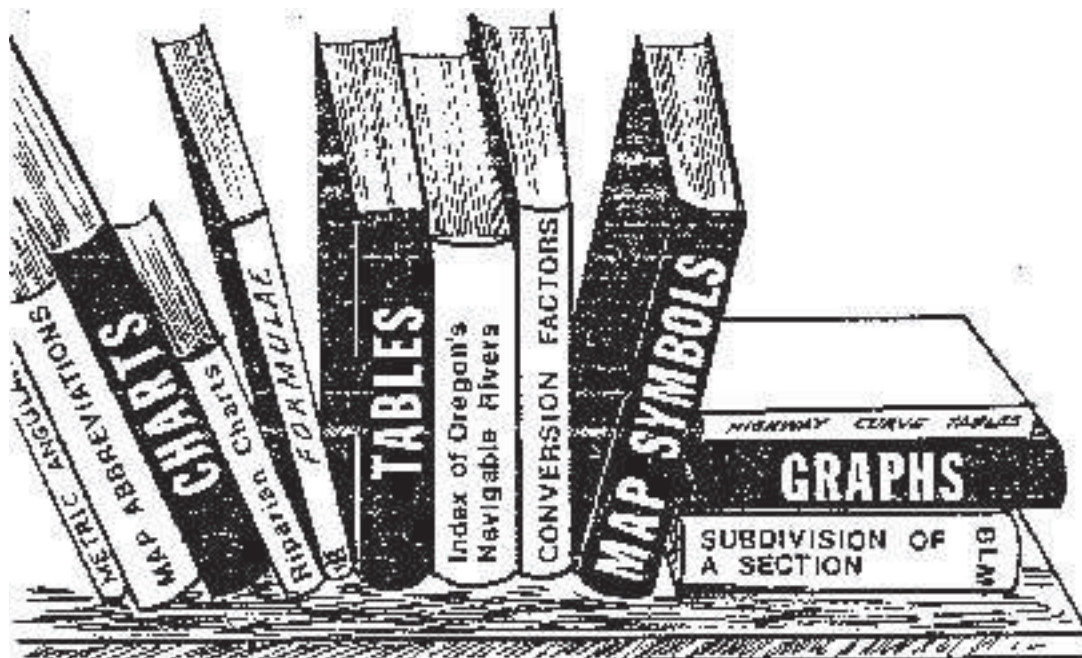
Changing 2° for each 15 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
15	4°	00°18,	00°09'00"	7.50	7.50	15.00	7.50	.020	1,432.49	14.9999	.0393
30	6°	00°54'	00°22'00"	17.50	12.50	30.00	15.00	.078	955.12	29.999	.1963
45	8°	01°48'	00°42'00"	27.50	17.50	45.00	22.49	.197	716.54	44.995	.5497
60	10°	03°00'	01°07'30"	37.51	22.51	59.99	30.00	.392	575.53	59.98	1.1779
75	12°	04°30'	01°30'00"	47.52	27.52	74.98	37.47	.686	478.37	74.95	2.1589
90	14°	06°18'	02°16'30"	57.54	32.54	89.95	44.95	1.10	410.61	89.88	3.5706
105	16°	08°24'	02°59'59"	67.58	37.58	104.90	52.41	1.65	360.03	104.76	5.4895

T=4

Changing 2°30' for each 15 feet

L feet	D° Central curve	S°	HAX	u feet	v feet	C feet	t feet	d feet	(R+d) feet	x feet	y feet
15	5°	22'30"	00°11'15"	7.50	7.50	15.00	7.50	.024	1,146.03	14.9999	.0491
30	7°30'	1°07'30"	00°28'07"	17.50	12.50	30.00	15.00	.098	764.18	29.999	.2454
45	10°	2°15'00"	00°52'30"	27.50	17.50	44.99	22.49	.245	573.38	44.99	.6872
60	12°30'	3°45'00"	01°24'22"	37.51	22.51	59.99	29.98	.490	459.08	59.97	1.4722
75	15°15'	5°37'30"	02°03'45"	47.53	27.53	74.97	37.46	.857	383.10	74.92	2.6980
90	17°30'	7°52'30"	02°50'36"	57.56	32.56	89.93	44.91	1.370	329.09	89.82	4.4611
105	20°	10°50'00"	03°44'57"	67.63	37.62	104.85	52.35	2.053	288.90	104.62	6.8561



APPENDIX

Annotations

Additional information acquired from research, new cases, law reviews and other published material will be periodically added to this part of this publication. This section will also be used to note important changes in statutory law. Any reference to this publication for problem solving must include a review of the annotations.

Appendix B:

Oregon Revised Statutes

Chapter 92	TENTATIVE AND FINAL APPROVAL OF PLANS; PLATS
3.310	[Amended by 1955 c.715 §2; 1959 c.557 §5; 1961 c.724 §10; 1965 c.510 §8; repealed by 1981 c.215 §8]
6.000	
16.630	[Repealed by 1979 c.284 §199]
27.000	
34.010	Former writ of certiorari as writ of review. The writ heretofore known as the writ of certiorari is known in these statutes as the writ of review.
40.120	No results were found for your search.
40.135	"Relating to adverse possession; creating new provisions; amending ORS 40.135, 96.060 and ..."
41.360	[Amended by 1957 c.679 §1; 1961 c.726 §399; repealed by 1981 c.892 §98]
41.540	[Repealed by 1977 c.479 §1]
86.705	"Definitions for ORS 86.705 to 86.795. As used in ORS 86.705 to 86.795, unless the context requires otherwise:"
86.715	"Trust deed deemed to be mortgage on real property; applicability of mortgage laws. A trust deed is deemed to be a mortgage on real property and is subject to all laws relating to mortgages on real property except to the extent that such laws are inconsistent with the provisions of ORS 86.705 to 86.795, in which event the provisions of ORS 86.705 to 86.795 shall control. For the purpose of applying the mortgage laws, the grantor in a trust deed is deemed the mortgagor and the beneficiary is deemed the mortgagee. [1959 c.625 §21]"
86.795	"Compensation of trustee. The charge of a trustee for the performance of powers and duties of foreclosure by advertisement and sale imposed under ORS 86.705 to 86.795 shall not exceed 50 percent of the compensation allowable to an executor or administrator under ORS 116.173 or a minimum charge of \$100. Such compensation shall be based upon the amount due on the obligation, both principal and interest, at the time of the trustee's sale. [1959 c.625 §19; 1961 c.616 §7; 1965 c.457 §10]"
91.500	[Formerly 91.505; 1979 c.650 §1; 1981 c.647 §1; renumbered 94.004]
91.506	[Formerly 91.525; 1979 c.650 §26; 1981 c.647 §3; renumbered 94.023]
91.509	[Formerly 91.530; 1979 c.650 §2; 1981 c.647 §4; renumbered 94.029]
91.512	[Formerly 91.535; 1979 c.350 §2; 1981 c.697 §7; renumbered 94.036]
91.515	[Formerly 91.540; 1979 c.650 §3; renumbered 94.042]
91.535	[1963 c.541 §17; 1971 c.230 §1; 1973 c.402 §1; 1973 c.803 §1; 1977 c.658 §6; renumbered 91.512]
91.536	[Formerly 91.565; 1979 c.650 §12; renumbered 94.171]
91.561	[Formerly 91.605; renumbered 94.231]
91.563	[Formerly 91.610; 1979 c.650 §14; renumbered 94.243]
91.581	[Formerly 91.640; 1979 c.650 §17; renumbered 94.285]
91.591	[Formerly 91.665; 1979 c.650 §18; renumbered 94.306]
91.990	[1977 c.484 §23; renumbered 94.991]

92.000

92.012 Compliance with ORS 92.010 to 92.190 required. No land may be subdivided or partitioned except in accordance with ORS 92.010 to 92.190. [1973 c.696 §2; 1975 c.643 §24]

92.020 [Repealed by 1955 c.756 §5 (92.025 enacted in lieu of 92.020 and 92.030)]

92.025 Prohibition of sales of lots or certain interests prior to recordation of plat; waiver. (1) No person shall sell any lot in any subdivision or convey any interest in a parcel in any partition until the plat of the subdivision or partition has been acknowledged and recorded with the recording officer of the county in which the lot or parcel is situated.

92.030 [Repealed by 1955 c.756 §5 (92.025 enacted in lieu of 92.020 and 92.030)]

92.040 “Application for approval of subdivision or partition; tentative plan; applicability of local government laws. (1) Before a plat of any subdivision or partition subject to review under ORS 92.044 may be made and recorded, the person proposing the subdivision or partition or authorized agent or representative of the person shall make an application in writing to the county or city having jurisdiction under ORS 92.042 for approval of the proposed subdivision or partition in accordance with procedures established by the applicable ordinance or regulation adopted under ORS 92.044. Each such application shall be accompanied by a tentative plan showing the general design of the proposed subdivision or partition. No plat for any proposed subdivision or partition may be considered for approval by a city or county until the tentative plan for the proposed subdivision or partition has been approved by the city or county. Approval of the tentative plan shall not constitute final acceptance of the plat of the proposed subdivision or partition for recording; however, approval by a city or county of such tentative plan shall be binding upon the city or county for the purposes of the preparation of the subdivision or partition plat, and the city or county may require only such changes in the subdivision or partition plat as are necessary for compliance with the terms of its approval of the tentative plan for the proposed subdivision or partition.”

92.044 “Adoption of standards and procedures governing approval of plats and plans; delegation; fees. (1) The governing body of a county or a city shall, by regulation or ordinance, adopt standards and procedures, in addition to those otherwise provided by law, governing, in the area over which the county or the city has jurisdiction under ORS 92.042, the submission and approval of tentative plans and plats of subdivisions, tentative plans and plats of partitions in exclusive farm use zones established under ORS 215.203.”

92.050 “Requirements of survey and plat of subdivision and partition. (1) A person shall not submit a plat of a subdivision or partition for record, until all the requirements of ORS 209.250 and the plat requirements of the subdivision or partition have been met.”

92.060 “Marking certain points of subdivisions, partitions or condominium plats with monuments; specifications of monuments; monuments placed before recording; adjusted property line survey and monument. (1) The initial point of all plats shall be on the exterior boundary of the plat and shall be marked with a monument, either of concrete, galvanized iron pipe or an iron or steel rod. If concrete is used it shall not be less than 6 inches by 6 inches by 24 inches and shall contain not less than five cubic inches of ferrous material permanently imbedded in the concrete. If galvanized iron pipe is used it shall not be less than three-quarter inch inside diameter and 30 inches long, and if an iron or steel rod is used it shall not be less than five-eighths of an inch in least dimension and 30 inches long. The location of the monument shall be with reference by survey to a section corner, one-quarter corner, one-sixteenth corner, Donation Land Claim corner or to a monumented lot corner or boundary corner of a recorded subdivision, partition or condominium plat. The county surveyor may authorize the setting of another type of monument in circumstances where setting the required monuments is impracticable.”

92.070	“Surveyor’s certificates; procedure for recording monumented corners on plat previously recorded; reestablishing certain monuments. (1) Except as otherwise provided in this section, all subdivision or partition plats designating the location of land in any county in the State of Oregon, offered for record, shall include on the face of the plat a surveyor’s certificate together with the seal and signature of the surveyor having surveyed the land represented on the plat, to the effect that the surveyor has correctly surveyed and marked with proper monuments the lands as represented, and has placed a proper monument as provided in ORS 92.060 indicating the initial point of the plat and its location in accordance with ORS 92.060 (1) and accurately describing by metes or bounds, or other description as approved by the county surveyor, the tract of land upon which the lots and blocks or parcels are laid out. If the plat is a partition plat which contains parcels not surveyed, the surveyor’s certificate shall so indicate.”
92.090	“Approval of subdivision plat names; requisites for approval of tentative subdivision or partition plan or plat. (1) Subdivision plat names shall be subject to the approval of the county surveyor or, in the case where there is no county surveyor, the county assessor. No tentative subdivision plan or subdivision plat of a subdivision shall be approved which bears a name similar to or pronounced the same as the name of any other subdivision in the same county, unless the land platted is contiguous to and platted by the same party that platted the subdivision bearing that name or unless the party files and records the consent of the party that platted the contiguous subdivision bearing that name. All subdivision plats must continue the lot numbers and, if used, the block numbers of the subdivision plat of the same name last filed. On or after January 1, 1992, any subdivision submitted for final approval shall not use block numbers or letters unless such subdivision is a continued phase of a previously recorded subdivision, bearing the same name, that has previously used block numbers or letters.”
92.095	“Relating to taxation; creating new provisions; and amending ORS 92.095, 100.110, 307.112, ...”
92.100	
92.150	Construction of donations marked on plat.
92.205	“Relating to judicial review; creating new provisions; amending ORS 19.028, 25.768, 28.020, ...”
92.215	“TENTATIVE AND FINAL APPROVAL OF PLANS; PLATS 92.010 Definitions for ORS 92.010 to 92.190. As used in ORS 92.010 to 92.190, unless the context requires otherwise:”
92.225	“TENTATIVE AND FINAL APPROVAL OF PLANS; PLATS 92.010 Definitions for ORS 92.010 to 92.190. As used in ORS 92.010 to 92.190, unless the context requires otherwise:”
92.234	“Relating to judicial review; creating new provisions; amending ORS 19.028, 25.768, 28.020, ...”
93.000	Conveyancing and Recording
93.030	“Contracts to convey, instruments of conveyance and related memoranda to state consideration. (1) As used in this section, “”consideration”” includes the amount of cash and the amount of any lien, mortgage, contract, indebtedness or other encumbrance existing against the property to which the property remains subject or which the purchaser agrees to pay or assume.”
93.280	“Manner of conveyance to create joint property rights. (1) Any person or persons owning real property which the person or persons have power to convey may convey such property by a conveyance naming the person or persons and another person or persons, or one or more of themselves and another person or other persons, as grantees. The conveyance shall have the same effect as a conveyance from a stranger who owned the property to the persons named as grantees.”
93.310	

93.320	Oregon Coordinate System; zones.
93.330	“Definition. (1) For more precisely defining the Oregon coordinate systems, the following definitions by the National Geodetic Survey of the National Ocean Service are adopted:”
93.340	93.340 [Repealed by 1985 c.202 §7]
93.350	Plane coordinates.
93.360	Coordinates excluded from recordation.
93.370	Description as supplemental.
93.380	“Purchaser or mortgagee not required to rely on description. Nothing contained in ORS 93.320 to 93.370 requires any purchaser or mortgagee to rely on a description, any part of which consists only of coordinates. [Amended by 1985 c.202 §6]”
93.630	“Index to record of deeds, mortgages and other real property interests. The county clerk shall also keep a proper direct index and a proper indirect index to the record of deeds, mortgages and all other real property interests required or permitted by law to be recorded, in which the county clerk shall enter, alphabetically, the name of every party to each instrument recorded by the county clerk, with a reference to where it is recorded. [Amended by 1987 c.586 §22; 1999 c.654 §11]”
93.635	“Acknowledgment and recording of instruments contracting to convey fee title. (1) All instruments contracting to convey fee title to any real property, at a time more than 12 months from the date that the instrument is executed and the parties are bound, shall be acknowledged, in the manner provided for acknowledgment of deeds, by the conveyor of the title to be conveyed. Except for those instruments listed in subsection (2) of this section, all such instruments, or a memorandum thereof, shall be recorded by the conveyor not later than 15 days after the instrument is executed and the parties are bound thereby.”
93.640	“Unrecorded instrument affecting title or unrecorded assignment of sheriff’s certificate of sale void as to subsequent purchaser. (1) Every conveyance, deed, land sale contract, assignment of all or any portion of a seller’s or purchaser’s interest in a land sale contract or other agreement or memorandum thereof affecting the title of real property within this state which is not recorded as provided by law is void as against any subsequent purchaser in good faith and for a valuable consideration of the same real property, or any portion thereof, whose conveyance, deed, land sale contract, assignment of all or any portion of a seller’s or purchaser’s interest in a land sale contract or other agreement or memorandum thereof is first filed for record, and as against the heirs and assigns of such subsequent purchaser. As used in this section, “”every conveyance, deed, land sale contract, assignment of all or any portion of a seller’s or purchaser’s interest in a land sale contract or other agreement or memorandum thereof affecting the title of real property”” includes mortgages, trust deeds, and assignments for security purposes or assignments solely of proceeds, given by purchasers or sellers under land sale contract. As used in this section, “”memorandum”” means an instrument that contains the date of the instrument being memorialized, the names of the parties, a legal description of the real property involved, and the nature of the interest created, which is signed by the person from whom the interest is intended to pass, and acknowledged or proved in the manner provided for the acknowledgment or proof of deeds. A memorandum of an instrument conveying or contracting to convey fee title to any real estate shall state on its face the true and actual consideration paid for such transfer as provided in ORS 93.030.”
93.850	Warranty deed form; effect. (1) Warranty deeds may be in the following form:
93.850	Warranty deed form; effect. (1) Warranty deeds may be in the following form:
93.855	Special warranty deed form; effect. (1) Special warranty deeds may be in the following form:
93.860	Bargain and sale deed form; effect. (1) Bargain and sale deeds may be in the following form:

93.865	Quitclaim deed form; effect. (1) Quitclaim deeds may be in the following form:
93.870	Statutory deed forms optional. The form of deeds set forth in ORS 93.850 to 93.865 are permissive and not mandatory. Other forms of deeds may be used for the conveyance of real property. [1973 c.194 §5]
94.004	[Formerly 91.500; 1983 c.530 §48; 1987 c.459 §1; 1989 c.595 §1; renumbered 100.005 in 1989]
94.005	[Repealed by 1971 c.478 §1]
94.010	[Repealed by 1971 c.478 §1]
94.011	[Formerly 91.503; renumbered 100.010 in 1989]
94.013	[1987 c.459 §6; 1989 c.595 §2; renumbered 100.020 in 1989]
94.015	[Repealed by 1971 c.478 §1]
94.016	[1987 c.459 §39; renumbered 100.025 in 1989]
94.017	[Formerly 91.504; 1987 c.459 §37; 1989 c.595 §3; renumbered 100.185 in 1989]
94.020	[Repealed by 1971 c.478 §1]
94.021	[1987 c.459 §3; 1989 c.595 §4; renumbered 100.150 in 1989]
94.022	[1987 c.459 §4; 1989 c.595 §5; renumbered 100.155 in 1989]
94.023	[Formerly 91.506; 1987 c.459 §7; 1989 c.595 §6; renumbered 100.100 in 1989]
94.025	[Repealed by 1971 c.478 §1]
94.029	[Formerly 91.509; 1983 c.530 §49; 1983 c.615 §1; 1987 c.459 §8; 1989 c.595 §7; renumbered 100.105 in 1989]
94.030	[Repealed by 1971 c.478 §1]
94.035	[Repealed by 1971 c.478 §1]
94.036	[Formerly 91.512; 1983 c.615 §2; 1983 c.740 §7a; 1987 c.459 §9; renumbered 100.110 in 1989]
94.040	[Repealed by 1971 c.478 §1]
94.042	[Formerly 91.515; 1983 c.309 §8; 1985 c.582 §2; 1987 c.459 §10; 1989 c.595 §8; renumbered 100.115 in 1989]
94.045	[Repealed by 1971 c.478 §1]
94.047	[Formerly 91.518; 1983 c.309 §8a; 1987 c.459 §11; 1989 c.595 §9; renumbered 100.120 in 1989]
94.048	[1987 c.459 §3a; renumbered 100.125 in 1989]
94.050	[Repealed by 1971 c.478 §1]
94.055	[Repealed by 1971 c.478 §1]
94.059	[Formerly 91.521; 1983 c.615 §3; 1987 c.459 §12; renumbered 100.135 in 1989]
94.060	[Repealed by 1971 c.478 §1]
94.065	[Repealed by 1971 c.478 §1]
94.066	[1981 c.647 §30; renumbered 100.170 in 1989]
94.070	[Repealed by 1971 c.478 §1]
94.072	[1981 c.647 §33; renumbered 100.175 in 1989]
94.075	[Repealed by 1971 c.478 §1]
94.078	[1981 c.647 §25; 1983 c.206 §1; 1983 c.530 §50; 1987 c.459 §13; 1989 c.595 §10; renumbered 100.200 in 1989]

94.080	[Repealed by 1971 c.478 §1]
94.084	[1981 c.647 §26; 1987 c.459 §14; renumbered 100.205 in 1989]
94.085	[Repealed by 1971 c.478 §1]
94.090	[Repealed by 1971 c.478 §1]
94.091	[1981 c.647 §27; 1983 c.206 §2; 1987 c.459 §15; renumbered 100.210 in 1989]
94.095	[Repealed by 1971 c.478 §1]
94.097	[1981 c.647 §29; 1989 c.595 §11; renumbered 100.220 in 1989]
94.100	[Repealed by 1971 c.478 §1]
94.103	[1981 c.647 §28; 1989 c.595 §12; renumbered 100.225 in 1989]
94.105	[Repealed by 1971 c.478 §1]
94.109	[Formerly 91.523; renumbered 100.300 in 1989]
94.110	[Repealed by 1971 c.478 §1]
94.115	[Repealed by 1971 c.478 §1]
94.116	[Formerly 91.524; renumbered 100.305 in 1989]
94.120	[Repealed by 1971 c.478 §1]
94.122	[Formerly 91.526; 1989 c.595 §13; renumbered 100.310 in 1989]
94.125	[Repealed by 1971 c.478 §1]
94.128	[1981 c.886 §5; 1989 c.595 §14; renumbered 100.315 in 1989]
94.130	[Repealed by 1971 c.478 §1]
94.134	[1981 c.886 §6; 1989 c.595 §15; renumbered 100.320 in 1989]
94.135	[Repealed by 1971 c.478 §1]
94.140	[Repealed by 1971 c.478 §1]
94.145	[Repealed by 1971 c.478 §1]
94.146	[Formerly 91.527; 1989 c.595 §16; renumbered 100.405 in 1989]
94.150	[Repealed by 1971 c.478 §1]
94.152	[Formerly 91.531; 1983 c.615 §4; 1987 c.459 §16; 1989 c.595 §48; renumbered 100.410 in 1989]
94.155	[Repealed by 1971 c.478 §1]
94.158	[Formerly 91.533; 1987 c.459 §17; 1989 c.595 §17; renumbered 100.415 in 1989]
94.160	[Repealed by 1971 c.478 §1]
94.164	[Formerly 91.534; renumbered 100.420 in 1989]
94.165	[Repealed by 1971 c.478 §1]
94.170	[Repealed by 1971 c.478 §1]
94.171	[Formerly 91.536; 1987 c.459 §18; renumbered 100.430 in 1989]
94.175	[Repealed by 1971 c.478 §1]
94.177	[1981 c.647 §32; renumbered 100.435 in 1989]
94.180	[Repealed by 1971 c.478 §1]
94.185	[Formerly 91.539; 1989 c.595 §18; renumbered 100.440 in 1989]

94.190	[Formerly 91.542; renumbered 100.445 in 1989]
94.195	Formerly 91.546; 1983 c.530 §51; 1989 c.595 §19; renumbered 100.450 in 1989]
94.202	[Formerly 91.548; 1989 c.595 §20; renumbered 100.460 in 1989]
94.205	[Repealed by 1971 c.478 §1]
94.208	[Formerly 91.551; 1989 c.595 §21; renumbered 100.475 in 1989]
94.210	[Repealed by 1971 c.478 §1]
94.214	[Formerly 91.554; renumbered 100.480 in 1989]
94.215	[Repealed by 1971 c.478 §1]
94.220	[Repealed by 1971 c.478 §1]
94.221	[Formerly 91.557; renumbered 100.485 in 1989]
94.225	[Repealed by 1971 c.478 §1]
94.230	[Repealed by 1971 c.478 §1]
94.231	[Formerly 91.561; renumbered 100.505 in 1989]
94.235	[Repealed by 1971 c.478 §1]
94.237	[Formerly 91.562; renumbered 100.510 in 1989]
94.240	[Repealed by 1971 c.478 §1]
94.243	[Formerly 91.563; 1983 c.309 §8c; 1983 c.615 §5; renumbered 100.515 in 1989]
94.245	[Repealed by 1971 c.478 §1]
94.250	[1981 c.647 §31; 1983 c.309 §8d; renumbered 100.520 in 1989]
94.255	[Formerly 91.564; renumbered 100.525 in 1989]
94.260	[Formerly 91.566; 1987 c.459 §19; 1989 c.595 §22; renumbered 100.530 in 1989]
94.265	[Formerly 91.569; renumbered 100.535 in 1989]
94.270	[Formerly 91.572; renumbered 100.540 in 1989]
94.275	[Formerly 91.576; renumbered 100.545 in 1989]
94.280	[Formerly 91.578; 1983 c.615 §6; 1989 c.595 §23; renumbered 100.550 in 1989]
94.285	[Formerly 91.581; renumbered 100.555 in 1989]
94.295	[Formerly 91.584; 1989 c.595 §24; renumbered 100.600 in 1989]
94.300	[Formerly 91.587; 1989 c.595 §25; renumbered 100.605 in 1989]
94.305	[Repealed by 1971 c.478 §1]
94.306	[Formerly 91.591; 1989 c.595 §26; renumbered 100.610 in 1989]
94.310	[Repealed by 1971 c.478 §1]
94.312	[Formerly 91.593; 1989 c.595 §27; renumbered 100.615 in 1989]
94.315	[Repealed by 1971 c.478 §1]
94.318	[Formerly 91.596; 1989 c.595 §28; renumbered 100.620 in 1989]
94.320	[Repealed by 1971 c.478 §1]
94.322	[1983 c.615 §8; renumbered 100.625 in 1989]
94.324	[Formerly 91.599; 1985 c.760 §1; repealed by 1987 c.459 §41]

94.325	“[Repealed by 1971 c.478 §1]
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94.330	[Amended by 1969 c.591 §278; repealed by 1971 c.478 §1]
94.331	[Formerly 91.602; 1987 c.459 §20; 1989 c.595 §29; renumbered 100.635 in 1989]
94.333	[1987 c.459 §22; renumbered 100.015 in 1989]
94.335	[Repealed by 1971 c.478 §1]
94.336	[Formerly 91.606; repealed by 1987 c.459 §41]
94.340	[Repealed by 1971 c.478 §1]
94.342	[Formerly 91.608; 1987 c.459 §29; renumbered 100.645 in 1989]
94.345	[Repealed by 1971 c.478 §1]
94.348	[Formerly 91.611; 1987 c.459 §30; renumbered 100.650 in 1989]
94.350	[Repealed by 1971 c.478 §1]
94.351	[1987 c.459 §24; 1989 c.595 §30; renumbered 100.655 in 1989]
94.353	[1987 c.459 §25; renumbered 100.640 in 1989]
94.354	[1987 c.459 §23; renumbered 100.670 in 1989]
94.355	[Repealed by 1971 c.478 §1]
94.356	[1987 c.459 §26; renumbered 100.660 in 1989]
94.357	[1987 c.459 §27; renumbered 100.675 in 1989]
94.358	[1987 c.459 §28; renumbered 100.680 in 1989]
94.359	[Formerly 91.614; 1987 c.459 §31; renumbered 100.700 in 1989]
94.360	[Repealed by 1971 c.478 §1]
94.365	[Repealed by 1971 c.478 §1]
94.366	[Formerly 91.617; repealed by 1987 c.459 §41]
94.370	[Repealed by 1971 c.478 §1]
94.372	[Formerly 91.621; repealed by 1987 c.459 §41]
94.375	[Repealed by 1971 c.478 §1]
94.378	[Formerly 91.623; repealed by 1987 c.459 §41]
94.380	[Repealed by 1971 c.478 §1]
94.384	[Formerly 91.626; 1987 c.459 §32; 1989 c.171 §12; 1989 c.595 §31; renumbered 100.705 in 1989]
94.385	[Repealed by 1971 c.478 §1]
94.390	[Repealed by 1971 c.478 §1]
94.391	[Formerly 91.629; 1987 c.459 §35; renumbered 100.710 in 1989]
94.395	[Repealed by 1971 c.478 §1]
94.400	[Formerly 91.631; renumbered 100.720 in 1989]
94.405	[Repealed by 1971 c.478 §1]
94.406	[Formerly 91.634; renumbered 100.725 in 1989]

94.410	[Repealed by 1971 c.478 §1]
94.412	[Formerly 91.637; 1989 c.595 §47; renumbered 100.730 in 1989]
94.415	[Repealed by 1971 c.478 §1]
94.418	[1981 c.647 §24; renumbered 100.735 in 1989]
94.420	[Repealed by 1971 c.478 §1]
94.424	[Formerly 91.641; 1989 c.595 §32; renumbered 100.740 in 1989]
94.425	[Repealed by 1971 c.478 §1]
94.430	[Repealed by 1971 c.478 §1]
94.431	[Formerly 91.646; 1987 c.459 §36; renumbered 100.745 in 1989]
94.435	[Repealed by 1971 c.478 §1]
94.437	[Formerly 91.649; renumbered 100.750 in 1989]
94.440	[Repealed by 1971 c.478 §1]
94.445	[Repealed by 1971 c.478 §1]
94.448	[Formerly 91.652; renumbered 100.770 in 1989]
94.454	[Formerly 91.656; renumbered 100.775 in 1989]
94.460	[Formerly 91.658; renumbered 100.780 in 1989]
94.465	[Formerly 91.661; 1989 c.595 §33; renumbered 100.785 in 1989]
94.470	[Formerly 91.664; 1983 c.696 §7b; 1989 c.706 §7; renumbered 100.900 in 1989]
94.475	[Formerly 91.667; renumbered 100.905 in 1989]
94.550	“Relating to home businesses in planned communities; amending ORS 94.550, 94.580 and 94.635.”
94.665	“Relating to organized communities; creating new provisions; amending ORS 65.369, 94.550, ...”
94.728	“Relating to planned unit development; creating new provisions; and amending ORS 94.550, ...”
94.991	See annotations under ORS 100.005 to 100.910.
98.140	“Notice of sale. Before property shall be sold pursuant to ORS 98.130, at least 60 days’ notice of sale shall be given the owner of the property, if the name and residence of the owner are known, either personally or by mail, or by leaving a notice at the residence or place of doing business of the owner, or, if the name and residence of the owner is not known, a notice shall be published containing a description of the property for six weeks successively in a newspaper published in the county where the property was deposited. If there is no newspaper published in that county, then the notice shall be published in a newspaper nearest thereto in the state. The last publication of the notice shall be at least 18 days prior to the time of sale.”
183.310	Relating to corrections; amending ORS 183.310 and 183.315.

209.090	"Procuring and filing copies of plats and field notes of United States surveys; copies as evidence. (1) The county court shall procure from the Bureau of Land Management a copy of the field notes and plats of all surveys and resurveys of public lands of townships, sections, Donation Land Claims, mineral claims, homesteads, meander lines or other similar surveys lying within its county. These shall include copies of the official plats and field notes of the survey and shall be filed in the office of the county surveyor. (2) Copies, certified by the county surveyor, of copies of such field notes or plats filed in the office of the county surveyor by the county court shall be prima facie evidence. [Amended by 1979 c.653 §6; 1989 c.394 §9]"
209.250	"Survey by registered land surveyor; requirements for map, narrative or report of survey; effect of noncompliance."
221.750	"Relating to adverse possession; creating new provisions; amending ORS 40.135, 96.060 and ...Adverse possession of county lands. The rights of any county to public lands are not extinguished by adverse possession. No title or property rights to public lands shall be acquired against the county through operation of a statute of limitations. [1981 c.153 §51]"
229.000	
271.140	"Title to vacated areas. The title to the street or other public area vacated shall attach to the lands bordering on such area in equal portions; except that where the area has been originally dedicated by different persons and the fee title to such area has not been otherwise disposed of, original boundary lines shall be adhered to and the street area which lies on each side of such boundary line shall attach to the abutting property on such side. If a public square is vacated the title thereto shall vest in the city. [Amended by 1981 c.153 §58]"
271.150	"Vacation records to be filed; costs. A certified copy of the ordinance vacating any street or plat area and any map, plat or other record in regard thereto which may be required or provided for by law, shall be filed for record with the county clerk. The petitioner for such vacation shall bear the recording cost and the cost of preparing and filing the certified copy of the ordinance and map. A certified copy of any such ordinance shall be filed with the county assessor and county surveyor."
271.750	No results were found for your search.
272.015	"Relating to acquisition of land by United States; amending ORS 272.015, 272.020, 272.040, ..."
272.036	Power of United States to acquire title for public improvements by eminent domain. Whenever it is necessary for the United States to acquire title to real property ...
272.102	
273.265	"Relating to duties of Division of State Lands; amending ORS 183.457, 196.600, 196.610, ..."
273.751	"Relating to management of state-owned lands; amending ORS 273.751, 273.755, 273.761, ..."
273.850	State title to certain lands and improvements transferred to Clatsop County; lands not subject to board jurisdiction.
273.855	"OREGON LAWS 1969 Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS 2.. 481.970 8.. 414.047 31.. 240.055 Oregon Laws 1969 35.. 1, 2 .. Appn 9.. 418.110 32.. 240.060 1.. 1 .. Appn 3.. Temp 10.. 418.115 33,33a ..."

273.860	“Filing fee; use of fees; additional fee to cover costs of investigation. Each applicant under ORS 273.865 (1) shall pay, at the time of filing an application, a fee of \$25. Moneys received under this section shall be deposited with the county treasurer and be available for payment of the expenses of the Board of County Commissioners of Clatsop County in carrying out ORS 273.855 (3), (4) and (5) and 273.860 to 273.880. In addition to such fee, if the county board determines that an investigation under ORS 273.865 (2) is necessary, it may require the applicant, prior to execution of any deed under ORS 273.855 (1), to pay an additional fee sufficient to pay the costs incurred by the county board in excess of \$25 in carrying out its duties with respect to that application under ORS 273.855 (3), (4) and (5) and 273.860 to 273.880. [1969 c.495 §7]”
273.865	“OREGON LAWS 1969 Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS 2.. 481.970 8.. 414.047 31.. 240.055 Oregon Laws 1969 35.. 1, 2 .. Appn 9.. 418.110 32.. 240.060 1.. 1 .. Appn 3.. Temp 10.. 418.115 33,33a ...”
273.870	“Notice of deed application; protest; hearing; dual applications. (1) The Board of County Commissioners of Clatsop County shall give public notice of each application received by it under ORS 273.865 (1), prior to its consideration thereof, by advertisement not less than once each week for four successive weeks in a newspaper of general circulation in Clatsop County. Such notice need not describe the lands applied for in legal terms, but by the use of common descriptions or maps shall be designed to identify the lands in a manner intelligible to the layman. Each notice shall indicate that a protest against the execution of the deed applied for may be filed, in a manner prescribed by the county board, with the county board not later than the 60th day after the fourth publication of the notice, or within such further time as the county board authorizes on a showing of good cause. Not later than the fifth day after the first publication of the notice, the county board shall send written notice of the application to the Division of State Lands.(2) If no protest is received within the time provided for in subsection (1) of this section, and if the county board thereafter determines that the application conforms to the requirements of ORS 273.865 (1), the county board shall execute and deliver to the applicant a deed in accordance with ORS 273.855 (1). (3) If protest is received within the time provided for in subsection (1) of this section, the county board shall cause a hearing to be held with respect to the protest, in a manner prescribed by its rules, prior to the making of its findings with respect to an application. (4) If two or more applications are filed with respect to the same lands, the county board shall cause a hearing to be held at which all such applicants may appear or be represented. [1969 c.495 §8]”
273.875	“OREGON LAWS 1969 Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS 2.. 481.970 8.. 414.047 31.. 240.055 Oregon Laws 1969 35.. 1, 2 .. Appn 9.. 418.110 32.. 240.060 1.. 1 .. Appn 3.. Temp 10.. 418.115 33,33a ...”
273.880	“Relating to judgments; creating new provisions; amending ORS 1.010, 1.655, 3.070, 3.260, ...”
273.885	“OREGON LAWS 1969 Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS Chap. Sec. ORS 2.. 481.970 8.. 414.047 31.. 240.055 Oregon Laws 1969 35.. 1, 2 .. Appn 9.. 418.110 32.. 240.060 1.. 1 .. Appn 3.. Temp 10.. 418.115 33,33a ...”
273.890	“Application of ORS 273.850 to 273.890 to certain lands; tax refunds prohibited. (1) Nothing in ORS 273.850 to 273.890 affects controversies among persons and governmental entities asserting proprietary rights, title and interests with respect to lands described in ORS 273.850 (1). (2) No ad valorem taxes paid or owing with respect to lands described in ORS 273.850 (1) shall be refunded or canceled on the ground that the State of Oregon may have been the legal owner of such lands before January 1, 1970. [1969 c.495 §§2,3]”

273.890	“Application of ORS 273.850 to 273.890 to certain lands; tax refunds prohibited. (1) Nothing in ORS 273.850 to 273.890 affects controversies among persons and governmental entities asserting proprietary rights, title and interests with respect to lands described in ORS 273.850 (1). (2) No ad valorem taxes paid or owing with respect to lands described in ORS 273.850 (1) shall be refunded or canceled on the ground that the State of Oregon may have been the legal owner of such lands before January 1, 1970. [1969 c.495 §§2,3]”
273.900	“Confirmation of title to tide lands and tide flats. The titles to all tide lands within this state, and all tide flats not adjacent to the shore in the waters of the state, which have been heretofore sold to purchasers by the State of Oregon, where the purchaser has, in good faith, actually paid to the state the purchase price, and the same has been received by the state, and the purchaser has not purchased from the state to exceed 320 acres of that character or class of land, are hereby confirmed to all such purchasers and grantees of the state, their heirs, successors or assigns, when such tide lands have not been fraudulently obtained, and without reference to the amount of any other character of lands purchased by such purchaser theretofore from the state. [Formerly 274.050]”
273.902	“Appointment, partisan political office, political Local Government Boundary Commissions, affiliation, 236.100, 236.225 members, 190.440 Bar Association, Oregon State”
273.903	“Title of certain swamp lands not to be questioned by division; prohibition against sale of certain swamp lands. The Division of State Lands shall not call in question the title of any person to any swamp lands which the person may not have acquired by full and complete compliance with the preemption or homestead laws of the United States, nor shall the division sell to anyone any unsurveyed swamp lands, or swamp lands on which any settler shall have made and perfected bona fide legal entry under the laws of the United States. “Swamp lands,” as used in this section, means lands classified as swamp lands pursuant to ORS 273.251. [Formerly 274.130]”
273.905	“Confirmation of state land deeds prior to 1891. All deeds prior to February 20, 1891, to state, school, and university lands, the purchase price of which was paid to the board of commissioners for the sale of school and university lands and for the investment of the fund arising therefrom, hereby are confirmed to the grantees of the state, or to their lawful heirs or assigns, together with all rights, title or interest which the state might or could have in any of the said lands. This section shall not apply to or confirm the title to any lands which were procured by false swearing or by fraudulent representations. [Formerly 273.280]”
273.910	“Confirmation of title to state lands purchased before 1918. In all cases prior to May 21, 1917, where state deeds were issued to lands claimed by this state under the laws of the United States, the legal title to which had not yet vested in the state at the date of such deeds, the after-acquired title of this state in or to such lands shall be deemed vested in such purchasers who purchased such lands in good faith, and their heirs and assigns, from the time such legal title passed or may pass out of the United States. Nothing in this section shall prevent the State of Oregon from proceeding at any time to set aside on the ground of fraud any deed made by the state, nor shall anything contained in this section be deemed to prejudice the rights of any person claiming title to any public land adversely to the State of Oregon or to the United States. [Formerly 273.270]”
273.915	Release of claims under pre-1947 deeds reserving right of way.
274.010	[Amended by 1961 c.619 §41; renumbered 274.885]
274.015	Determination of ordinary high and low water.
274.031	[Formerly 274.034; 1981 c.219 §2; repealed by 1983 c.566 §1]
274.036	Status of channel of Willamette River; approval of dam; state not obligated to maintain river location.
274.040	Sale or lease of submersible lands; easements.

274.050	[Renumbered 273.900]
274.210	Authority of division to contract for drainage and reclamation of certain lands.
274.430	"274.430 State ownership of meandered lakes; status as navigable and public waters. (1) All meandered lakes are declared to be navigable and public waters. The waters thereof are declared to be of public character. The title to the submersible and submerged lands of such meandered lakes, which are not included in the valid terms of a grant or conveyance from the State of Oregon, is vested in the State of Oregon. (2) ORS 274.430 to 274.450 shall not apply to any nonnavigable lakes lying within the boundaries of any duly organized and incorporated drainage district which was in existence on January 1, 1921. (3) Nothing in this section impairs the title of any upland or riparian owner to or any vested rights in land which was added prior to May 25, 1921, by natural accretion or reliction to the lands of such upland owner. [Amended by 1967 c.421 §132]"
274.430	State ownership of meandered lakes; status as navigable and public waters.
274.440	Acquisition of future rights to meandered lakes denied; extension of riparian ownership; lands overflowed by high water.
274.450	"Acquisition of riparian rights by division. The Division of State Lands may acquire by purchase, gift, condemnation or otherwise, any riparian rights which may, by any court of competent jurisdiction, be held to be owned by or vested in any upland or riparian owner on any meandered lakes, and may institute such suits or actions as may be necessary in such condemnation proceedings. [Amended by 1967 c.421 §134]"
274.460	"Settler's and riparian owner's preferential right to purchase land within meander lines. All persons qualified to become entrymen and to secure land patents under the homestead laws of the United States and who prior to January 1, 1921, in good faith settled upon lands within the meander lines of lakes returned as navigable by the United States surveys and who, on January 1, 1921, by reason of settlement, cultivation and improvements on any such lands would be entitled to patent from the United States if such lands were open or subject to homestead entry are given a preference right to purchase from the State of Oregon such lands so settled upon by them, not exceeding 160 acres for any one person, upon such terms and at such prices and within such times as shall be fixed by the Division of State Lands. However, owners of the upland bordering upon such ordinary high water mark have a preference right to purchase, at the best price bid, state lands described in ORS 274.430 and riparian to their lands, and not exceeding 160 acres, in addition to the lands granted them by ORS 274.430 and 274.440. [Amended by 1967 c.421 §135]"
274.470	"Settler's right to deed to land within meander lines; preferential right to additional land; tacking by successive settlers. (1) Any person who in good faith settled upon lands within the meander lines of any meandered lake and who, on January 1, 1921, actually resided thereon, who maintained residence thereon for at least five years immediately prior to such date, and who complied with the requirements of settlement, residence, cultivation and improvement, specified for homestead entrymen under the homestead laws of the United States, and which would be sufficient to acquire title by patent if such lands were subject to homestead entry by qualified entrymen, upon proof of such facts to the satisfaction of the Division of State Lands: (a) Is entitled to a deed from the state, conveying and granting such lands not exceeding 160 acres without cost; and (b) Has a preferential right to purchase from the State of Oregon 160 acres of additional lands, chiefly valuable for agricultural purposes. (2) Any person who did not reside on any lands described in subsection (1) of this section for five years immediately prior to January 1, 1921, but who purchased the improvement or possessory rights or claims of a prior occupant, and whose residence and possession when tacked to that of such prior occupant extended for a period of not less than five years immediately prior to such date, shall have a preferential right to purchase such lands, not exceeding 160 acres, the price of which shall be fixed without reference to the value of the improvements thereon. [Amended by 1967 c.421 §136]"
274.480	Rights of riparian owners on Malheur and Mud Lakes.

274.480	Rights of riparian owners on Malheur and Mud Lakes.
274.480	“Rights of riparian owners on Malheur and Mud Lakes. The owners of lands riparian to Malheur and Mud Lakes, in Harney County, Oregon, shall be granted title to so much of the lands within the meander lines of such lakes as is required to fill out the least fractional subdivision or subdivisions of any section owned by such upland owners, and which is rendered fractional by the meander line of such lakes, in addition to the rights recognized by ORS 274.430 to 274.460 to any natural accretion or reliction added to the lands of such upland owners prior to May 24, 1923. Owners of any upland bordering upon such meander lines shall have a preferential right to purchase, in addition, 160 acres of such state lands, chiefly valuable for agricultural purposes. [Amended by 1967 c.421 §137]”
274.520	Acceptance of deed to lake bed lands as precluding any other claim.
274.520	“Acceptance of deed to lake bed lands as precluding any other claim. Any person who elects to take any deed from the State of Oregon under ORS 274.430 to 274.520 to any lands within the meander lines of a lake takes the same in lieu of any claim to any other lands within the meander line of such lake in which such deeded lands lie, and shall not thereafter maintain in any court any claim to any lands inside the meander line of such lake other than to the lands conveyed to such person by deed from the state under ORS 274.430 to 274.520 or which such person acquires in good faith from a grantee or purchaser from the State of Oregon under such statutes. [Amended by 1967 c.421 §141]”
274.530	Lease or license of stream beds for removal of material; measurement of volume removed.
274.615	“[1961 c.703 §§1,13; 1967 c.421 §151; 1987 c.300 §2; repealed by 1991 c.217 §6]”
274.705	Definitions for ORS 274.705 to 274.860.
274.710	“Jurisdiction of division over tidal submerged lands; easements; leases for oil, gas and sulphur.”
274.885	Lease of kelp fields.
274.915	Division to lease or dispose of new lands; method.
274.920	Creation of new lands upon submersible or submerged lands.
274.925	Right of public riparian owner to purchase new lands; price determination.
274.935	“Ownership, by nonpublic owner of submersible or submerged lands, of new lands created thereon.”
305.100	Rulemaking; forms. The Department of Revenue shall:
307.010	“Definition of ““real property”” and ““land.”””
307.030	Property subject to assessment generally.
307.080	Mining claims.
307.200	Public ways.
307.200	Public ways.
307.450	Certain beach lands.
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307.450	Certain beach lands.
308.115	“Minerals, coal, oil, gas or other severable interests owned separately from realty not subject to tax; exception for actively mined interests; separately owned improvements separately assessed.”
308.125	Undivided interest; assessment; ownership of less than one forty-eighth interest.

308.225	"Boundary change or proposed boundary change; procedure. (1) In preparing the assessment roll in any year, a county assessor shall disregard changes or proposed changes described in subsections (3), (4) and (5) of this section in the boundary lines of any taxing district levying ad valorem property taxes if the description and map showing changes or proposed changes are not filed in final approved form, in accordance with and at the time required by subsection (2) of this section."
308.240	"Description of land; assessment to ""unknown owners""; mistake or omission in owner's name; error in description of property. (1) Real property may be described by giving the subdivision according to the United States survey when coincident with the boundaries thereof, or by lots, blocks and addition names, or by giving the boundaries thereof by metes and bounds, or by reference to the book and page of any public record of the county where the description may be found, or in such other manner as to cause the description to be capable of being made certain. Initial letters, abbreviations, figures, fractions and exponents, to designate the township, range, section or part of a section, or the number of any lot or block or part thereof, or any distance, course, bearing or direction, may be employed in any such description of real property."
308.245	Maps; taxpayers' index.
311.280	"Payment of taxes on part of property assessed as one parcel; division; when division not allowed; division between manufactured structure and parcel. (1) Any person desiring to pay taxes on any part of any real estate assessed as one parcel or tract may do so by applying to the county assessor or deputy county assessor. The county assessor shall determine the relative or proportionate value such part bears to the value of the whole tract assessed, and shall file a statement thereof with the tax collector, on which basis the assessment shall be divided and taxes shall be collected accordingly."
336.290	[Repealed by 1963 c.544 §52]
365.550	
366.005	"Definitions. As used in this chapter and in ORS chapter 367, unless the context requires otherwise:"
366.155	"Duties and powers of department regarding highways. (1) The Department of Transportation shall, among other things:"
366.215	"Creation of state highways. The Oregon Transportation Commission may select, establish, adopt, lay out, locate, alter, relocate, change and realign primary and secondary state highways. [Amended 1977 c.312 §2]"
366.295	"Relocation of highways. The Oregon Transportation Commission may make such changes in the location of highways designated and adopted by the commission, as in the judgment and discretion of the commission will result in better alignment, more advantageous and economical highway operation and maintenance, or as will contribute to and afford a more serviceable system of state highways than is possible under the present location. [Amended by 1977 c.312 §1]"
366.300	Treatment of sections eliminated when highway relocated.
366.320	"Acquisition of rights of way and right of access. (1) The Department of Transportation may acquire rights of way deemed necessary for all primary and secondary state highways, both within and without the corporate limits of cities and towns, except that such rights of way within the corporate limits of cities and towns may be acquired at the sole expense of the state, at the expense of the city or town or at the expense of the city or town and the state, as may be mutually agreed upon."

366.322	“Studies to aid in relocating persons displaced by highway acquisition. When plans of the Department of Transportation projected for one year involve acquisition of properties in any city which will require removal of 25 or more dwelling units, businesses or institutions, the Department of Transportation shall make a study of the persons residing on or maintaining businesses or institutions on property scheduled for highway acquisition. Such studies shall be kept current until the premises required for highway acquisition are vacated. The department shall obtain such other information as it finds appropriate to aid in the relocation of persons displaced by the highway acquisition, and may extend its studies beyond city boundaries when the highway acquisition will involve dwellings, businesses or institutions within three miles of a city boundary. Such information shall be made available to the persons displaced and to other persons who may provide or assist in providing new locations. This section shall apply whether the highway acquisitions will be paid for in whole or in part from state funds either directly or by reimbursement. The Department of Transportation may contract with any governmental subdivision or agency, or with private concerns to make and maintain such studies, or may employ necessary assistants therefor. [1959 c.648 §1; 1963 c.187 §1]”
366.332	Definitions for ORS 366.332 and 366.333. As used in ORS 366.332 and 366.333:
366.360	“Taking fee simple. In all cases where title to real property is acquired by the Department of Transportation either by donation, agreement or exercise of the power of eminent domain, a title in fee simple may be taken.”
368.000	
368.001	Definitions. As used in this chapter:
368.016	“County authority over roads; limitations. (1) Except as provided in this section or as otherwise specifically provided by law, the exercise of governmental powers relating to a road within a county is a matter of county concern.”
368.026	Withdrawal of county road status; report; notice; hearing. (1) A county governing body shall use the following procedure to withdraw county road status from a portion of a county road that is outside a city:
368.031	County jurisdiction over local access roads. A local access road that is outside a city is subject to the exercise of jurisdiction by a county governing body in the same manner as a county road except as follows:
368.036	“Standards for county roads and road work. (1) County roads and work performed on county roads shall comply with specifications and standards, including standards for width, adopted by the county governing body. If the county governing body does not have specifications for work performed on county roads, the work shall comply with standards and specifications adopted by the Department of Transportation.”
368.041	“Widths of county roads; maintenance of designated roads as county roads. (1) Unless otherwise provided under ORS 368.036, a public road that is designated as a county road after August 2, 1951, shall be 50 feet or any greater width the county governing body establishes. The proposed width shall be stated in all petitions or notices that initiate consideration of the designation of a road as a county road. The width established for a road shall be stated in orders or resolutions accepting the road as a county road under ORS 368.016.”
368.073	Initiation of proceedings to acquire property for road purposes. A county governing body may initiate proceedings to acquire title or a lesser interest in real property for public road purposes:
368.081	Requirements for petition to initiate road proceedings. (1) A petition to initiate proceedings under ORS 368.073 must contain all of the following:

368.091	Owners' rights to terminate road proceedings. (1) A county governing body shall discontinue any proceedings to acquire real property for public road purposes that are initiated by a petition described ORS 368.081 at any time before acquisition of the property if a majority of the owners of property that would abut the proposed road file objections to establishing the road with the county governing body.
368.096	"Alternative methods to acquire property for roads. (1) If proceedings to acquire real property for public road purposes have been initiated under ORS 368.073, a county governing body may acquire the property by any of the following methods:"
368.106	"Records and survey of property acquired for road. If a county governing body acquires an interest in real property for public road purposes, the county governing body shall cause:"
368.116	"Acquisition of railroad right of way. (1) Whenever in the location, relocation, construction or betterment of a public road, a county governing body determines that it is necessary to locate, relocate or construct the public road, or any part thereof, upon the right of way of a railroad company, the county may negotiate and agree with the railroad company for the right to use or occupy the right of way, or any portion necessary for public road purposes."
368.126	"Order establishing new road along existing road to identify parts of existing road to be vacated. When a county governing body establishes a new public road following the general alignment of an existing public road, the final order or resolution shall identify all parts of any existing road that are to be vacated. Vacation of those parts described is effective without any other proceedings. A road so vacated shall not be closed to public use until the road laid out to replace it is actually opened to travel. [Formerly 368.540]"
368.131	Right of way over United States public lands. The county governing body may by resolution accept the grant of rights of way for the construction of public roads over public lands of the United States. This section does not invalidate the acceptance of such grant by general public use and enjoyment. [Formerly 368.555]
368.161	"Use of road viewers to establish road. (1) When proceedings have been initiated under ORS 368.073 to acquire real property for public road purposes, the county governing body may establish a board of road viewers and acquire property for the proposed road in the manner described in ORS 368.161 to 368.171."
368.171	"Order, costs and damages under proceeding with road viewers. (1) After completion of proceedings under ORS 368.161 to 368.171 and consideration of matters and issues presented during the proceedings, the county governing body shall determine whether a public need exists for the public road and shall enter an order or resolution granting or denying the property acquisition. If the county governing body enters the order or resolution establishing a public road, the order or resolution shall:"
368.201	Basis for legalization of road. A county governing body may initiate proceedings to legalize a county road under ORS 368.201 to 368.221 if any of the following conditions exist:
368.205	[Amended by 1975 c.774 §1; 1977 c.338 §1; repealed by 1981 c.153 §79]
368.206	Proceedings for legalization of roads; report; notice.
368.216	
368.221	
368.221	Compensation for property affected by road legalization.

368.366	“Ownership of vacated property. (1) When a county governing body vacates public property under ORS 368.326 to 368.366, the vacated property shall vest as follows: (a) If the county holds title to the property in fee, the property shall vest in the county. (b) If the property vacated is a public square the property shall vest in the county. (c) Unless otherwise described in paragraph (a) or (b) of this subsection, the vacated property shall vest in the rightful owner holding title according to law. (d) Except as otherwise provided in this subsection, the vacated property shall vest in the owner of the land abutting the vacated property by extension of the person’s abutting property boundaries to the center of the vacated property. 2) Notwithstanding subsection (1) of this section, a county governing body may determine the vesting of property vacated under ORS 368.326 to 368.366 in the order or resolution that vacates the property. [1981 c.153 §42]”
368.405	[Repealed by 1981 c.153 §79]
368.415	[Amended by 1953 c.229 §2; 1971 c.427 §1; 1981 c.153 §66; renumbered 368.041]
368.415	[Amended by 1953 c.229 §2; 1971 c.427 §1; 1981 c.153 §66; renumbered 368.041]
368.430	[Repealed by 1981 c.153 §79]
368.435	[Repealed by 1981 c.153 §79]
368.440	[Repealed by 1981 c.153 §79]
368.445	[Repealed by 1981 c.153 §79]
368.450	[Repealed by 1981 c.153 §79]
368.455	[Repealed by 1981 c.153 §79]
368.460	[Repealed by 1981 c.153 §79]
368.465	[Repealed by 1981 c.153 §79]
368.470	[Repealed by 1981 c.153 §79]
368.480	[Repealed by 1981 c.153 §79]
368.535	[Repealed by 1981 c.153 §79]
373.010	“Routing and marking state highways through cities. Whenever the route of any state highway passes through the corporate limits of any city of this state, the Department of Transportation:”
373.020	“Jurisdiction over streets taken over for state highway routing through cities; effect on public utility duties. (1) Complete jurisdiction and control of streets taken over by the Department of Transportation as provided in ORS chapter 366 and ORS 105.760, 373.010, 373.015, 373.030 and this section, is vested in the department and extends from curb to curb, or, if there is no regular established curb, then such control extends over such portion of the right of way as may be utilized by the department for highway purposes. Responsibility for and jurisdiction over all other portions of the street or road remains in the city.”
374.025	“Change from throughway to highway. Any state highway or section thereof which has been located, established, designated and constructed as a throughway may, in whole or in part, be changed from a throughway to an ordinary highway by the Department of Transportation if in its judgment such action will best serve public needs.”

374.035	“Acquisition of real property; effect of resolution. (1) The Department of Transportation may, in the name of the state, acquire by agreement, donation or exercise of the power of eminent domain, fee title to or any interest in any real property, including easements of air, view, light and access, which in the opinion or judgment of the department is deemed necessary for the construction of any throughway, the establishment of any section of an existing state road or highway as a throughway or the construction of a service road. The department may accomplish such acquisition in the same manner and by the same procedure as real property is acquired for state highway purposes, except that in case the acquisition is by proceedings in eminent domain the resolution required under such procedure shall specify, in addition to other provisions and requirements of law, that the real property is required and is being appropriated for the purpose of establishing, constructing and maintaining a throughway.”
374.040	“Acquisition of land not immediately needed. Whenever it becomes necessary to acquire any real property for use in connection with the location, relocation, construction, reconstruction, improvement and maintenance of any throughway or section thereof or for a service road, the Department of Transportation may, in its discretion, acquire an entire lot, block or tract of land if by so doing the interests of the owner and the state will be best served, even though the entire tract is not immediately needed for the highway proper. This provision and authority shall apply to and be effective whether the real property is acquired by purchase, agreement or exercise of the power of eminent domain.”
374.075	“Cooperation of municipal and county authorities with Department of Transportation. The municipal authorities of cities and the county court or board of county commissioners of any county may do anything or all things necessary to cooperate with the Department of Transportation for laying out, acquiring and constructing any section or portion of any street or highway within their respective jurisdiction as a throughway and to convert any existing street or highway into a throughway.”
374.405	“Access rights of property abutting on state highways. No rights in or to any state highway, including what is known as right of access, shall accrue to any real property abutting upon any portion of any state highway constructed, relocated or reconstructed after May 12, 1951, upon right of way, no part of the width of which was acquired prior to May 12, 1951, for public use as a highway, by reason of the real property abutting upon the state highway.”
374.410	“Department of Transportation to prescribe access rights of abutting property. In connection with any acquisition of real property for right of way of any state highway, the Department of Transportation shall prescribe and define the location, width, nature and extent of any right of access that may be permitted by the department to pertain to real property described in ORS 374.405.”
384.105	“Department of Transportation to acquire and operate or license ferries. Whenever the Department of Transportation finds and determines that the operation of a ferry across any stream, river, bay, arm of the ocean or other body of water is necessary and convenient in connection with the use of any state highway, the department may acquire, construct, establish, maintain and operate the ferry. The department may operate the ferry under a contract, or with its own employees or under a license or permit granted by the department, the license or permit to contain such conditions, requirements, terms and provisions as to the department seem best. The maintenance or operation of any such ferry is subject, however, to the federal laws and requirements governing navigation.”
384.110	“Ferry approaches and other appurtenances. The Department of Transportation may itself, or under a cooperative agreement with any county, construct the necessary approaches, ramps, docks, wharves, ferry slips or other such appurtenances as are necessary for the maintenance and operation of a ferry mentioned in ORS 384.105, or the department may require the construction of such approaches, ramps, docks, wharves, ferry slips and other necessary approaches by the licensee in the event that the ferry is operated under a license or permit.”

384.115	“Cooperation between Department of Transportation and counties as to ferries. In the acquisition, establishment, construction or operation of a ferry mentioned in ORS 384.105, the Department of Transportation and the county court of any county within which is located any stream, river, bay, arm of the ocean or other body of water over which it is contemplated and found necessary to operate ferries, may enter into a cooperative agreement for the acquisition, construction, operation or maintenance of the ferry upon such terms and conditions as the county court and the department agree. When the ferry is operated under a cooperative agreement between the county court and the department, the cost and expense incident to the acquisition, construction, operation or maintenance of the ferry shall be apportioned between the county and the state in such manner and amount as is agreed upon.”
384.120	“Discretion as to ferry operation with county and charging tolls. It is discretionary with the Department of Transportation whether a ferry mentioned in ORS 384.105 be operated by the state. If operated by the state and the county under a cooperative agreement, it is discretionary with the Department of Transportation and the county court whether the ferry be operated as a free public ferry or as a charge or toll ferry.”
384.125	“Funds from which ferry expense paid. When a ferry mentioned in ORS 384.105 is acquired, constructed, operated and maintained by the Department of Transportation alone, the entire cost and expense may be paid out of the State Highway Fund. If the ferry has been acquired, constructed and is being operated and maintained under a cooperative agreement between the state and a county, the proportion of the cost and expense to be borne by the state, as agreed upon, shall be paid out of the State Highway Fund and the proportion to be paid by the county shall be paid out of county road funds.”
384.130	“Fixing ferriage rates. (1) The Department of Transportation may fix, alter and establish from time to time the rate of ferriage to be levied and collected, and may, in its judgment, whenever circumstances warrant and require, alter or change any such rate. (2) Whenever the Department of Transportation grants a license to keep and operate a ferry across any stream, river, bay, arm of the ocean or other body of water, the department shall establish the rates of ferriage which may be lawfully demanded for the transportation of persons and property across the body of water, having due regard to the width, situation and location of the body of water and the damages and difficulties incident to the operation of the ferry.
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384.135	“Posting ferriage rates. Every person licensed to keep and operate a ferry as provided in ORS 384.105 shall post in some conspicuous place near the ferry landing a written or printed list of the rates of ferriage which are chargeable under the orders of the Department of Transportation. The list of rates shall at all times be written or printed in a plain, legible manner and posted so near the place where persons pass across the ferry that it may be readily read.”
384.140	“Bond or letter of credit of ferry licensee. Persons licensed by the Department of Transportation to maintain and operate a ferry under ORS 384.105 to 384.150 shall be required to furnish a bond or an irrevocable letter of credit issued by an insured institution as defined in ORS 706.008 in such amount as the department requires. The bond or letter of credit shall be conditioned upon the faithful compliance with and performance of all the conditions, requirements and provisions contained in the license, and shall be in such form as the department may prescribe. The bond or letter of credit shall be made payable to the state. [Amended by 1991 c.331 §61; 1997 c.631 §469]”

384.145	“Revocation of ferry licenses. (1) If any keeper or operator of a ferry at any time demands and receives more than the amount designated for ferrying or fails to keep or perform the conditions of the license or contract, the Department of Transportation may revoke the license or permit and may require the keeper or operator to discontinue further operation of the ferry. (2) If at any time the keeper of a ferry mentioned in ORS 384.105 neglects or refuses to post and keep up the list of the rates of ferriage mentioned in ORS 384.135, the Department of Transportation may cancel and revoke the license.
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384.205	[Repealed by 1981 c.126 §6]
384.210	[Repealed by 1981 c.126 §6 and 1981 c.153 §79]
384.305	“Operation of interstate ferries by Department of Transportation, counties, cities, towns or ports. The state acting by and through the Department of Transportation, and any county, city, town or port of the State of Oregon adjoining or bordering on any interstate river or stream of water, is each and every one authorized to: (1) Establish, maintain and operate ferry service in and to any adjoining state, and for such purpose may acquire by gift, purchase, lease, contract, agreement, condemnation or otherwise, real, personal and mixed property, rights, rights of way, approaches, licenses, privileges and easements, equipment and facilities in the State of Oregon or any adjoining state, necessary or convenient for the proper construction, maintenance and operation of any such ferry service or services; or (2) Contract with others for the purpose of operating and maintaining such ferry service.”
384.310	“Independent or joint action. In carrying out the provisions of ORS 384.305 to 384.360, the Department of Transportation, and each of the counties, cities, towns or ports mentioned in ORS 384.305, may act independent of or in conjunction with each other upon the terms and conditions agreed upon by the contracting parties.”
384.315	“Agreements for carrying out powers of interstate ferry authorities. For the purpose of carrying out or putting into effect any right, power and authority granted by ORS 384.305 to 384.360 or any other law, the Department of Transportation, and each and all of the public bodies or agencies mentioned in ORS 384.305, may make and enter into agreements with: (1) The Government of the United States or any of its agencies. (2) Any adjoining state, its county, municipality, port or other political subdivisions or agencies. (3) Any persons, associations, corporations, domestic or foreign.”
384.320	“Use of funds for interstate ferry expenses. The Department of Transportation, and any county, city, town or port mentioned in ORS 384.305, may pay out of its respective funds, or any other funds to any of them available, all or any part of the cost of the construction, maintenance and operation of the ferry service.”
384.325	“Loans for interstate ferry acquisition and operation; security. The construction, purchase, maintenance and operation of any ferry service under ORS 384.305 to 384.360 may be financed in whole or in part by loans obtained from the United States Government or any of its agencies, or from any other sources. As security for the payment of such loans the revenues derived from the ferry service, over and above the cost of its maintenance and operation, may be hypothecated or pledged, but no such hypothecation or pledge of revenues shall constitute in any manner, or to any extent be made to constitute, a general obligation of the State of Oregon, or of any county, city, town or port making the pledge.”
384.330	“Issuing revenue certificates for interstate ferry expenses. For the purpose of procuring funds, when necessary, with which to construct, maintain and operate the ferry service, the authority constructing, maintaining and operating the service may issue and sell revenue certificates, which shall not be the general obligation of the authority issuing them but shall be redeemable and payable solely from revenues accruing from the ferry service, over and above the cost of operating and maintaining the service. Such certificates may be purchased by the State of Oregon.”

384.335	“Acceptance of funds from United States and gifts. The Department of Transportation, and every other public body and agency mentioned in ORS 384.305 may: (1) Accept from the United States or any of its agencies, such funds as are available to this state or to any such public body or agency, for any of the purposes contemplated by ORS 384.305 to 384.360, and enter into such contracts and agreements with the United States or any of its agencies as may be necessary, proper and convenient, and not contrary to the laws of the state. (2) Accept from any source any grant or donation of land, any gift of money or any other valuable thing, made to the state or any such county, city, town or port, for any of the purposes contemplated by ORS 384.305 to 384.360.
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384.340	“Eminent domain. The Department of Transportation, and any county, city, town or port mentioned in ORS 384.305 to 384.360, may exercise the power of eminent domain to carry out any of the provisions of ORS 384.305 to 384.360, in accordance with the procedure provided in ORS chapter 35. [Amended by 1971 c.741 §30]”
384.340	Eminent domain.
384.345	“Operation of interstate ferry free or on toll. Any ferry constructed, purchased or otherwise acquired and operated under ORS 384.305 to 384.360 may be operated free to the public or on toll. If operated on toll, the revenues derived therefrom may be pledged as provided in ORS 384.305 to 384.360.”
384.350	“Use of interstate ferry by federal government. If any ferry constructed, maintained and operated under ORS 384.305 to 384.360 is needed by the United States for any purpose in connection with national defense, then the authority which constructed and is maintaining and operating the ferry may sell it to the United States or may, by contract, make the ferry available to the United States.”
384.355	“Location of interstate ferry; part of state highway system. Any ferry service maintained and operated under ORS 384.305 to 384.360 shall connect, or provision shall be made for such connection, with a state and federal highway in this state and a state and federal highway in the adjoining state to which the ferry service is maintained. Such ferry service is a part of the Oregon highway system.”
384.360	The authority conferred by ORS 384.305 to 384.355 is in addition and supplemental to the authority conferred by any other law.
384.405	“Oregon-Washington cooperative interstate ferry service. The Department of Transportation, in the name of this state, if and when it appears to the department to be for the best interest of this state and the citizens thereof, may enter into a written agreement with the State of Washington, by and through its Director of Highways or other lawfully constituted authority, whereby there shall be established and maintained ferry service for the transportation of persons and property across the Columbia River at such sites or locations as are mutually agreed upon by the Oregon Department of Transportation and the Director of Highways of the State of Washington.”
384.410	Location of ferry. No ferry service shall be established or maintained under ORS 384.405 to 384.440 unless it connects a state and federal highway in the State of Oregon with a state and federal highway in the State of Washington.
384.415	“Manner of ferry acquisition and operation. For the purpose of carrying out the objects of ORS 384.405 to 384.440 the Department of Transportation, acting jointly with the State of Washington, may: (1) Purchase, acquire and operate ferries between such places; or (2) Lease, rent or hire and operate ferries; or (3) Contract with others for the operation of ferries between such places.”

384.420	“Payment of Oregon’s share of ferry expense. This state shall not be obligated to pay, nor shall it pay for such ferry service, whether furnished by the facilities owned, acquired or operated by the state jointly or under contract with others, any sum in excess of 50 percent of the total cost of the service. The Department of Transportation may pay Oregon’s part of the cost of the ferry service out of state highway funds in the same manner that other disbursements are made out of such funds.”
384.425	Ferry as part of state highway system. Any ferry operated under ORS 384.405 to 384.440 and the approach roads thereto on the Oregon side of the Columbia River are a part of the state highway system and shall be so declared and designated by an appropriate resolution entered in the minutes of the Department of Transportation.
384.425	Ferry as part of state highway system.
384.430	“Rules and regulations as to ferry operation. (1) The Department of Transportation shall, jointly with the proper officials of the State of Washington, for the protection of the general public and for the safeguarding of the interests of the State of Oregon, its officers, agents and employees, prescribe all necessary rules and regulations for the proper and efficient operation of any ferry mentioned in ORS 384.405. (2) The operation of any ferry under ORS 384.405 to 384.440 shall conform in all respects to all federal or state laws, rules or regulations.
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384.435	“Liability and other insurance for ferry service. The Department of Transportation may, for the use and benefit of the state, its officers, agents or employees and of the general public, carry public liability insurance if ferries mentioned in ORS 384.405 are owned and operated by the state. The department shall require such public liability insurance if the ferry service is provided under contract with others. In addition to such public liability insurance the department may require such other insurance as in the department’s judgment the interest of the state and the general public require.”
384.440	Free ferry operation. Any ferry operated under ORS 384.405 to 384.440 may be operated free of tolls.
384.445	“Ferry between Umatilla, Oregon, and Plymouth, Washington. (1) The County Court of Umatilla County, Oregon, and the Department of Transportation, in cooperation, may enter into such agreement, as in their judgment is advisable, with the County Court of Benton County, Washington, and the Director of Highways of the State of Washington, for the establishment, maintenance and operation of a public ferry across the Columbia River between Umatilla, Oregon, and Plymouth, Washington, and for connecting the ferry with and making it a part of the state highway systems of Oregon and Washington.”
390.230	Fort Stevens Military Reservation; Clatsop Spit.
390.415	[1977 c.482 §2; repealed by 1987 c.14 §12]
390.460	[1977 c.482 §3; repealed by 1987 c.14 §12]
390.620	Pacific shore not to be alienated; judicial confirmation.
390.630	Acquisition along ocean shore for state recreation areas or access.
390.635	Jurisdiction of department over recreation areas.
390.640	Permit required for improvements on ocean shore; exceptions.
390.650	Improvement permit procedure; fee.
390.655	Standards for improvement permits.
390.658	[1969 c.601 §12; 1979 c.186 §23; repealed by 1999 c.373 §5 (390.659 enacted in lieu of 390.658)]

390.660	Regulation of use of lands adjoining ocean shores.
390.690	Title and rights of state unimpaired.
390.755	Periodic reexamination of vegetation line; department recommendations for adjustment.
390.755	Periodic reexamination of vegetation line; department recommendations for adjustment.
390.760	Exceptions from vegetation line.
390.770	Vegetation line described.
390.915	Determination of value of scenic easement for tax purposes; easement exempt.
478.010	Formation; territories that may not be included in districts.
509.425	[Amended by 1965 c.570 §128; 1969 c.675 §1; 1981 c.638 §3; renumbered 622.220]
509.427	[1969 c.675 §10; 1981 c.638 §4; renumbered 622.230]
509.430	[Repealed by 1965 c.570 §152]
509.431	[1969 c.675 §11; 1981 c.638 §6; renumbered 622.250]
509.433	[1969 c.675 §12; 1981 c.638 §7; renumbered 622.260]
509.435	[Repealed by 1965 c.570 §152]
509.439	[1969 c.675 §13; 1981 c.638 §9; renumbered 622.280]
509.440	[Repealed by 1965 c.570 §152]
509.445	[Repealed by 1965 c.570 §152]
509.495	[Amended by 1969 c.675 §4; renumbered 622.340]
509.527	[1969 c.675 §10; 1981 c.638 §4; renumbered 622.230]
509.529	[1969 c.675 §11a; 1981 c.638 §5; renumbered 622.240]
509.536	[1965 c.570 §59d; 1969 c.675 §2; 1981 c.638 §8; renumbered 622.270]
517.170	“EXTINGUISHING DORMANT MINERAL INTEREST, Policy.”
537.110	Public ownership of waters.
672.025	Practice of land surveying without registration prohibited; seal required.
777.116	Port may acquire real and personal property; appraisal by state certified appraiser required; purchase contract limited.
777.120	“Port’s authority over harbors, wharf lines and navigation.”
780.010	Stream improvement authorized; channel obstruction prohibited.
780.030	Channels improved are highways free to navigation.
780.040	When landowner may construct wharf.
780.050	Municipality or port may regulate construction of certain structures beyond low-water mark.
780.060	Construction not to interfere with oyster production.
936.000	No results were found for your search.
204.016(2)	Relating to qualifications for county offices; amending ORS 204.016.

273.850(1)

“State title to certain lands and improvements transferred to Clatsop County; lands not subject to board jurisdiction. (1) In the manner and under the conditions set out in ORS 273.850 to 273.890, and notwithstanding any other law, the State of Oregon shall remise, release and forever quitclaim to Clatsop County all rights, title and interest that may remain or be vested in the state with respect to lands described in subsection (2) of this section and any improvements thereon (excluding bridges, wharves, quays, docks, piers, marinas or similar structures protruding above the line of ordinary high water), that are located within the following described area: Those portions of sections 12 and 13 of township 8 north, range 10 west of the Willamette Meridian, and sections 2, 7, 8, 9, 10, 11, 16, 17 and 18, and the south one-half of section 3, of township 8 north, range 9 west of the Willamette Meridian, that are within the boundaries of the City of Astoria as such boundaries existed on June 13, 1969.”

**273.850(1) and
(2)**

“State title to certain lands and improvements transferred to Clatsop County; lands not subject to board jurisdiction. (1) In the manner and under the conditions set out in ORS 273.850 to 273.890, and notwithstanding any other law, the State of Oregon shall remise, release and forever quitclaim to Clatsop County all rights, title and interest that may remain or be vested in the state with respect to lands described in subsection (2) of this section and any improvements thereon (excluding bridges, wharves, quays, docks, piers, marinas or similar structures protruding above the line of ordinary high water), that are located within the following described area: Those portions of sections 12 and 13 of township 8 north, range 10 west of the Willamette Meridian, and sections 2, 7, 8, 9, 10, 11, 16, 17 and 18, and the south one-half of section 3, of township 8 north, range 9 west of the Willamette Meridian, that are within the boundaries of the City of Astoria as such boundaries existed on June 13, 1969. (2) Subsection (1) of this section applies to lands created before May 28, 1963, by artificial fill or deposit on lands formerly submersible or submerged, if such lands were possessed under color of title by a person or governmental entity, or predecessors in interest of such person or governmental entity, throughout the period beginning when such lands were created and ending on January 1, 1970.”

273.850(2)

“State title to certain lands and improvements transferred to Clatsop County; lands not subject to board jurisdiction. (1) In the manner and under the conditions set out in ORS 273.850 to 273.890, and notwithstanding any other law, the State of Oregon shall remise, release and forever quitclaim to Clatsop County all rights, title and interest that may remain or be vested in the state with respect to lands described in subsection (2) of this section and any improvements thereon (excluding bridges, wharves, quays, docks, piers, marinas or similar structures protruding above the line of ordinary high water), that are located within the following described area: Those portions of sections 12 and 13 of township 8 north, range 10 west of the Willamette Meridian, and sections 2, 7, 8, 9, 10, 11, 16, 17 and 18, and the south one-half of section 3, of township 8 north, range 9 west of the Willamette Meridian, that are within the boundaries of the City of Astoria as such boundaries existed on June 13, 1969. (2) Subsection (1) of this section applies to lands created before May 28, 1963, by artificial fill or deposit on lands formerly submersible or submerged, if such lands were possessed under color of title by a person or governmental entity, or predecessors in interest of such person or governmental entity, throughout the period beginning when such lands were created and ending on January 1, 1970.”

273.855(2)	“Clatsop County to transfer title to lands and improvements to certain possessors; fee on execution of deed. (1) ORS 273.850 (1) and (2) apply with respect to any lands described therein only when the Board of County Commissioners of Clatsop County executes and delivers a deed remising, releasing and forever quitclaiming all rights, title and interest that may remain or be vested in such county with respect to such lands, to a person or governmental entity that has been found under subsections (3), (4) and (5) of this section and ORS 273.860 to 273.880 to have such possession of the lands as of the time of application for a deed under ORS 273.850 to 273.890 as would bar an action or suit for recovery of the lands by a private person under no disability holding legal title thereto. However, in the case of lands heretofore or hereafter acquired by Clatsop County through foreclosure for delinquent ad valorem taxes or otherwise, ORS 273.850 (1) and (2) apply with respect to any lands described therein when it has been found under subsections (3), (4) and (5) of this section and ORS 273.860 to 273.880 that Clatsop County or its predecessor in interest with respect to such lands has such possession of the lands as would bar an action or suit for recovery of the lands by a private person under no disability holding legal title thereto. (2) A deed executed under this section is intended only to evidence the action of the State of Oregon and Clatsop County in remising, releasing and quitclaiming their rights, title and interest, and does not confer any rights, title or interest on the recipient of the deed or indicate any judgment of the State of Oregon or Clatsop County with respect to any other rights, title or interest that remain or be vested in the recipient of the deed.”
273.860 to 273.880	“Relating to judgments; creating new provisions; amending ORS 1.010, 1.655, 3.070, 3.260, ...”
274.005(3)	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
274.005(4)	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
274.005(5)	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
274.005(6)	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
274.025(1)	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
274.025(2)	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
“274.025(2), 274.440(1)”	Relating to public use of waterways; creating new provisions; and amending ORS 274.005 and ...
274.040(2)(c)	“Sale or lease of submersible lands; easements. (2) Submersible lands owned by the State of Oregon that are determined by the State Land Board to be available for sale may be sold only to the highest bidder, after being advertised not less than once each week for two successive weeks in one or more newspapers of general circulation in the county in which the lands are situated. However: (c) Any owner of lands abutting or fronting on such submersible lands shall have the preference right to purchase such lands for the fair appraised value provided that the sale of such lands be approved by the State Land Board.”

274.040(8)	“Sale or lease of submersible lands; easements. (2) Submersible lands owned by the State of Oregon that are determined by the State Land Board to be available for sale may be sold only to the highest bidder, after being advertised not less than once each week for two successive weeks in one or more newspapers of general circulation in the county in which the lands are situated. However: (8) The act of any person entering into an agreement with the division under this section or ORS 274.530 for the lease of submersible lands shall not be considered a waiver by such person of any claim of ownership in the submersible lands described in the agreement. [Amended by 1961 c.37 §1; subsection (3) enacted as 1961 c.37 §2; 1967 c.421 §104; 1969 c.594 §32; subsection (4) enacted as 1969 c.675 §17; 1975 c.547 §1; 1975 c.765 §2; 1979 c.793 §3; 1981 c.158 §1; 1981 c.432 §1; 1991 c.217 §5; 1995 c.113 §2]”
274.430(2) and (3)	“State ownership of meandered lakes; status as navigable and public waters. (1) All meandered lakes are declared to be navigable and public waters. The waters thereof are declared to be of public character. The title to the submersible and submerged lands of such meandered lakes, which are not included in the valid terms of a grant or conveyance from the State of Oregon, is vested in the State of Oregon. (2) ORS 274.430 to 274.450 shall not apply to any nonnavigable lakes lying within the boundaries of any duly organized and incorporated drainage district which was in existence on January 1, 1921. (3) Nothing in this section impairs the title of any upland or riparian owner to or any vested rights in land which was added prior to May 25, 1921, by natural accretion or reliction to the lands of such upland owner. [Amended by 1967 c.421 §132]”
274.430(3)	“State ownership of meandered lakes; status as navigable and public waters. (1) All meandered lakes are declared to be navigable and public waters. The waters thereof are declared to be of public character. The title to the submersible and submerged lands of such meandered lakes, which are not included in the valid terms of a grant or conveyance from the State of Oregon, is vested in the State of Oregon. (2) ORS 274.430 to 274.450 shall not apply to any nonnavigable lakes lying within the boundaries of any duly organized and incorporated drainage district which was in existence on January 1, 1921. (3) Nothing in this section impairs the title of any upland or riparian owner to or any vested rights in land which was added prior to May 25, 1921, by natural accretion or reliction to the lands of such upland owner. [Amended by 1967 c.421 §132]”
274.440(1)	“Acquisition of future rights to meandered lakes denied; extension of riparian ownership; lands overflowed by high water. (1) There are no vested rights in or to any future accretion or reliction to the lands of any upland or riparian owner on any meandered lake. No person shall acquire any right, title or interest in or to the submerged or submersible lands of any such lakes, or any part thereof, by reliction, accretion or otherwise, or by reason of the lowering or drainage of the waters of such lakes, except as provided by statute.”
274.440(2)	“(2) Upon drainage of meandered lakes, the title of owners of land riparian to such lakes drained under any law shall extend to so much of the submersible and submerged lands reclaimed by such drainage as is required to fill out the least fractional subdivision or subdivisions of any section owned by such riparian owners and which is rendered fractional by the meander line of such lake; and the title of such owners shall be so limited when the receding lake waters, because of such drainage, uncover the submersible and submerged lands. Where by reason of natural accretion or reliction such fractional subdivision or subdivisions of such upland owners were filled out thereby prior to May 25, 1921, such upland owners shall hold to the line of such lands as extended by the natural accretion or reliction.”
274.440(3)	“(3) Submersible and submerged lands covered at ordinary high water at ordinarily recurring seasons by the waters of meandered lakes, or from which the waters of any such lakes have not at ordinary high water permanently receded, are not considered to be accreted or relicted lands, but the same and all accretions and relictions occurring or formed over any of the lands of the State of Oregon, as provided by ORS 274.430, are the property of the State of Oregon, and may be by it leased, sold or managed in the manner provided by law. [Amended by 1967 c.421 §133]”

“274.480, 274.260, 274.460, 274.025, 274.430, and 274.440”	
274.510(1)	
274.510(2)	
274.705(1)	
“274.705(1); 274.905(1), 274.920; 274.925; 274.935; and 274.960”	“Definitions for ORS 274.705 to 274.860. As used in ORS 274.705 to 274.860, unless the context requires otherwise:”
274.705(7)	“Definitions for ORS 274.705 to 274.860. As used in ORS 274.705 to 274.860, unless the context requires otherwise: (7) “Tidal submerged lands” means lands lying below the line of mean low tide in the beds of all tidal waters within the boundaries of this state as heretofore or hereafter established. [1961 c.619 §1; 1967 c.421 §158]”
274.929(1)	“Right of nonpublic riparian owner to purchase new lands; price determination; applies to certain new lands. (1) Whenever the United States, while engaged in the promotion of navigation, creates new lands upon submersible or submerged lands owned by the state and the adjoining or opposite upland or riparian land on the same side of the body of water is owned by other than a public body, the nonpublic riparian owner has the right to purchase the new lands as provided in this section.”
274.932(1)	“Right of public body to purchase new lands created by it; price determination. (1) Whenever a public body, in accordance with ORS 274.920, creates new lands upon submersible or submerged lands owned by the state, the public body has the right to purchase the new lands as provided in this section. The public body shall pay to the Division of State Lands for the new lands the value of the state-owned submersible or submerged lands upon which the new lands were created immediately prior to the creation of the new lands thereon and an amount prescribed by the division to pay its administrative costs incurred with respect to the new lands. Such payment shall be made by the public body within one year after the date of the receipt by it of actual notice by the division of the creation of the new lands, the value of the state-owned submersible or submerged lands upon which the new lands were created and the administrative costs incurred by the division with respect to the new lands. If the public body fails to make payment for the new lands as provided in this subsection within one year after the date of the notice by the division, the division may dispose of the new lands as provided in ORS 274.915.”
274-029(2)	[1973 c.496 §1; 1977 c.471 §1; 1981 c.219 §1; repealed by 1983 c.566 §1]
306.125(1)	“Property tax appraisal program; maps, plats, standardized record systems for assessors and tax collectors. (1) The Department of Revenue is authorized to institute programs for the appraisal of property in counties of the state and to make appraisals for the use of county assessors and boards of property tax appeals in assessing property and reviewing assessment rolls, and may install, and assist in the preparation and maintenance of maps, plats or standardized record systems as prescribed by the department, in the offices of assessors and tax collectors.”

306.125(2)	“Property tax appraisal program; maps, plats, standardized record systems for assessors and tax collectors. (1) The Department of Revenue is authorized to institute programs for the appraisal of property in counties of the state and to make appraisals for the use of county assessors and boards of property tax appeals in assessing property and reviewing assessment rolls, and may install, and assist in the preparation and maintenance of maps, plats or standardized record systems as prescribed by the department, in the offices of assessors and tax collectors. (2) The department and county courts are authorized to enter into agreements for the sharing of the expenses of such appraisals and installations including salaries and expenses of department employees engaged therein.”
307.01091)	“Definition of ““real property”” and ““land.”””
308.125(2)	Undivided interest; assessment; ownership of less than one forty-eighth interest.
308.240(1)	“Description of land; assessment to ““unknown owners””; mistake or omission in owner’s name; error in description of property.”
336.220(1)	
368.445 (1)	[Repealed by 1981 c.153 §79]
368.445(2)	[Repealed by 1981 c.153 §79]
368.470(7)	[Repealed by 1981 c.153 §79]
368.470(7)	[Repealed by 1981 c.153 §79]
374.005 to 374.095	
374.015(1)	
374.305 to 374.325	
390.310 to 390.368	“Definitions for ORS 390.310 to 390.368. As used in ORS 390.310 to 390.368, unless the context requires otherwise:”
390.332 to 390.338	“Submission of plan to Land Conservation and Development Commission; revision, approval and distribution of plan. (1) Following the preparation of the plan or any segment thereof under ORS 390.318, the State Parks and Recreation Department shall submit such plan or segment to the Land Conservation and Development Commission. The commission shall investigate and review such plan or segment as it considers necessary. If the commission finds that the plan or segment complies with ORS 390.310 to 390.368, it shall approve the plan or segment. If the commission finds revision of any part of the submitted plan or segment to be necessary, it may revise the plan or segment itself or require such revision by the department and units of local government.”
390.605(2)	“Relating to ocean shore use; creating new provisions; and amending ORS 390.605, 390.678 and ...”
390.805 to 390.925	“Definitions for ORS 390.805 to 390.925. As used in ORS 390.805 to 390.925, unless the context requires otherwise:”

390.835 and 390.845	“Highest and best use of waters within scenic waterways; prohibitions; authority of various agencies; water rights; conditions; recreational prospecting; placer mining. (1) It is declared that the highest and best uses of the waters within scenic waterways are recreation, fish and wildlife uses. The free-flowing character of these waters shall be maintained in quantities necessary for recreation, fish and wildlife uses. No dam, or reservoir, or other water impoundment facility shall be constructed on waters within scenic waterways. No water diversion facility shall be constructed or used except by right previously established or as permitted by the Water Resources Commission, upon a finding that such diversion is necessary to uses designated in ORS 536.310 (12), and in a manner consistent with the policies set forth under ORS 390.805 to 390.925. The Water Resources Commission shall administer and enforce the provisions of this subsection.”
506.006(13)	“General definitions. As used in the commercial fishing laws, unless the context requires otherwise:”
537 through 538	
541.605 to 541.665	Chapter 541 541.351 to 541.395 LAW REVIEW CITATIONS: 26 EL 175 (1996) 541.370 LAW REVIEW CITATIONS: 26 EL 175 (1996) 541.605 to 541.695 See annotations under ORS 196.800 to 196.905. 541.605
545.452(3)	“Relating to irrigation districts; creating new provisions; amending ORS 541.700, 545.002, ...”
547.455(3)	“Annual charge or assessment; computation; apportionment; liability of state lands; payment of assessments by bonds, coupons or warrants. (1) The board of supervisors shall each year make a computation of the whole amount of money to be raised by the district through charges or assessments for the ensuing year for any purposes whatsoever in carrying out the provisions of the Drainage District Act, including maintenance and operation and estimated delinquencies on charges or assessments. This amount when determined by the board shall constitute an assessment upon all the land included in the district and shall be apportioned by the board in accordance with the report of the commissioners as confirmed or amended by the court as provided for in ORS 547.235. (3) Any land, the title to which is vested in the state, or state lands sold under contract in any drainage district, shall be subject to charge or taxation by the district, and the full amount of the charge or assessment due against such lands shall be paid to the district at the same times and in the same manner as other drainage district charges and assessments are paid.”
92.010 (10)	“Definitions for ORS 92.010 to 92.190. As used in ORS 92.010 to 92.190, unless the context requires otherwise (10) “Property line” means the division line between two units of land.”
92.010 (11)	“(11) “Property line adjustment” means the relocation of a common property line between two abutting properties.”
92.010 (9)	“(9) “Plat” includes a final subdivision plat, replat or partition plat.”
92.014 (1)	Approval of city or county required before creating street or road to partition land. (1) No person shall create a street or road for the purpose of partitioning an area or tract of land without the approval of the city or county having jurisdiction over the area or tract of land to be partitioned.
92.014 (2)	“(2) Notwithstanding ORS 92.175, no instrument dedicating land to public use shall be accepted for recording in this state unless such instrument bears the approval of the city or county authorized by law to accept such dedication. [1955 c.756 §3; 1973 c.696 §4; 1991 c.763 §4]”

92.018 to 92.170	“Buyer’s remedies for purchase of improperly created lot or parcel. (1) A person who buys a lot or parcel that was created without approval of the appropriate city or county authority may bring an individual action against the seller in an appropriate court to recover damages or to obtain equitable relief. The court may award reasonable attorney fees to the prevailing party in an action under this section. (2) If the seller of the lot or parcel is a county that involuntarily acquired the lot or parcel by means of foreclosure under ORS chapter 312 of delinquent tax liens, the person who purchases the lot or parcel is not entitled to damages or equitable relief. [1983 c.718 §4; 1995 c.618 §53; 1997 c.805 §2]
“	
92.025 (2)	“(2) No person shall sell any lot in any subdivision or convey any interest in a parcel in any partition by reference to or exhibition or other use of a plat of such subdivision or partition before the plat for such subdivision or partition has been so recorded. In negotiating to sell a lot in a subdivision or convey any interest in a parcel in any partition under ORS 92.016 (1) and (2), a person may use the approved tentative plan for such subdivision or partition.”
92.025 (3)	“(3) Notwithstanding subsections (1) and (2) of this section, the governing body of a city or county may enact an ordinance waiving the requirement that parcels created in excess of 80 acres be shown on a partition plat. Nothing in this subsection shall exempt a local government from minimum area requirements established in acknowledged comprehensive plans and land use regulations. [1955 c.756 §6 (enacted in lieu of 92.020 and 92.030); 1973 c.696 §6; 1977 c.809 §6; 1989 c.772 §4; 1991 c.763 §6]”
92.040 (2)	“(2) After September 9, 1995, when a local government makes a decision on a land use application for a subdivision inside an urban growth boundary, only those local government laws implemented under an acknowledged comprehensive plan that are in effect at the time of application shall govern subsequent construction on the property unless the applicant elects otherwise.”
92.040 (3)	“(3) A local government may establish a time period during which decisions on land use applications under subsection (2) of this section apply. However, in no event shall the time period exceed 10 years, whether or not a time period is established by the local government. [Amended by 1955 c.756 §7; 1973 c.696 §7; 1983 c.826 §8; 1989 c.772 §5; 1995 c.812 §9]”
92.050(4)	“Requirements of survey and plat of subdivision and partition. (1) A person shall not submit a plat of a subdivision or partition for record, until all the requirements of ORS 209.250 and the plat requirements of the subdivision or partition have been met. (4) The plat of the subdivision or partition shall be of such scale and lettering size, approved by the county surveyor, so that all survey and mathematical information, and all other details may be clearly and legibly shown thereon. Each lot or parcel shall be numbered consecutively. The lengths and courses of all boundaries of each lot or parcel shall be shown. Each street shall be named.
“	

92.060(2)

“Marking certain points of subdivisions, partitions or condominium plats with monuments; specifications of monuments; monuments placed before recording; adjusted property line survey and monument. (1) The initial point of all plats shall be on the exterior boundary of the plat and shall be marked with a monument, either of concrete, galvanized iron pipe or an iron or steel rod. If concrete is used it shall not be less than 6 inches by 6 inches by 24 inches and shall contain not less than five cubic inches of ferrous material permanently imbedded in the concrete. If galvanized iron pipe is used it shall not be less than three-quarter inch inside diameter and 30 inches long, and if an iron or steel rod is used it shall not be less than five-eighths of an inch in least dimension and 30 inches long. The location of the monument shall be with reference by survey to a section corner, one-quarter corner, one-sixteenth corner, Donation Land Claim corner or to a monumented lot corner or boundary corner of a recorded subdivision, partition or condominium plat. The county surveyor may authorize the setting of another type of monument in circumstances where setting the required monuments is impracticable.”

92.090 (3)

“Approval of subdivision plat names; requisites for approval of tentative subdivision or partition plan or plat. (1) Subdivision plat names shall be subject to the approval of the county surveyor or, in the case where there is no county surveyor, the county assessor. No tentative subdivision plan or subdivision plat of a subdivision shall be approved which bears a name similar to or pronounced the same as the name of any other subdivision in the same county, unless the land platted is contiguous to and platted by the same party that platted the subdivision bearing that name or unless the party files and records the consent of the party that platted the contiguous subdivision bearing that name. All subdivision plats must continue the lot numbers and, if used, the block numbers of the subdivision plat of the same name last filed. On or after January 1, 1992, any subdivision submitted for final approval shall not use block numbers or letters unless such subdivision is a continued phase of a previously recorded subdivision, bearing the same name, that has previously used block numbers or letters. (2) No tentative plan for a proposed subdivision and no tentative plan for a proposed partition shall be approved unless: (a) The streets and roads are laid out so as to conform to the plats of subdivisions and partitions already approved for adjoining property as to width, general direction and in all other respects unless the city or county determines it is in the public interest to modify the street or road pattern. (b) Streets and roads held for private use are clearly indicated on the tentative plan and all reservations or restrictions relating to such private roads and streets are set forth thereon. (c) The tentative plan complies with the applicable zoning ordinances and regulations and the ordinances or regulations adopted under ORS 92.044 that are then in effect for the city or county within which the land described in the plan is situated. (3) No plat of a proposed subdivision or partition shall be approved unless: (a) Streets and roads for public use are dedicated without any reservation or restriction other than reversionary rights upon vacation of any such street or road and easements for public utilities. (b) Streets and roads held for private use and indicated on the tentative plan of such subdivision or partition have been approved by the city or county. (c) The subdivision or partition plat complies with any applicable zoning ordinances and regulations and any ordinance or regulation adopted under ORS 92.044 that are then in effect for the city or county within which the land described in the subdivision or partition plat is situated. (d) The subdivision or partition plat is in substantial conformity with the provisions of the tentative plan for the subdivision or partition, as approved. (e) The subdivision or partition plat contains a donation to the public of all common improvements, including but not limited to streets, roads, parks, sewage disposal and water supply systems, the donation of which was made a condition of the approval of the tentative plan for the subdivision or partition. (f) Explanations of all common improvements required as conditions of approval of the tentative plan of the subdivision or partition have been recorded and referenced on the subdivision or partition plat. “

92.090(2)	“Approval of subdivision plat names; requisites for approval of tentative subdivision or partition plan or plat. (1) Subdivision plat names shall be subject to the approval of the county surveyor or, in the case where there is no county surveyor, the county assessor. No tentative subdivision plan or subdivision plat of a subdivision shall be approved which bears a name similar to or pronounced the same as the name of any other subdivision in the same county, unless the land platted is contiguous to and platted by the same party that platted the subdivision bearing that name or unless the party files and records the consent of the party that platted the contiguous subdivision bearing that name. All subdivision plats must continue the lot numbers and, if used, the block numbers of the subdivision plat of the same name last filed. On or after January 1, 1992, any subdivision submitted for final approval shall not use block numbers or letters unless such subdivision is a continued phase of a previously recorded subdivision, bearing the same name, that has previously used block numbers or letters. (2) No tentative plan for a proposed subdivision and no tentative plan for a proposed partition shall be approved unless: (a) The streets and roads are laid out so as to conform to the plats of subdivisions and partitions already approved for adjoining property as to width, general direction and in all other respects unless the city or county determines it is in the public interest to modify the street or road pattern. (b) Streets and roads held for private use are clearly indicated on the tentative plan and all reservations or restrictions relating to such private roads and streets are set forth thereon.”
92.170(1)	Amending recorded plat; affidavit of correction. (1) Any plat of a subdivision or partition filed and recorded under the provisions of ORS 92.018 to 92.190 may be amended by an affidavit of correction:
93.310(5)	“Rules for construing description of real property. The following are the rules for construing the descriptive part of a conveyance of real property, when the construction is doubtful, and there are no other sufficient circumstances to determine it: (5) When tidewater is the boundary, the rights of the grantor to low watermark are included in the conveyance, and also the right of this state between high and low watermark.
93.640 (1)	“Unrecorded instrument affecting title or unrecorded assignment of sheriff’s certificate of sale void as to subsequent purchaser. (1) Every conveyance, deed, land sale contract, assignment of all or any portion of a seller’s or purchaser’s interest in a land sale contract or other agreement or memorandum thereof affecting the title of real property within this state which is not recorded as provided by law is void as against any subsequent purchaser in good faith and for a valuable consideration of the same real property, or any portion thereof, whose conveyance, deed, land sale contract, assignment of all or any portion of a seller’s or purchaser’s interest in a land sale contract or other agreement or memorandum thereof is first filed for record, and as against the heirs and assigns of such subsequent purchaser. As used in this section, “every conveyance, deed, land sale contract, assignment of all or any portion of a seller’s or purchaser’s interest in a land sale contract or other agreement or memorandum thereof affecting the title of real property” includes mortgages, trust deeds, and assignments for security purposes or assignments solely of proceeds, given by purchasers or sellers under land sale contract. As used in this section, “memorandum” means an instrument that contains the date of the instrument being memorialized, the names of the parties, a legal description of the real property involved, and the nature of the interest created, which is signed by the person from whom the interest is intended to pass, and acknowledged or proved in the manner provided for the acknowledgment or proof of deeds. A memorandum of an instrument conveying or contracting to convey fee title to any real estate shall state on its face the true and actual consideration paid for such transfer as provided in ORS 93.030.”
94.570(4)	“Relating to planned communities; amending ORS 94.570. Relating to organized communities; creating new provisions; amending ORS 94.550, 94.565, ...
94-480	[Formerly 91.671; renumbered 100.910 in 1989]

Appendix C:

Court Cases

The Oregon Supreme Court

The Supreme Court is composed of seven justices elected by nonpartisan statewide ballot to serve six-year terms. Justices elected to the Supreme Court must be U.S. citizens, members of the Oregon State Bar, and must have resided in the state three years.

The Supreme Court is created and its jurisdiction is defined by Amended Article VII of the Oregon Constitution. It is primarily a court of review; that is, it reviews the decisions of the Court of Appeals in selected cases. The Supreme Court decides which cases to review, usually selecting those with significant legal issues calling for interpretation of laws affecting many citizens and institutions of society, not just the parties involved in the case at hand. The court may either affirm, reverse or modify a decision of the Court of Appeals. When it decides not to review a case, the Court of Appeals decision becomes final. In addition to this review functions, the Supreme Court hears appeals from the decisions of the Oregon Tax Court and may accept original jurisdiction in mandamus, quo warranto, and habeas corpus proceedings. The court also has responsibility for admitting attorneys to practice in Oregon and for the discipline of attorneys and judges.

The Supreme Court may sit *in banc* (full court) or in departments of three to five justices, the majority of whom must be regularly elected justices. When the court sits *in banc*, a majority of justices must concur to pronounce judgment. When a case is heard by a department, not fewer than three justices must concur to pronounce judgment.

Administrative Authority of the Supreme Court

Under a statute passed in 1981, the chief justice is designated as the administrative head of the Judicial Department of state government and, as such, exercises administrative authority and supervision over the appellate, circuit, district and tax courts. In that capacity, the chief justice may make rules and issue orders to carry out duties of the office and may require appropriate reports from judges and other officers and employees of the court. In the 1981 statute, the legislature directed that the chief justice establish “an accountable, equitably funded and uniformly administered system of justice for all the people of this state.” As the head of the Judicial Department, it is the chief justice’s

responsibility to promulgate a personnel plan for all officers and employees of the courts governing appointment, compensation, promotion, discipline, and all other incidents of employment. The chief justice is also charged with the duty of supervising a statewide plan for budgeting, accounting and fiscal management of the Judicial Department.

The chief justice may also assign any circuit or district court judge to serve temporarily as a circuit court judge in any county of any judicial district in the state. The Supreme Court may appoint any regularly elected circuit judge or Court of Appeals judge to serve as a judge pro tempore of the Supreme Court when the need arises. It also has the authority to appoint senior judges (those judges who have served a total of 12 or more years and are now retired) to serve temporarily in any state court at or below the level of the court in which the judge served before retirement.

Oregon Court of Appeals

The Court of Appeals was created by the legislature in 1969 as a five-member court, was expanded to six judges in 1973 and to 10 in 1977. Its judges, elected by statewide nonpartisan ballot for six-year terms, must be U.S. citizens, members of the Oregon State Bar, and qualified electors of their county of residence. The chief judge is appointed for a two-year term by the chief justice from among the judges of the court.

Since Jan. 1, 1976, the Court of Appeals has had exclusive jurisdiction of all appeals, both civil and criminal, from circuit and district courts and of all review of state administrative agency actions.

Reviews and Decisions

A party aggrieved by a decision of the Court of Appeals may petition the Supreme Court for review within 30 days after the Court of Appeals decision is issued. The party must file copies of the petition with the Court of Appeals, and the Court of Appeals must determine whether it will reconsider its decision before the Supreme Court considers the petition. After the Court of Appeals acts, the Supreme Court determines whether to review the case. A petition for review is allowed whenever three or more supreme court judges vote to allow it.

Oregon Tax Court

The Oregon Tax Court, created by the 1961 Legislature, has exclusive jurisdiction over tax questions relating to income, inheritance, gift, **real property**, **personal property**, **timber**, and cigarette taxation, and the **local budget law levy**.

In cases within the court's jurisdiction, the Regular Division is comparable to a circuit court and exercises equivalent powers. The Small Claims Division has jurisdiction over income tax, gift and inheritance tax, homeowner's and renter's refunds, and timber severance tax controversies involving \$500 or less, exclusive of penalties and interest. In the property tax field, the Small Claims Division has jurisdiction in cases where the value of either the parcel of land or the total improvements thereon is less than \$35,000 and less than \$15,000 true cash value of personal property. In cases where the amounts involved exceed the jurisdiction of the Small Claims Division, the cases must be filed in the Regular Division of the court, after having been first appealed to the Department of Revenue. Appeal from the court's decision is made directly to the Supreme Court. In the Small Claims Division, the cases come directly from the state's tax auditor or from the county board of equalization, and the court's decision is final.

Where factual issues are pleaded, court is usually held in the county where the taxpayer resides or the property is located. The judge serves a six-year term and is elected on the statewide, nonpartisan judicial ballot.

Circuit Courts

The circuit courts are the state trial courts of general jurisdiction and have appellate jurisdiction over the county courts, the justice courts and some municipal courts. The circuit courts have adoption and juvenile jurisdiction in all counties except Crook, Gilliam, Harney, Jefferson, Morrow, Sherman and Wheeler counties, where the county court exercises juvenile jurisdiction. The circuit courts also exercise jurisdiction in probate, guardianship and conservatorship cases in all counties except Gilliam, Grant, Harney, Malheur, Sherman and Wheeler counties.

Circuit court judges are elected on a nonpartisan ballot for a term of six years. They must be citizens of the U.S., members of the Oregon State Bar, residents of Oregon at least three years and residents of their judicial district at least one year (except Multnomah County judges, who may reside within 10 miles of the county). There are 84 circuit judges serving the 36 Oregon counties, which are grouped in 19 geographic

areas called judicial districts. Multnomah County district has 20 circuit judges; Lane, 10; Marion, seven; Clackamas, Washington, Josephine/Jackson, Linn/Benton, five judges each. One district has four judges, five have three judges each. Two have two judges each, and four have one judge each.

To expedite judicial business, the chief justice of the Supreme Court may assign any circuit judge to sit in any judicial district in the state, and he may appoint members of the Oregon State Bar as circuit judges pro tempore.

District Courts

The district courts are trial courts limited to \$3,000 in civil cases and to misdemeanor criminal cases, including traffic offenses, where conviction is punishable by a fine of up to \$3,000, imprisonment of one year or less, or both. District courts conduct preliminary hearings in felony matters, which may result in binding over the accused to the grand jury. District courts may not try cases involving title to real property. The district courts have small claims departments which have jurisdiction for recovery of money or damages where the amount claimed does not exceed \$700.

County Courts

At one time, county courts existed in all 36 Oregon counties. The title "county judge" is retained in some counties as the title of the chairman of the board of county commissioners. There is no requirement that county judges be members of the bar.

Where a county judge's judicial function still exists, it is limited to juvenile and probate matters and occupies only a portion of the judge's time, which is primarily devoted to nonjudicial administrative responsibilities as a member of the county board. Only nine Oregon counties, all east of the Cascades, now have a county judge who retains any judicial authority: Harney, Gilliam, Sherman and Wheeler (having both juvenile and probate jurisdiction); Malheur and Grant (probate only); and Morrow, Crook and Jefferson (juvenile only).

Justice Courts

A justice court is held by a justice of the peace within the district for which he is elected, except in those cities where district courts have been established. The county commissions have power to establish justice court district boundaries. The justice of the peace is a remnant of territorial days when each precinct of

the state was entitled to a justice court. Justice courts presently exist in 38 communities.

The justice court has civil jurisdiction, nonexclusive where the amount claimed does not exceed \$1,000, except in actions involving title to real property, false imprisonment, libel, slander, malicious prosecution, criminal conversation, seduction or upon a promise to marry. Justice courts have small claims departments where actions for recovery of money or damages do not exceed \$500 may be prosecuted.

Justice courts have criminal jurisdiction in all misdemeanors (crimes punishable by imprisonment of no more than one year), but the defendant may elect to have his or her case transferred to district court or, if there is no district court, to the circuit court in the county of his or her arrest. The justice courts also have jurisdiction over traffic and other violations.

Notes

A. Court citations

The court citations in this volume, and in most legal authorities, are to cases before the Supreme Court or Court of Appeals of this and other states, the United States Supreme Court, and occasionally English cases. Circuit court cases are mentioned, but not cited as authority. A typical Oregon Supreme Court case will be cited, for example, as:

Bernards et ux v. Link and Haynes, 199 Or. 579, 248 P~2d 341.

“Bernards et ux” in this case are the plaintiffs who are appealing the decision of the circuit court of Yamhill County. The plaintiffs are Theodore M. Bernards “and another.”

“Link and Haynes,” in this case, are the defendants E.J. Link “and another,” a co-partnership “doing business under the firm name and style of L.H.L. Lumber Company.”

The citation 199 Or. 579 simply means the case is filed in Volume 199 of the *Oregon Reports*, page 579 (the first page of the report).

The accompanying citation, 248 P.2d 341, means a digest of this case is published in Volume 248 of the *Pacific Reporter*, second series (the 2d), beginning on page 341.

Although the court report will show how the case is to be cited, it will often be cited with slight variations. The case of *Portland Baseball Club v. Portland*, 142 Or. 13, 18 P.2d 811, is a good example. This case involved

the Portland Baseball Club, the City of Portland “and others” (et al). Although the official citation is as shown in italics, it has been cited in subsequent cases and authorities as, *Baseball Club v. Portland*, *Portland Baseball Club v. City of Portland*, *Portland Baseball Club v. Portland et al*, *Portland Baseball Club v. City of Portland et al*, and *Portland Baseball Club*. The latter is acceptable in discussions where the case has been already cited and the reader is aware of the case being referenced by the shorter, abbreviated citation.

The danger of using the abbreviated citation is that there may be other cases with the same name. *Cabell et al v. Cottage Grove et al* provides a good example. Cabell was once the commissioner of the Oregon Highway Department. Consequently, in more than one case his name appeared as either the plaintiff or the defendant in cases involving the Highway Department.

B. Oregon Supreme Court

The Oregon Supreme Court cases are published in *The Oregon Reports* (reports of cases decided in the Supreme Court of the State of Oregon) and Court of Appeal cases are published in the *Oregon Reports*, *Court of Appeals*. A digest of the cases are also published in the *Pacific Reporter*, abbreviated “P.” in the citation. “Pacific” is one of the seven regions, which also include the following regions: Southern, Southwestern, Atlantic, Southeastern, Northeastern and Northwestern. Another publication containing U.S. Supreme Court case law is the *Federal Reporter*. The following is a key to the abbreviations cited.

P., P.2d	<i>Pacific Reporter</i>
So., So.2d	<i>Southern Reporter</i>
S.W.2d	<i>Southwestern Reporter</i>
A., A.2d	<i>Atlantic Reporter</i>
S.E., S.E.2d	<i>Southeastern Reporter</i>
N.E., N.E.2d	<i>Northeastern Reporter</i>
N.W., N.W.2d	<i>Northwestern Reporter</i>
F.2d	<i>Federal Reporter</i>

There are many other “reporter” publications, such as the *Federal Supplement* (F.2d), *Federal Rules Decisions* (F.R.D.), and the like, few of which are cited in this publication. For details, explanation and abbreviations, a recommended reference is *A Uniform System of Citation*, published and distributed by The Harvard Law Review Association, Gannett House, Cambridge, Mass. 02138.

C. Citations: Supreme Courts of Other States

The abbreviations for the court reports of other states are the same as, or similar to the uniform system of

abbreviation for states, and are easily identified, such as: 156 Ind. 478, Volume 156, *Indiana Reports of Cases Before the Supreme Court*, page 478.

D. Citations: Oregon Court of Appeals

Example:

City of Salem v. Merritt Truax
70 Or. App. 138

In this case the city is the respondent and Merritt Truax (et al) are the appellants. The case is published in Volume 70 of the *Oregon Reports, Court of Appeals*, beginning at page 138.

E. Citations: Federal Cases

U.S. Supreme Court cases are cited as "U.S.", such as:

Craig v. Boren
429 U.S. 1909

The *Supreme Court Reporter* is abbreviated S. Ct. and the *United States Law Week*, U.S.L.W. The most common citation included with the Supreme Court Report citation will be the *Federal Reporter*, abbreviated F. or F.2d.

F. Law publications

Several authorities cited here are excellent sources for research and references, such as George W. Thompson's *Commentaries on the Law of Real Properties*, published by the Bobbs-Merrill Co., New York, N.Y. For example:

2 Thompson 391, subsec 359

is a citation of Volume 2, Thompson On Real Property, page 391, subsection 359. The information is regarding a principle of law, cited in Oregon cases:

"So if one conveys lots by a map or plat, which represents the lots as bounded upon a road or way, and the map or plat is referred to in the deed, the right of way over it passes as part of the grant of each lot as an easement appurtenant thereto." *Carter v. Portland*, 4 Or. 339; *Nicholas v. Title & Trust Co.*, 79 Or. 226, 154 P. 391, Ann. Cas. 1917A, 1149; *Menstell v. Johnson*, 125 Or. 150, 262 P. 853, 266 P. 891, 57 A.L.R. 311.

Other cited law publications are:

American Jurisprudence, (Am. Jur.)
American Law Reports (A.L.R.), for example:
20 A.L.R. 315
American Law Review (Am. Law Rev.)

G. Oregon Revised Statutes

These are abbreviated "ORS." The statutes are the state laws of a general, public and permanent nature,

contained in seven volumes, 1 through 6A. A typical reference to a statutory law is:

ORS 92.014(2)

This refers to Oregon Revised Statute, chapter 92, section .014, subsection 2. However, 92.014 would usually be referred to as the section number.

The text of every statute section, in the official publication of the statutes by the Legislative Counsel Committee of the Legislative Assembly, was copied verbatim from an enrolled act, with exception of changes in form permitted by ORS 173.160 and other changes authorized by law.

H. Periodicals

Over 400 periodicals contain discussions on legal questions, case law, statutory law, legal ethics, subject law, etc. Many of these are published by law schools such as the University of Oregon School of Law. Four times a year the U. of O. publishes the "*Oregon Law Review*," cited as Or. L. Rev. An important treatise cited here, by Sheldon W. Parks, "*The Law of Dedication in Oregon*," was cited as:

20 Or. L. Rev. 111

This refers to Volume 20, *Oregon Law Review*, beginning on page 111. Other law reviews cited were:

Willamette Law Journal (Willamette L.J.)
Pacific Law Journal (Pac. L.J.)
Lawyers Reports Annotated (L.R.A.)
Harvard Law Review (Harv. L. Rev.)
American Law Reports Annotated (A.L.R.)

Note: *Black's Law Dictionary*, rev. 4th ed., pp. 1797-1882 lists most of the abbreviations you will encounter in legal textbooks, journals, law reviews, and the like.

Black's Law Dictionary (Black's).

Brown, Curtis M. *Boundary Control and Legal Principles* (Brown). John Wiley & Sons, New York, N.Y. (Note: "Brown" cited elsewhere, could be a reference to *Brown On Personal Property*, published by Callaghan & Company.)

Burby, William E. *Real Property*, (Burby). An excellent treatise on the history of real property law, beginning with the feudal system, explanation of rights in land, possessory estates, titles, future interests and restraints pertaining to alienation. West Publishing Co.

Clark, Frank Emerson, *A Treatise on the Law of Surveying and Boundaries* (Clark). Bobbe-Merrill Co., Indianapolis.

Corpus Juris Secundum (C.J.S.), a restatement of law as known from 1658 to today. West Publishing Co.

Elliott's *Roads & Streets*, (Elliott), by Byron K. and William F. Elliott, Bowen-Merrill, publishers.

Law of Real Property (Moynihan), by Cornelius J. Moynihan, West Publishing Co. (1962).

Oregon Law Review (Or. L. Rev.), U. of O. School of Law, Eugene, Or.

Skelton, *The Legal Elements of Boundaries and Adjacent Properties* (Skelton), by Ray Hamilton Skelton, Bobbe-Merrill Co., publishers.

Survey of the Law of Real Property (Boyer), by Ralph E. Boyer, West Publishing Co.

Words and Phrases (W & P), West Publishing Co. A complete series of volumes on all judicial constructions and definitions of words and phrases by the state and federal courts from the earliest of times.

The user of this glossary must be aware that legal terms seldom have exact meanings. The term "right of way" is an excellent example. *Black's Law Dictionary, supra*, defines "right of way" as:

"The right of passage over another's ground, and its general accepted meaning is that it denotes an easement. It would be using the term in an unusual sense by applying it to an absolute purchase of the fee simple in lands."

Yet, in *Highway Comm. v. Pac. Shore Land Co.*, 201 Or. 142, the Oregon Supreme Court decision called attention to the importance of defining such a term in context with the law or principle where it is used. The court explained that the term "right of way," in the statute granting the State Highway Commission the power to acquire land for "rights of way," had its usual and ordinary meaning, *"and the power granted is simply the power to acquire property deemed necessary for the construction of a highway for use of vehicular and other travel."* But the court noted the importance of other statutory provisions which must be considered to arrive at an accurate definition of "right of way" as used in the Highway Code, *i.e.*: "but the legislature has authorized the Department of Transportation to acquire fee title when acquiring land *for right of way purposes*, so the term 'right of way' includes land acquired in fee (as well as land where only an easement has been acquired)." And in certain other cases, it has been held that the term "right of way" merely denotes the contemplated use of the land, rather than words of limitation.

The Oregon Revised Statutes quoted here are as codified and published as in effect on Sept. 27, 1987. Because this material was formally published after the 1987 Legislative Assembly, reference should be made to the official statutes for precise, up-to-date wording, as published by the Legislative Committee of the Oregon Legislative Assembly.

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- Argo Investment v. Dept. of Transportation, 66 Or. App. 430 (1984), exception made in case of limited access highway
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City of Salem v. Merritt Truax, 70 Or. App. 138

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Colclough v. Milwaukee, 92 Wis. 182, 65 N.W. 1039

Cole v. Seaside, 80 Or. 73

Coleman v. Flint & P.M.R. R. Co., 64 Mich. 160

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Fegtly, Historical Development of Land Surveys, 38 111. L. Rev. 220: Lines established by official surveys control over those made by private parties.

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Frederick v. Douglas County, (1945) 176 Or 54, 155 P2d 925.

French-Glenn Livestock Co. v. Springer, 185 U.S. 47

Freytag v. Vitas, (1958) 213 Or. 462, 336 P. (2d) 110.

Frick v. City of Gary, Ind., 135 N.E. 346

Galewski v. Noe, 266 Wis. 7, 62 N. W. 2d 703 (1954)

Gasperd vs. LeBaron, 237 P2d 278, 281 (1951)

Geer v. Chapin, 163 El. App. 654, 659, 660

George v. Cox, 114 Mass. 382, 387; Spaulding v. Abbott, 55 N.H. 423

Gietl v. Smith, 320 Ill. 467; Easton v. Koch, 152 Pa.; etc.

Gillean v. City of Frost, 25 Tex. Civ. App. 371,377, 61 S.W. 345

Gilliam v. Cielona, 145 P. 1061, 74 Or. 462.

Glatts v. Henson, 31 Cal.2d 368, 371-372, 188 P.2d 745

Goff v. Avent, 122 Miss. 86, 84 So. 134: If a deed description is by rectangular survey section numbers, the land conveyed is such as it physically exists on the ground, the original government corners and lines being such sections’ true and only boundari

Goodenough v. Warren, (1879) 5 Sawy 494, 498 Fed case No. 5, 534;

Goodman v. Myrick, 5 Ore. 65; Van Dusen v. Shively, 22 Ore. 64, 29 Pac. 76: Where there is a discrepancy in a government survey, between the monument and the distances given in the field notes (or on the plat), the monuments will control...

Grady v. Dundon, 30 Or. 333, 47 P. 915. But see: City of Molalla v. Coover et ux, 192 Or. 233, 235 P.2d 142.

Grammer v. Sacramento, 2 Cal. 2d 432, 41 P. 2d 543, and in other juris.

Green v. Kunkel, Civ. App. 183 S. W. 2d 585

Greene v. City of Antonio, Tex. Civ. App., 178 S.W. 6

Greer v. Squire, 9. Wash. 359, 37 Pac. 545: Corners shown to have been originally set by U.S. surveyors are conclusive and must be accepted as the true corners, no matter how inaccurately they may have been originally established.

Gregory v. Knight, 50 Mich. 61, 64, 14 N.W. 47.

Gubser v. Town, (1954) 202 Or 55, 273 P2d 430,

Gubser v. Vitas, (1954) supra; Payne v. Hall, (1921) 185 N.W. 912, 192 Ia. 780.

Guild v. Wallis, (1929) 130 Or 148, 279 P546;

Guilliams v. Baker Lake Club, 90 Or 13, 175 Pac. 437, 28 Arizona L. Review 267

Guthrie v. Haun, (1938) 159 Or 50, 76 P2d 292.

Haase v. Kingston Co-op. Creamery Association, (1932) 212 Wis 585, 250 N.W. 444.

Hall v. Fairchild-Gilmore Wilton Co., 66 Cal. App. 615.

Hall v. Tanner, 4 Pa. 244, 45 Am. Dec. 686, it was "It has ever been held that the marks on the ground constitute the survey. The courses and distances are only evidence of the survey."

Hamilton v. State, 106 Ind. 361, 7 N.W. 9

Hamlin v. City of Norwich, 40 Conn. 25

Hammer v. Polk County, 15 Or. 578, 580, 16 P. 420.

Hanes v. Land Co., 129 N.C. 311, 40 S.E. 114.

Hanlin v. Chicago & Al. W Ry. Co., 61 Wis. 515, 526, 21 N.W. 623.

Hannibal v. Draper, 15 Mo. 634;

Hanns v. Friedly, 181 Or 631, P2d 855.

Hanson v. Thornton, 91 Ore. 585, 591, 179 P 494 (1919).

Hardin v. Jordan, 140 US. 371

Hardin Y. Shedd, 190 U.S. 508, 519

Harniss v. Bulpitt, 1 Cal. App. 140, 81 P. 1022

Harris v. St. Helens, 72 Or. 386 (1914); cit. Black's Law Dictionary, 2d ed., pp. 340, 341, supra.

Hart v. City of Independence, 84 Or. 194, 164 P. 719

Hay v. Stephens, 262 Or. 193 497 P.2d 362 (May, 1972).

Heiple v. City of East Portland, 13 Or. 103

Henderson v. Frio County, Tex. Civ. App., 362 S.W.2d 406, 408: "Instruction properly defined 'dedicated as public road' to mean road devoted or appropriated to public use as a public road by owner, by some unequivocal acts or conduct manifested an intent

Hendrickson v. City of Astoria, 127 Or.

Hendrickson v. City of Astoria, 127 Or. 1, 270 P. 924;

Hennigan v. Mathews, (1916) 79 Or 622, 155 p169;

Henrie v. Hyer, 92 Utah 530, 70 Pac. (2d) 154: Official government surveys are not open to attack between private parties in boundary disputes.

Henry v. Dubuque R. Co., 2 Iowa 288

Heuel v. Wallowa Co., 76 Or. 354, 149 P. 77

Hickey v. Daniel, (1921) 99 Or 525, 195 p812;

Hicklin v. McClear, 18 Or. 126, 137, 22 P. 1057

Himmelmann v. Saterlee, 50 Cal. 69; Reed v. Erie, 79 Pa. 352

Hinman v. Warren, (1877) 6 Or 408, 411

Hislop v. County of Lincoln, 249, Or. 259, 437 P. 2d 847.

Hoban v. Bucklin, 88 N.H. 73, 80, 184 A. 362, 186 A. 8

Hogg v. Davis, (1892) 22 Or 428

Hogue v. Albina, 20 Or. 182, 25 P. 386, 10 L.R.A. 673

Hogue v. City of Albina, 20 Or. 182, 25 P. 386, 10 L.R.A. 673;

Hogue v. City of Albina, 20 Or. 182, 25 P. 386, 10 L.R.A. 673;

Hohnbaum v. City of Woodburn, 29 Or. App. 283, 563, P. 2d 173 (1977)

Holt v. Sargent, 15 Gray 97

Holton v. Northwestern Oil Co., 201 N.C. 744. See: ORS Chapter 368, "Road Hazards." See: ORS Chapter 221 for acts authorized by the legislature.

Home Real Estate Loan & Ins. Co. v. Parmele, (1938) 214 N.C. 63, 197 S.E. 714, 717.

Hubbard v. Dusy, 80 Cal. 281, 22 Pac. 214: Where it is doubtful which of two lines or monuments is the true government line, that one is to be so considered which more nearly conforms to the U.S. field notes (or plat).

Huber v. Gazley, 18 Ohio 18;

Huddleston v. Eugene, (1899) 34 Or 343, 55 p868, 43 LRA 444

Huddleston v. Eugene, 34 Or. Or. 343, 55 P. 868 (1899)

Huggett et ux v. Moran et ux, 201 Or. (1954) 201 Or. 105, 117

Huggett et ux v. Moran et ux, 201 Or. 105, 266 P.2d 692 (1954).

Hughes v. Bingham, 135 N. Y.

Hughes v. State of Washington, 389 U.S. 290 (1967).

Hume v. Rogue River Packing Co., (1908) 51 Or 237, 83 p391, 92 p1065, 96 p865, 131 Am St. Rep 732, 31 LRA (NS) 396.

Hurd v. Byrnes, 264 Or. 591, 506 P. 2d 1973.

Indianapolis v. Kingsbury, 101 Ind. 200, 51 Am. Rep. 749

Irvin v. Crammond, 58 Ind. App. 540, 108 NE (2d) 539.
 Jaloff v. United Auto Indem. Exch., 120 Or. 381
 Jeffries. v. East Omaha Land Company, 134 U.S. 178, 3 L. ed 872, 10 Supreme Court 518.
 John P. Sharkey Co. v. Portland, 58 Or. 353, 106 P. 331, 114 P. 933 (1911);
 Johnson v. Jeldness, 85 Or. 657, 167 P. 798, L.R.A. 1918A, 1074
 Johnson v. Knott, 13 Or. 308, 315, 316, 10 P. 418
 Jones v. Teller, 65 Or. 328, 332, 133 P. 354
 Jory v. Palace Dry Goods Co., 1896) 30 Or 196, 46 p786. Regarding ORS 308.240,
 Kane v. Kane, (1930) Or 79, 291 p785.
 Kanne v. Otty, (1894) 25 Or 531, 36 p537;
 Katz v. Patterson, (1931) 135 Or 449, 296 p.54
 Kean v. Calumet Canal Co., 190 U.S. 452, 459
 Keane v. Portland, 115 Or. 1, 7, 235 P. 677; Lewis, Eminent Domain, 3d ed., subsec 387 Elliotts' Roads and Streets, 3d ed., subsec 355; 20 C.J. 881, subsec 310.
 Killiam v. Multnomah Co., (1931) 137 Or 562, 4 P2d 323.
 Kimball v. Kenosha, 4 Wis. 321, 336.
 King v. Ehghan, (1890) 19 Or 560, 23 Or 262, 25 p150, 31 p601, 18 LRA 361;
 Kingsley v. Jacobs, (1944) 174 Or 514, 149 P2d 950.
 Kister v. Reeser, 98 Pa. 1, 4, 42 Am. Rep. 608.
 Knight v. U.S. Land Assn., 142 U.S. 161.
 Knight v. United Land Assoc, 142 U.S. 161, 183, 35 L ed 974, 981, 12 S Ct 258;
 Knott v. Jefferson Ferry Co., 9 Or. 530
 Kropitzer v. Portland, 237 Or. 157 (1964).
 Kuck v. Wakefield, 58 Or. 549, 555, 115 P. 428.
 Kurtz v. Southern Pacific Co., 80 Or. 213, 155 P. 367 (1916)
 Kurtz vs. Southern Pacific Co., 80 OR 213, 217; 156 P2d 794 (1916)
 Lade v. Shepherd.
 Lang v. Portland, 75 Or. 388, 389
 Langley v. Gallipolis, 2 Ohio
 Lankin v. Terwilliger, 22 Or. 97, 29 P. 268.
 Latourette v. Clackamas County
 Latourette v. County Court, 121 Or. 323, 255 P. 330
 Lauderback v. Multnomah County, 111 Or. 631, 226 P. 697;
 Leadville v. Bohn. Min. Co., 37 Colo. 248, 86 P. 1038, 8 L.R.A.; N.S. 422, 11 Ann. Cas. 443; 18 C. J. p. 112 note 37.
 Lee Wilson & Co. v. United States, 245 U.S. 24: "First. Where, in a survey of the public domain a body of water or lake is found to exist and is meandered, the result of such meander is to exclude the area from the survey and to cause it as thus separated
 Lehigh Valley R. Co. v. McFarlan, 43 N.J.L. 605 cited in: 2 Thompson on Real Property, 1961 ed., subsec 335, n. 18, pp. 156-157. See: State ex rel McNutt v. Orcutt, 221 Ind. 523, 199 N.E. 595; Buss v. Dyer, 125 Mass. 287.
 Lewis v. Lewis, (1871) 5 Or 65;
 Logansport v. Dunn, 8 Ind. 378. And note: regardless of any charter provision of an Oregon municipality, a common law dedication may be effected; See: Mid-County Cem. Dist. v. Thomason, 267 Or. 637.
 Love v. Morrill, 19 Or. 545, 24 P. 916
 Lowell v. Pendleton Auto Co., 123 Or. 383, 402, 261 P. 415
 Lownsdale v. City of Portland, 1 Or. (1861), discussing Daniel Lownsdale's, J. L. Parrish's, Stephen Coffin's and W. W. Chapman's interest in the Portland claim. This case supplies historical data on the creation of Portland and territorial land laws.
 Lownsdale v. Parrish v. The City of Portland,
 Luhrs v. Sturtevant, 10 Or. 170.
 Luscher v. Reynolds, (1936) 153 Or 625, 56, P2d 1158;
 Macleay Estate Co. v. Curry County, 127 Or. 356, 272 P. 263
 Macomber v. Nichols, 34 Mich. 212.
 Madison v. Basart, 59 I.D. 415 (1947).
 Magee Heirs v. Slack, 152 Tex. 427, 258, S. W. 2d 797 (1953).
 Magic v. Basquin, Ohio Com. Pl., 102 N.E.2d 42, 44: "the word 'dedicate' means a grant of an interest in land for public use." See: 26, 27 Am. Jur. 2d, Em. Dom., 56 Am. Jur. 2d;
 Mann v. Tacoma Land Co., 153 U.S. 273, 284,
 Marchland v. Town of Maple Grove, 48 Minn. 271, 51 N.W. 606;
 Marks v. Bettendorf's Inc., Mo. App., 377 S. W. 2d 585

- Martin v. Klamath Co., 39 Or. App 455 (1979), 592 P. 2d 1037. CJS Highways.
- Martin v. Waddell, 41 U. S. (16 Pct.) 367, 410-411 (1842).
- Massachusetts v. New York, 271 U.S. 65, 89.
- Mathis v. Thunderbird Village, Inc., 236 Or. 439, 440 (1964); 389 P.2d 343.
- Maxwell v McCall, 145 Iowa 687
- Maynel v. Saltmarsh, 1 Keble 647, 83 Eng. Rep. 1278 (1664)
- McAdam et ux v. Smith et al, 221 Or. 48, 350 P. 2d 689
- McAdam v. Smith, 221 Or 48, 350 P2d 689 (1960).
- McAdam v. Smith, 221 Or. 48, 350 Pac. (2d) 689
- McCashum v. Hoselton, (1975) 273 Or 778, 543 P2d 657.
- McConaughy v. Wiley, (1888) 13 Sawy 148, 33 Fed 449
- McCoy v. Thompson, 84 Or. (1917), Portland Ry. L & P. Co. v. Oregon City, 85 Or.
- McDowell v. Carothers, (1915) 75 Or 126, 146 p800;
- McGee v. Swearengen, 194 Ark. 735, 109 S. W. 2d 444
- McGowan v. City of Burns, 172 Or. 63, 74, 137 P.2d 994, 139 P.2d 785
- McKay v. Sause, "As long as the upland owner does not encroach on the rights of the state or of any other parties he may make artificial changes in his bank, which will not destroy his title or affect his boundary."
- McLoughlin v. Stevens, 18 Ohio 94.
- McQuaid v. Portland & V. Ry., (1889) 15 Or 237, 22 p899;
- McQuillan, Municipal Corp., 3d ed., op. cit. 636 subsec 33.04.
- McRose v. Bottyer, 81 Cal. 122, 22 P. 393.
- Meier v. Portland Cable Ry. Co. 16 Or. 500, 19 P. 610, 1 L.R.A. 856
- Meier v. Portland Cable Ry. Co. 16 Or. 500, 19 P. 610, 1 L.R.A. 856
- Menstell et ux v. Johnson, et ux 125 Or. 162
- Merchant v. Town of Marshfield, (1899) 35 Or. 55, 61 56 P. 1013.
- Micelli v. Andrus, 61 Or 78, 120 P. 737 (1919);
- Michelli v. Andrus, (1912) 61 Or 78, 120 p737;
- Mid-County Cemetery Dist. v. Thomason, 267 Or. 637 (1974).
- Milarkey v. Foster, 6 Or. 378, 25 Am. Rep. 531;
- Miles v. Cedar Point Club, 175 U.S. 300
- Miller v. Fisher, 90 Or. 111, 174 P. 1152 (1918)
- Miller v. Roy W. Heinrich & Co., 257 Or. 155, 160 (Dec. 1970), 476 P.2d 183
- Minto v. Delaney, 7 Ore. 337; Weiss v. Oregon Iron & Steel Co., 13 Ore. 496, 11 Pac. 255.
- Montgomery v. Shaver,
- Montgomery v. Somers, 50 Or. 259, 90 section on "Prescription") P. 674.
- Moore v. Fowler, 58 Or. 292, 297, 114 P. 472
- Morris v. City of Salem, et al, 179
- Morse v. Whitcomb, 54 Or. 412, 423, 102 P. 788:103 P. 775:135 Am. St. Rep. 832
- Morton v. Hood R. Co., 88 Or. 144, 171, P. 584
- Muckle v. Good, (1904) 45 Or 230, 77 p743
- Muhlker v. New York & Harlem R.R. Co., 197 U.S. 544, 49 L. Ed. 872, 25 Sup. Ct. Rep. 522.
- Muhlker v. New York & Harlem R.R. Co., 197 U.S. 544, 49 L. Ed. 872, 25 Sup. Ct. Rep. 522.
- Mumford v. Wardell, (U.S.) 6 Wall 423, 436, 18 L ed 756, 761;
- Mutual Irr. Co. v. Baker City, 58 Or. 306, 321, 110 P. 392, 113 P. 9;
- Muzzy v. Wilson, 259 Or. (1971)
- Navajo Co. v. Apache Co., 26 Ariz. 74, 721 Pac. 837: If all the corners marked in the surveys, returned by the surveyor general, are established as proper corners of sections, or subdivisions of sections, which they were intended to designate, the corners
- Neal v. Delaware, 103 U.S. 370
- Neil v. Independent Realty case,
- Neil v. Independent Realty Co., supra (cited in Oregon cases.)
- New Orleans v. U.S., U.S. (10 Pet.).
- Nicholas v. Title & Trust Co., 79 Or. 226, 244, Ann. Cas. 1917A, 1149, 154 P. 226, 244, Ann. Cas. 1917A, 1149, 154 P.
- Nickson v. Garry, 51 N.M. 100, 179 P. 2d 524
- Nodine v. Union, 42 Or. 613, 616; Elliotts' Roads and Streets, 3d ed.; See: Muzzy v. Wilson, 259 Or. 518.

Nordale v. Waxberg, 84 Fed. Supp. 1004; State v. Brace, 76 N. Dak. 314, 36 N.W. (2d) 330.

Northwestern Auto Co. v. Hurlburt, 207 P. 161

Nosier v. Coos Bay R.R. Co., 39 Or. 331, 334, 64 P. 644

O'Hara v. Brace, (1971) 258 Or 416, 482 P2d 726.

OGorman v. Baker, (1959) 219 Or 170, 347 P2d 85, 338 P2d 638.

Oklahoma v. Texas, 261 U.S. 345.

Olcott v. Hawk, 105 Or. 319, P. 709.

Oliver v. Newberg, 50 Or.

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Oregon City v. Oregon and California Railway Company

Oregon v. Portland Gen. Elec. Co., 52 Or. 502, 95 P. 722, 98 P. 160

Pa/en v. Ocean City, 64 N.J. Laws, 46 A. 774.

Pacific Elevator Co. v. Portland, (1913) 65 Or 349, 133 P72, 46 LRA (NS) 363.

Palen v. Ocean City, 64 N.J. Laws, 46 A. 774.

Palmateer v. Reid, (1927) 121 Or 179, 254 p359;

Palmer Lumber Co. v. Wallowa Co. 60 Or. 342, 118 P. 1013

Parker v. Taylor (1879) 7 Or 436, 446; Shively v. Bowlby.

Parrish v. Stephens, 1 Or. 59, 73 (Dec. 1653). The bill was filed in 1850, and an injunction was allowed. A compromise followed, but failed. The cause came to be heard in the Washington, D.C., District Court, and under a late statute was adjourned to this

Parrott v. Stewart, 65 Or. 254, 132 P. 523

Paskey v. Bradley, 209 Ark. 93, cit. in 23 Am. J. Juris., 2d ed., Dedication

Paul v. Carver, Carver, 26 Pa. 223, 67 Am. Dec. 413

Peery v. Fletcher,

People v. Astle, 337, Ill. 253, 256, 169 N.E. 185

People v. Kerber (1908) 152 Cal. 731, 93

Peters v. Robertson, 73 Or. 263, 266, 144 P. 568.

Pewaukee v. Savoy, 103 Wis. 271, 79 N.W. 436 (1899).

Pillsbury v. Brown, 82 Me. 450, 19 A. 858, 9 L.R.A. 94, see: note, ""Right of Public to Use Entire Width of Highway,""

Pittsburgh & W.E. Pass. Ry. v. Point Bridge Co., 165 Pa. 37, 30 A. 511, 26 L.R.A. 323

Point Pleasant Manor Building Company v. Brown,

Polar v. Hagen (1845) 3 How. (44 U.S.)(212, 228).

Poleske v. Jones, 192 Iowa 1015, 185 N.W. 917: Centers of sections cannot be ascertained by running a line, (on a cardinal) directly south from the 1/4 section corner on the north line, and marking off 160 rods on such line. The lines must be run from 1/4

Pollards Lessee v. Hagan, (U.S.) 3 212, 228, 229, 11 L ed 565, 573, 574;

Port of Portland v. Reeder, 203 Or. 369, 280 P.2d 324 (1955).

Portland Baseball Club v. Portland, 142 Or. 13, 18 P.2d 811 (1933)

Portland Ry., L. & P. Co. v. Oregon City, 85 Or. 583; cit.: Elliotts' Roads and Streets, 3d ed. subsec 137.

Portland v. Miller, 72 Or. 317, 143 P. 1006

Portland v. Whittle, 3 Or. 126, 129.

Postal Telegraph Co. v. State Highway Commission, 276 F. 958, 961.

Powers v. Coos Bay Lbr., Co., 329, 263, P. 2d 913 (1953)

Pratt v. Atlantic and St. Lawrence Railroad Co., 42 Me. 579, 585

Price v. Inhabitants of Plainsfield, 40 N. J. Laws 608

Price v. Thompson, 48 Ky. (B. Mon.) 363

Quimby v. Vermont Central R. Co., 23 Vt. 387

R.L.C. (1939) Subsection 1022. Single and double proportionate measurement, post, subsection 384, 385. "A proportionate measurement is one that gives concordant relation between all parts of the line . . ." and new distances are to be of the same relation

Raab v. Casper, 51 Cal. App. 3d 866, 876, 124 Cal. Rep. 590, 596 (1975), cited in Shumate v. Robinson, supra.

Railroad Company v. Schurmeir, 7 Wall. 272 (19 L. ed. 74)

Ramstad v. Cart, 154 N.W. 195, 203; Words and Phrases

Rasmussen v. Walker Whse. Co., (1913) 68 Or 316, 136 p661.

Rayburn v. Winant, (1888) 16 Or 318, 18 P2d 855.

Raymond v. Coffey, (1873) 5 Or 132;

Reed v. Erie, 79 Pa. 352

Republics v. Arnold, 3 Yeates 422

Rex v. Cross, 3 Camp. (Eng.) 224 (1812) was cited to supply a historical basis for the doctrine of nuisances

Rex v. Hudson

Richards v. Page Inv. Co., (1924) 112 Or 507, 228 P937.

Rider v. Pottratz, 246 Or. 454, 456 425 P.2d 766 (1967)

Ridings v. Marion Co., 50 Or. 30, etc.

Robbins v. Scranton, 217 Pa. 577, 66 A. 97.

Robinson v. R.R. Co., Vt. 426, 10 A. 522

Rohde v. State Industrial Accident Commission, 108 Or. 426, 217 P. 627

Rowan Exrs. v. Portland, *supra*;

Salem Improvement Company v. McCourt; cited *supra*.

San Diego County v. Calif. Water & Tel. Co., 30 Cal. 2d 817, 186 P. 2d 124 (1947), and authorities cited therein.

Sanborn v. Chicago & N. W. R. Co., 16 Wis. 21

Sandstrom v. Oregon-Washington Ry. & Nav. Co., 75 Or. 159: "For an injury which an individual sustains in common with the general public, he or she cannot complain, though suffering more than the rest of the public, and in such case, relief, if any, is by

Savage v. City of Salem, 23 Or. 381, 363; 1 Wood on Nuisances

Scheimer v. Price, 65 Mich. 638, 32 N.W. 873

Schenley v. Commonwealth, 36 Pa. 62;

Schmidtke v. Keller, (1903) 44 Or 23, 73 p332, 74 p222.

School District 47 v. U.S. Nat'l. Bank of Portland, 187 Or. 360, 211 P.2d 723

Schooling v. Harrisburg, 42 Or.

Sears v. Chicago, 247 Ill. 204, 93 N.E. 158

Security Investment Co. v. Oregon City, 161 Or. 432.

Security Land & Exploration Co. v. Burns, 193 U.S. 167;

Sequin v. Maloney - Chambers, (1953) 198 Or 272, 281, 253 P2d 252,

Shively v. Bowlby, affirming Bowlby v. Shively, (1892) 22 Or 410, 30 p154; State v. McVey, (1942) 168 Or 337, 121 P2d 461, 126 P2d 181.

Shively v. Welch, (1884) 20 Fed 28

Shumate v. Robinson, 52 Or, App. 199 (1981), 627 P.2d 1295.

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Silverton v. Brown, 63 Or. 418, 424, 12 P. 45

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Skinner v. Hartford Bridge Co., 29 Conn. 523;

Skynetta v. Moore, 202 Miss. 585, 30 So. 2d 53

Sloss-Sheffield S. & I. Co., v. Johnson, 147 Ala. 384, 41 So. 907, 119 Am. St. Rep. 89, 11 Ann. Cas. 285, 8 L.R.A. N.S. 226, and note.

Smith Tug and Barge Co. v. Columbia Pacific Towing Corp., *supra*, 443 P2d 205, 86 Adv.Sh 913 (1968).

Smith v. Cameron, 123 Or. 501, 262 P. 946

Smith v. Dwight, (1916) 80 Or 1, 148 p477, 156 p573, Ann Cas 1918 D, 563.

Smith v. Mitchell, 21 Wash. 537, 58 P. 668, 75 Am. St. Rep. 658.

Spencer v. Peterson, 41 Or. 257, 259.

Sprague v. Waite, 17 'Pick. 309

Springer v. Durette et ux, 217 Or. 196, 352 P.2d 132 (1959)

Stamm v. City of Albuquerque, 10 N.M. 491, 62 P. 973

Stanley v. Schwalby, 147 U.S. 508, 13 S. Ct 418, 37 L. Ed. 259 (1893).

State exrel Thornton v. Hay, (1969) 254 Or 584, 462 P2d 671.

State Highway Com. V. Burke et al, 200, Or. 211

State Land Board v. Corvallis Sand & Gravel Co., *supra*, overruling Bonelli Cattle Co. v. Arizona, 414 U.S. 313, 94 S Ct 517, 38 L Ed 2d 526(1973)

State Land Board v. Reuker, (1976) 25 Or App 137, 548 P2d 1323,

State Land Board v. Sause et al, 217 Or. 52, 342 P2d 803 1959

State of Oregon via McKay v. Sause. 342 P.2d 803, 217 Or. 50

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State v. McVey, 168 Or. 337 (1942). See Atty Gen Op 324 (1949).

State v. Moriarty, 74 Ind. 104

- State v. Trask, 27 Am. Dec. 554 10c; cit. 559. Dill on Municipal Corporations, subsec 491. This is Principle 22 of this publication.
- State v. Wilkinson, 2 Vt. 480;
- State vs. The California-Oregon Power Co., 225 OR 604, 609 (1961)
- Steel v. Portland, 23 Or. 162
- Steiwer v. Steiwer, 112 Or. 485, 489, 490, 230 P. 359; Or. Laws, subsec 4555
- Stephenson v. Van Blokland, 60 Or. 247, 118 P. 1026 (1911).
- Stone v. Brooks, 35 Cal. 489
- Stotts v. Dichdel, 70 Or. 86, 139 P. 932.
- Strasbaugh v. Babler Bros. Inc., (1960) 220 Or 35, 348 P2d 448.
- Stratford v. Fidelity & Casualty Co., 106 Conn. 34
- Streeter v. Stalnaker, 61 Neb. 205, 85 N.W. 47
- Strothers v. Lucas, 12 Pet. 410, 428, note 9 L. Ed. 1137. See also: Black's Law Dictionary.
- Stubs v. Abel, 114 Or. 610
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- Sunset Lake v. Remington, 45 Or. App. 973 (1980).
- Sweet et al v. Irrigation Co., 198 Or. 166. (1953) 254 P.2d 700.
- Taylor Sands Fishing Co. v. State Land Board, (1910) 56 Or 157, 108 p126
- Thielke v. Albee, 79 Or. 48, 153 P. 793
- Tholl v. Koles, 65 Kan. 802, 70 P. 881 To the same effect is Wells v. Pennington County, supra.
- Thompson v. Scott, 270 Or. 542, 528 P.2d 509 1974);
- Titusville Amusement Co. v. Titusville Iron Works, 286 Pa.
- Tooze v. Willamette Valley S. Ry. Co., 77 Or. 157, 162, 150 P. 252
- Town Council v. Lithgoe, 7 Rich.
- Town of Gaston v. Thompson, 89 Or. 412, 420
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- Trustees of M.E. Church v. Hoboken, 33 N. J. Laws 13, 97 Am. Dec. 696.
- Tuttle v. Beem, 144 Or. 145, 157, 24 P.2d 12
- U. S. v. Oregon, 295 U. S. 1 (1954).
- U.S v. State of Washington, 9 Cir 1961, 294 F. 2d 830
- U.S. v. Appalachian Electric Power Co., (1940) 311 U.S. 377, 61 S. Ct 291, 85 L ed. 243.
- U.S. v. Cruikshank, 92 U.S. 542, cit. in Elliott on Roads and Streets.
- U.S. v. Holt State Bank, 270 U.S. 49 (1926).
- U.S. v. Rands, 389 U.S. 121 (1967).
- U.S. v. Texas, 339 U.S. 707, 716 70 S Ct 918, 94 L Ed 1221 (1949),
- Unger's Co. v. Lincoln Co., 5 Or. App. 270, 483 P. 2d 81, Sup. Ct. review denied. Atty. Gen. Op. (44-46)
- Union Power Co. v. Lichty, 42 Or. 563
- United States v. Chicago 185 U.S. (7How.).
- United States v. Hudspeth. 384 F2d 683. "Although some practical problems may arise, I see no legal reason why the assessor may not employ the resurveys in preparation and maintenance of his maps, as the resurveys represent the best information available
- United States v. Mission Rock Co., 189 U.S. 391, 404, 47 L ed 865, 869 23 S Ct 606."
- United States v. Oregon, 295 US 1, 14, 54 S Ct 610, 79 L Ed 1267 (1934),
- Urguhart v. Belloni, 57 Or. 314, 321, 322, 111 P. 692.
- Utah v. U.S., 403 U.S. 9, 91 S Ct. 1775, 29 L Ed 2d, 281 (1971);
- Valley Pulp & Paper Co. v. West, 58 Wis. 599, 17 N.W. 554; Bartlett & Beardmore, 77 Wis. 356, 46 N.W. 494
- Van Buskirk v. Bond, 52 Or. 234, 96 P. 1103
- Van Dusen Inv. Co. v. Western Fishing Co., (1912) 63 Or 7, 124 p677, 126 p604
- Vandusen v. Shively, (1892) 22 Or 64, 29 p76;
- Vaught v. McClymond, 116 Mont. 542, 155 Pac. (2d) Errors in U.S. surveys cannot be corrected by the courts since such surveys create boundaries and do not merely ascertain them.
- Virginia v. Rives, 100 U.S. 313; Ex parte Virginia, 100 U.S. 339
- Von Buskirk v. Bond, 52 Or. 234, 96 P. 1103.
- Wade v. Northup, 70 Or. 579
- Wakeman v. Wilburn, 147 N.Y. 657, 42 N.E. 341.
- Walish v. Milwaukee, 95 WIS. 16, 69 N.W. 818
- Wallowa County v. Wade, 43 Or. 253, 72 P. 793; See: Note 57 Am. St. Rep. 744.
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White Oak Coal Co. v. Manchester, 109 Va. 749

Whiteside v. Green, 13 Utah 34, 57 Am. St. Rep. 740, See: note of 25 pages, High-ways by User, 44 P. 1032

Whitney v. Crittenden, (1924) 112 Or 278, 229 p378.

Wilder v. DeCou, 26 Minn. 10, 1 N.W. 48

Wilder v. The City of St. Paul, 12 Minn. 203, 204, 211

Willamette Iron Works v. Oregon Ry. & Nav. Co., 24 Or. 224

Willeys Mfg. Co. v. Mercer Co. Freeholders, 92 N.J. Law, 95, 40 A. 782.

Williams v. Routt County, 37 Colo. 55, 84 P. 1109

Willis v. Leverich, 20 Or. 168, 25 P. 398

Wilson v. Shively, (1884) 11 Or 215,4 p324;

Wing v. Wallace 42 Idaho 430, 246 Pac. 8: A resurvey does not affect the rights previously vested Its purpose is to ascertain the lines of the original survey without regard to their correctness.

Winston Bros. v. State Tax Commission (1957) 156 Or. 505, 62 P.2d 7.

Winters v. George, 21 Or. 251, 259, 27 P. 1041

Wood v. Woodcock, 276 Or. 49, 56, 554 P.2d 151 (1976)

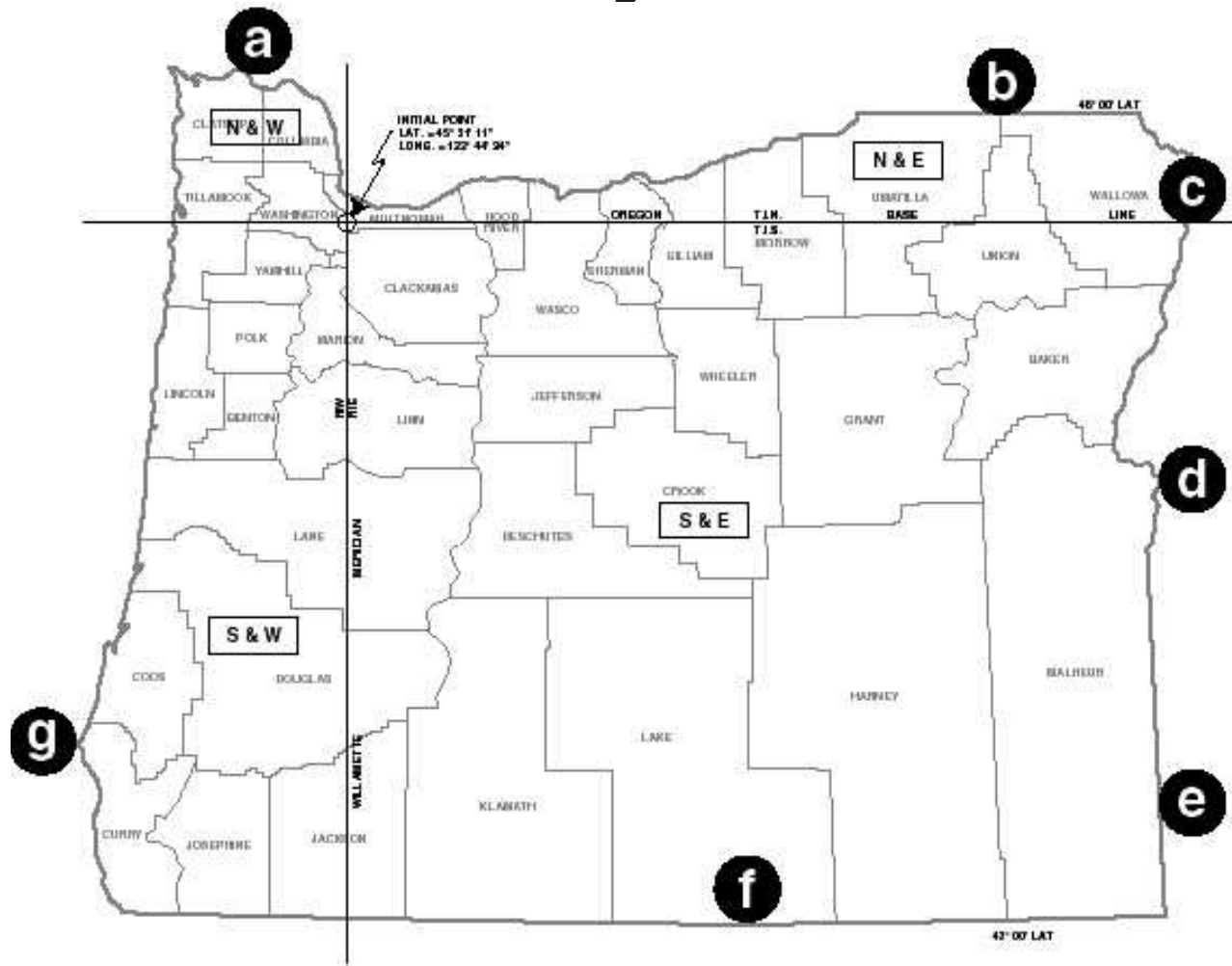
Woods v. Hart, 254 Or. 434,458 P.2d 945 (1969)

Wright v. Day, 33 Wis. 260; cited in Cross v. Talbot, supra.

Wurzweiler u. Cox, (1931) 138 Or 110, 5 P.2d 699

Wyckoff v. Mayfield, (1929) 130 Or 687, 280 p340.

Appendix D: Location of the Willamette Meridian and the Oregon Base Line



The Rectangular Survey in Oregon

N & W, N & E, S & W, and S & E identify the four quadrants of the U.S. Rectangular Survey; the location of the north and south townships and the east and west ranges.

- a. The most northerly township in Oregon is T.9N.
- b. 46 latitude runs through T.6N.
- c. The most easterly range is R.51E.
- d. The east point on the state line is the east line of R.47E.
- e. The east line of R.46E.
- f. State line at 42 latitude runs through T.41S.
- g. The westerly range is R.16W.

Appendix E

ABBREVIATIONS

As used in survey notes, deeds, on maps and other cadastral records.

See Table 3 for metric abbreviations.

See Appendix 1 for mathematical symbols and abbreviations.

See Appendix 3 for spiral curve symbols and abbreviations.

A	- Acres (GLO Plats)	Coord.	- Coordinate
a	- Are (Metric)	Coords.	- Coordinates
A & T	- Assessment & Taxation	Cor.	- Corner
Ac.	- Acre, Acres	Corr.	- Correction
Add.	- Addition (recommended)	Cos.	- Cosine
Addn.	- Addition (see Add.)	Cr.	- Creek
Adj.	- Adjustment	Ct.	- Court
Adjac.	- Adjacent	C.T.T.	- Correct to true
Adjn.	- Adjoining	cur.	- Curve (see C.)
Agmt.	- Agreement		
Alg.	- Along	d	- Decimeter (see dm.)
Alt.	- Altitude	d.	- Deed (see dd)
Am.	- Amended (GLO Plats)	D.a.f.	- Described as follows
A.M.S.	- Automated Mapping System	dam	- Decameter
Ang.	- Angle	dd	- Deed (recommended)
a/p	- Angle Point	dds	- Deeds
Avn.	- Avenue	Decl.	- Declination
Avg.	- Average	Decl.	- Dedicated
Az.	- Azimuth	Deg.	- Degree
		Dep.	- Departure
B & S	- Bargain & Sale	Desc.	- Describe
B & SD	- Bargain & Sale Deed	Desct.	- Description
B.a.p.	- Beginning at a point	Dia.	- Diameter (see Diam.)
BC	- Beginning of Curve	Diag.	- Diagonal
Bded.	- Bounded	Diff.	- Difference
Bdy.	- Boundary	Diam.	- Diameter (recommended)
Bel.	- Before	Dir.	- Direction
Beg.	- Begin, Beginning	Dist.	- Distance
Bet.	- Between	Dist.	- District
Bk.	- Book (deed records)	Div.	- Division
Bk.	- Block	dm	- Decimeter (recommended)
Bvd.	- Boulevard	DM	- Draftsman
B.M.	- Bench Mark	D.M.D.	- Double Meridian Distance
B.P.A.	- Bonneville Power Admin.	D.P.D.	- Double Parallel Distance
Bmg.	- Bearing	DR	- Department of Revenue
B.Z.L.	- Beach Zone Line (V.L.)	Dr.	- Drive
Cart.	- Cartographer, Cartography	E	- East, Easting
C	- Curve (recommended)	Ea.	- Each
c/a	- Center Angle	Eamt.	- Easement (see Eas.)
Calc.	- Calculated	Ease.	- Easement (recommended)
C.a.p.	- Commencing at a point	e.e.	- Eastern Elongation
Cen.	- Center	Egr.	- Egress
Ch.	- Chain	Elev.	- Elevation
Chs.	- Chains	Elong.	- Elongation
C/L	- Center Line (in deeds)	Ely.	- Easterly
C	- Center Line (on maps)	Eq. or *	- Equation
cm	- Centimeter	ERS	- Environmental Remote Sensing
CM	- Central Meridian	Est.	- Estate
Co.	- County	Estab.	- Established
Com.	- Commence	et al	- And Others
C.O.M.	- Computer Output Microfilm	et alivs	- And another
Consid.	- Consideration	et con	- And husband (see et vir)
Cont.	- Continue	et ux	- And wife
Contg.	- Continuing	et vir	- And husband (recommended)
Contg.	- Containing	Exc.	- Except
Conv.	- Convey		

ABBREVIATIONS — Continued

Exemptg.	- Excepting	Li.	- Link (Gunter's)
Ext.	- Extension (recommended)	Lin. Ft.	- Lineal feet (recommended)
Extd.	- Extended	Lk.	- Link
Extn.	- Extension (see Ext.)	Lks.	- Links (Gunter's)
		Log.	- Logarithmic Function
FAS	- Federal Aide Secondary	Long.	- Longitude
Fd.	- Found	L.S.	- Licensed Surveyor
Fig.	- Figure	Lea.	- Lease
Fls.	- Filed	Lsec.	- Lessee
FoL.	- Following	Lyg.	- Lying
Fr.	- From		
Frac.	- Fraction	m	- Minutes
Ft.	- Foot, Feet	m	- Meter
Fur.	- Furlong	M	- Thousand
		M.	- Meridian
G.L.O.	- Government Land Office	M.	- Mineral
G.M.	- Guide Meridian	Mag.	- Magnetic
Govt.	- Government	M. & B.	- Metes and Bounds
Gr.	- Greenwich	MB	- Magnetic Bearing
Gt.	- Grant	Mens.	- Measure, Measured
Gtd.	- Granted	Mer.	- Meridian
Gtee.	- Grantee	M.H.T.L.	- Mean high tide line
Gtr.	- Grantor	MHW	- Mean High Water
		Mi.	- Mile
ha	- Hectare (Metric Area)	Min.	- Mineral
Hav.	- Having	Min.	- Minute (also ')
Hd.	- Herein described	Misc.	- Miscellaneous
hm	- Hectometer (Metric Length)	Mkd.	- Marked
Horiz.	- Horizon, Horizontal	M/L	- More or less (recommended)
Hts.	- Heights	MLW	- Mean low water
Hwy.	- Highway (recommended)	m. or l.	- More or less (see M/L)
Hy.	- Highway (see Hwy)	M.p.	- More particularly
		M.P.	- Mid-point
I	- Iron (i.e., iron pipe)	M.S.	- Mineral Survey
i.e.	- That is	MSP	- Thousand square feet
Imp.	- Improvement	Mtg.	- Mortgage
In.	- Inch (recommended)	mym	- Myriameter
Ins.	- Inches		
Incl.	- Include	N	- North, Northing
Incl.	- Inclusive	Nat.	- National or Natural Function
Info.	- Information	N.C.	- Name Change
Ingr.	- Ingress	NE	- Northeast
Instr.	- Instruction	NEly	- Northeasterly
Int.	- Interest	N.F.	- National Forest
Inter.	- Intersection	N.G.S.	- Numerical grid scale
Inter./w	- Intersection with	Nly	- Northerly
I.P.	- Iron Pipe	NNE	- North Northeast
		NNW	- North Northwest
Int.	- Joint (see It.)	No.	- Number
It.	- Joint (recommended)	No.	- North (use N)
Itly.	- Jointly	NOAA	- National Oceanic & Atmospheric Admin.
Junct.	- Junction	NOS	- National Oceanic Survey*
		NW	- Northwest
Km	- Kilometer	NWly	- Northwesternly
Kn.	- Known		
Kn. as	- Known as	Obs.	- Observation
		O.C.S.	- Oregon Coordinate System
L	- Length	OCG	- Oregon Coordinate Grid
Lat.	- Latitude	Off bear.	- Off Bearing
L.C.	- Long Chord	Offcl.	- Official
Ld.	- Land	O.R.	- Official Records
L.F.	- Lineal feet (see Lin. Ft.)	OPLS	- Original Public Land Survey

ABBREVIATIONS – Continued

Ord.	– Ordinance	Ra.	– Ranges
Orig.	– Original	R.S.	– Road Survey
ORS	– Oregon Revised Statutes	R.S.	– U.S. Revised Statute
P	– Pole (5.5 yards)	Rt.	– Right
Pac.	– Pacific	Run.	– Running
Par.	– Parcel	R/W	– Right-of-way
Para.	– Parallel (recommended)	Ra/W	– Rights-of-way
Part.	– Particularly	R.Y.	– Railway
Partn.	– Partition	S	– South, Southing
P.B.M.	– Permanent Bench Mark	s.	– Second (also "s")
PC	– Point of Curve	Sc.	– Scale, Scaled
PCC	– Point of Compound Curve	sd.	– said
Pg.	– Page	S.D.	– School District
Pl.	– Place	S.D.B.	– School District Boundary
PL	– Parallel (see Para.)	SE	– Southeast
P.o.b.	– Point of beginning	Sec.	– Section
P.o.c.	– Point of commencement	Seg.	– Segregation (of property)
Por.	– Portion	SEly	– Southeasterly
Posn.	– Possession	SF	– Scale Factor
PRC	– Point of Reverse Curve	Sly	– Southerly
Prin.	– Principal	S.P.R.R.	– Southern Pacific Railroad
Prin. Mer.	– Principal Meridian	Sq.	– Square
ProL	– Prolongation	SS	– Verifies Place of Action*
Prop.	– Property	SS	– Subsection
PS	– Point of Spiral	SSE	– South Southeast
Pt.	– Point	SSW	– South Southwest
Pt.	– Part	St.	– Street
PT.	– Point of Tangent	Sta.	– Station
PT.	– Property Tax	Stan. Par.	– Standard Parallel
Ptl.	– Partial	Std.	– Standard
Pty.	– Party	St. Mi.	– Statute Miles
Pub.	– Public	Sub.	– Subdivision
p/w	– Parallel with	Subdiv.	– Subdivide
QC	– Quitclaim	Subj.	– Subject
QCD	– Quitclaim Deed	Sur.	– Survey
QT	– Quiet Title	SW	– Southwest
Quad.	– Quadrant, Quadrangle	SWD	– Special Warranty Deed
		SWly	– Southwesterly
R	– Radius (recommended)	T.	– Township
R.	– Range	T.	– Timber (see Tbr.)
R.	– River	Tan.	– Tangent
Rad.	– Radius (see R)	T.B.M.	– Temporary Bench Mark
Rad.	– Radian	Tbr.	– Timber (recommended)
Rd.	– Road	TD	– Trust Deed
rd.	– Rod (5.5 yards)	Temp.	– Temporary
Rec.	– Record	Term.	– Terminate
Red.	– Reduction	Th.	– Thence
Ref.	– Reference	Tp.	– Township (see Tshp.)
Res.	– Reservoir	T.P.	– Turning Point
Resub.	– Resubdivided	T.p.o.b.	– True Point of Beginning
Rev.	– Reverse	Tps.	– Townships
Rev.	– Reversion (BLM)	TR.	– Tracer, Tracing
Rge.	– Range	Tr.	– Tract
R/L	– Random Length	Tri.	– Triangulation
RM	– Reference Mark	Tshp.	– Township (recommended)
R.N.C.	– Request for name change	Twp.	– Township (see Tshp.)
R of S	– Record of Survey	U	– Undivided Interest
R/P	– Reference Point	Und.	– Undivided
R.R.	– Railroad	U.P.R.R.	– Union Pacific Railroad
R.R. spur	– Railroad spur		

ABBREVIATIONS — Continued

U.S.	- United States
U.S.C. & G.S.	- United States Coast & Geodetic Survey**
U.S.G.S.	- United States Geological Survey
U.S.L.M.	- United States Location Monument
U.S.M.M.	- United States Mineral Monument
U.S.P.L.S.	- United States Public Land Survey
U.T.M.	- Universal Transverse Mercator
Vac.	- Vacated
Vac. Ord.	- Vacation Ordinance
Vert.	- Vertical
VL	- Vegetation Line
W	- West
WD	- Warranty Deed
W.E.	- Western Elongation
Whf.	- Wharf
Wly	- Westerly
W.M.	- Willamette Meridian

X	- Abscissa (OCS)
x	- For separating dimension values (BLM)
Y	- Ordinate (OCS)
Yd.	- Yard
Yr.	- Year
Zip	- Zip-a-tone

MISCELLANEOUS

f	- Foot
"	- Inches
°	- Degree
'	- Minutes
"	- Seconds

*Example: When used behind name of state and county on a subdivision plat.

** - The U.S.C. & G.S. is now the National Oceanic & Atmospheric Administration (U.S. Department of Commerce).

MATHEMATICAL SYMBOLS AND ABBREVIATIONS

+	Plus, positive
-	Minus, negative
±	Plus or minus
±	Positive or negative
∓	Minus or plus
∓	Negative or positive
×	Multiplied by
•	Multiplied by
÷	Divided by
/	Divided by (solidus)
=	Equal to; Equals
≠	Does not equal
≠	Does not equal
≠	Not identically equal
≈	Equals approximately
≡	Is the same as
~	Similar to
>	Greater than
<	Less than
≧	Less than or greater than
≧	Greater than or equal to
≦	Less than or equal to
∴	Therefore; hence
∵	Since, because
√	Root, square root
√	Root, square root
π	Pi (=3.14159265+)
°	Degree of arc
∠	Angle
∠	Angle
⊥	Right angle
⊥	Perpendicular to
∥	Parallel to
Σ	Summation of; sum
∞	Infinity
Δ	The difference between
δ	Variation
R°	Radius in degree of arc
R'	Radius in min of arc
R''	Radius in sec of arc
'	Feet; or minutes of arc
"	Inches; or seconds of arc
r	Radius
:	Ratio of, is to, divided by
#	Number
%	Percent
∩	Vertex
⊙	Centroid number -
x	X Coordinate
y	Y Coordinate
Δ	Triangulation point value

A α (a) ¹	Alpha (in this book, designates angle)
B β (b)	Beta
Γ γ (g)	Gamma
Δ δ (d)	Delta
E ε (e)	Epsilon
Z ζ (z)	Zeta
H η (h)	Eta
Θ θ (th)	Theta
θ	Theta
I ι (i)	Iota
K κ (k)	Kappa
Λ λ (l)	Lambda
M μ (m)	Mu
N ν (n)	Nu
Ξ ξ (x)	Xi
O o (o)	Omicron
Π π (p)	Pi
P ρ (r)	Rho
Σ σ (s)	Sigma; Algebraic sum
σ	Sigma
T τ (t)	Tau
U υ (u)	Upsilon
Φ φ (ph)	Phi
φ	Phi
Χ χ (ch)	Chi
Ψ ψ (ps)	Psi
Ω ω (o)	Omega
sin	Sine
cos	Cosine
tan	Tangent
cot	Cotangent
sec	Secant
csc	Cosecant
log	Common logarithm
∫	Integral sign

¹ letter in bracket is English equivalent.

CURVE & SPIRAL CURVE NOMENCLATURE

P DESIGNATIONS

P.C.S.	- Point of change from circular curve to spiral curve.
P.I.	- Point of intersection of semi-tangents.
P.O.C.	- Point on the circular curve.
P.O.S.	- Point on the spiral curve.
P.O.S.T.	- Point on the semi-tangent.
P.O.T.	- Point on the tangent.
P.R.S.	- Point of reverse spiral.
P.S.	- Point of change from the tangent to the spiral.
P.S.C.	- Point of change from the spiral to the circular curve.
P.S.S.	- Point of change from an increasing spiral to a decreasing spiral.
P.T.	- Point of change in alignment from a spiral to a tangent.

CURVE ELEMENTS

a	- The increase in degree of curve per station on the spiral ($\frac{D}{L}$).
C	- The chord from the P.S. to the P.S.C.
D	- The degree of the central curve.
d	- The degree of curve at any point on the spiral.
E_s	- External of the spiraled curve.
I	- The angle at any point on the spiral between the tangent at that point and the chord from the P.S.
i	- The angle between the tangent at the P.S. and the chord from the P.S. to any point on the spiral, or the deflection angle to any point on the spiral.
L	- The length of the spiral from the P.S. to the P.S.C., and from the P.C.S. to the P.T.
l	- The length of the spiral from the P.S. to any given point.
p	- The offset from the main tangents to any point where the circular curve, produced backward or forward, becomes parallel to the main tangent.
q	- The distance measured along the main tangent from P.S. to P.T. to a point where the circular curve, produced backward or forward, becomes parallel to the main tangent.
R	- The radius of the central curve.
S	- The central angle of the whole spiral.
s	- The central angle of the whole spiral from the P.S. to any given point.
T_s	- The tangent distance of the spiraled curve; the distance from the P.S., or P.T., to the P.I.
U	- The distance on the tangent from the P.S. to the intersection with a tangent through the P.S.C.; the longer spiral tangent.
V	- The distance on the tangent through the P.S.C. from the P.S.C. to the intersection with the tangent through the P.S.; the shorter spiral tangent.
X	- The ordinate, or tangent offset of the P.S.C.
Y	- The abscissa or tangent distance of the P.S.C., referred to the P.S.
Δ	- The total central angle of the curve; the sum of the central angles of the spirals and the central angle of the circular curve.
Δ_1	- $\Delta - 2S$ = Total central angle minus the sum of the central angles of the spirals.

BASIC SPIRAL FORMULAS

(Reference to figure ___ page ___)

To find a, D, L, S and S°

$$a = \frac{100D}{L} \quad D = \frac{aL}{100}$$

$$L = \frac{100D}{a}$$

$$S^\circ = \frac{DL}{200} \quad D = \frac{200S^\circ}{L}$$

$$L = \frac{200S^\circ}{D}$$

$$S = \frac{aL^2}{20,000} = \frac{D^2}{2a}$$

To find R

$$R = \frac{5729.5779513}{D} = \frac{5729.5779513 L}{200S^\circ} = \frac{28.647889757 L}{S^\circ}$$

To find θ

$$\theta \text{ (theta)} = S \text{ in radians}$$

To find X

$$x = L \left(\frac{\theta}{3} - \frac{\theta^3}{42} + \frac{\theta^5}{1320} - \frac{\theta^7}{75,600} + \frac{\theta^9}{6,894,720} - \frac{\theta^{11}}{918,086,400} + \dots \right. \\ \left. \dots \frac{\theta^{13}}{168,129,561,600} - \frac{\theta^{15}}{40,537,905,408,000} \right)$$

To find Y

$$Y = L \left(1 - \frac{\theta^2}{10} + \frac{\theta^4}{216} - \frac{\theta^6}{9360} + \frac{\theta^8}{685,440} - \frac{\theta^{10}}{76,204,800} + \dots \right. \\ \left. \dots \frac{\theta^{12}}{11,975,040,000} - \frac{\theta^{14}}{2,528,170,444,800} \right)$$

To find Tan i

$$\text{Tan. } i = \frac{x}{y}$$

BASIC SPIRAL FORMULAS – Continued

To find I

$$I = S - i$$

To find p

$$p = X - R \text{ vers } S = X - \frac{28.647889757 L}{S^3} \text{ vers } S$$

To find q

$$q = Y - R \sin S = Y - \frac{28.647889757 L}{S^3} \sin S$$

To find U

$$U = Y - X \cot S$$

To find V

$$V = \frac{x}{\sin S} = x \csc S$$

To find C

$$C = \sqrt{x^2 + Y^2}$$

To find Ts

$$Ts = q + (R+p) \tan \frac{\Delta}{2}$$

To find Es

$$Es = p + (R+p) \operatorname{exsec} \frac{\Delta}{2}$$

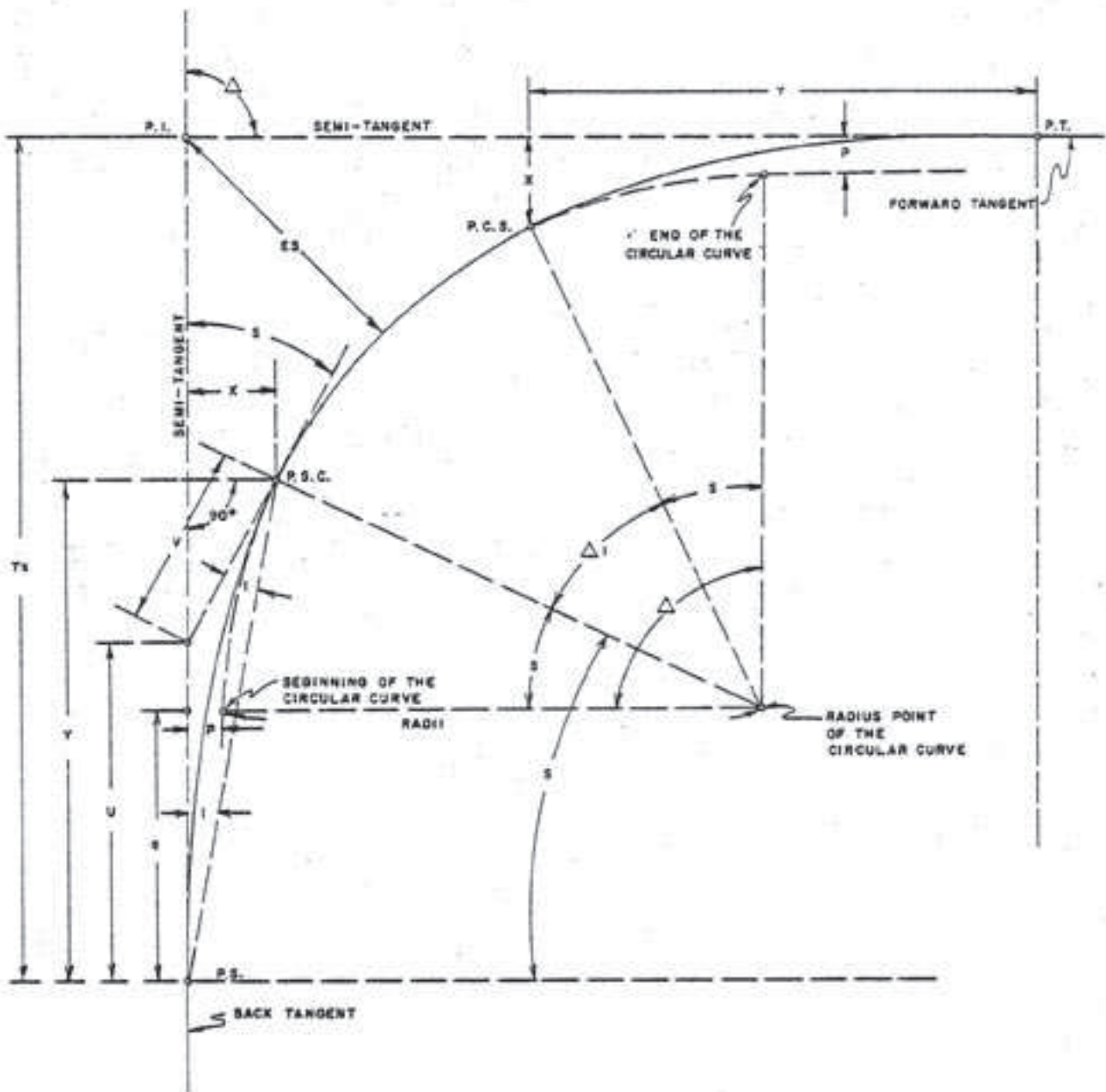
Misc.

$$\pi = 3.1415926536$$

$$1 \text{ radian} = 57.295779513^\circ \text{ (see tables 13 \& 14)}$$

Note: The foregoing formulas for "p", "q", "u", and "v", will not give consistent answers when "s" is less than 3 degrees 00' because the tables available do not have significant figures.

SPIRAL CURVE ELEMENTS

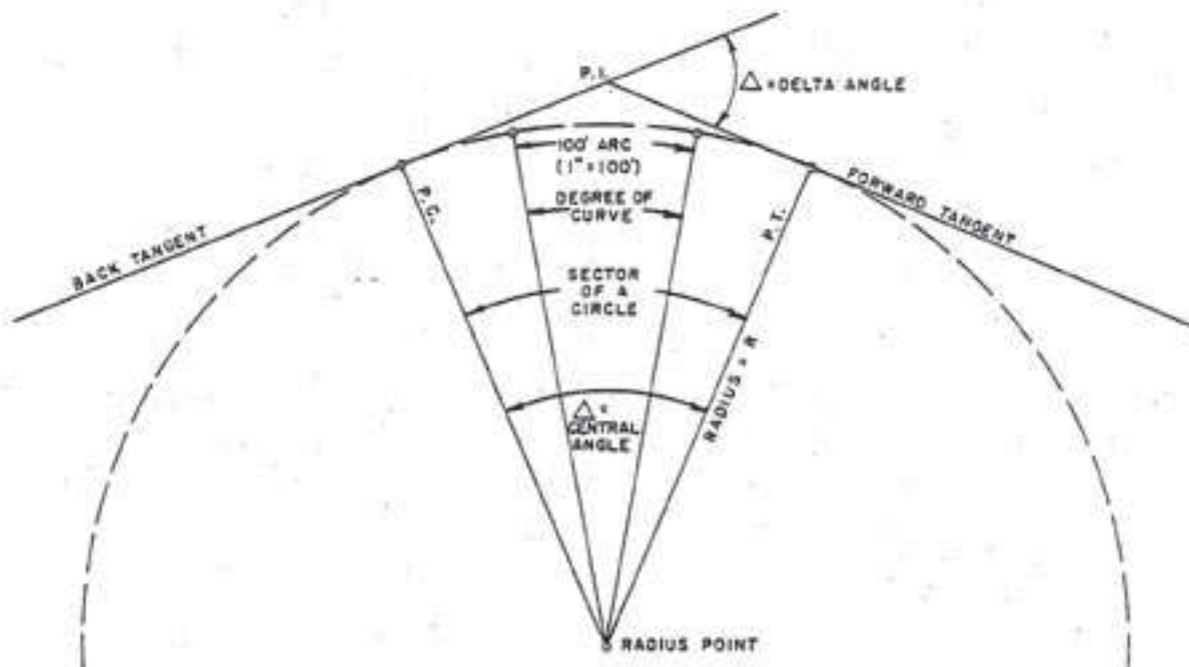


The standard highway spiral is a curve whose degree varies directly as its length, beginning at zero at the P.S. and reaching a degree of curve equal to the circular curve at the P.S.C.

See the preceding pages for curve and spiral curve nomenclature and formulae.

CIRCULAR CURVE ELEMENTS

A circular curve, or simple curve, is the arc of a segment (or sector) of a circle; a curved line having a constant radius



The sharpness of a curve is determined by either the radius of the curve, or the degree of curve.

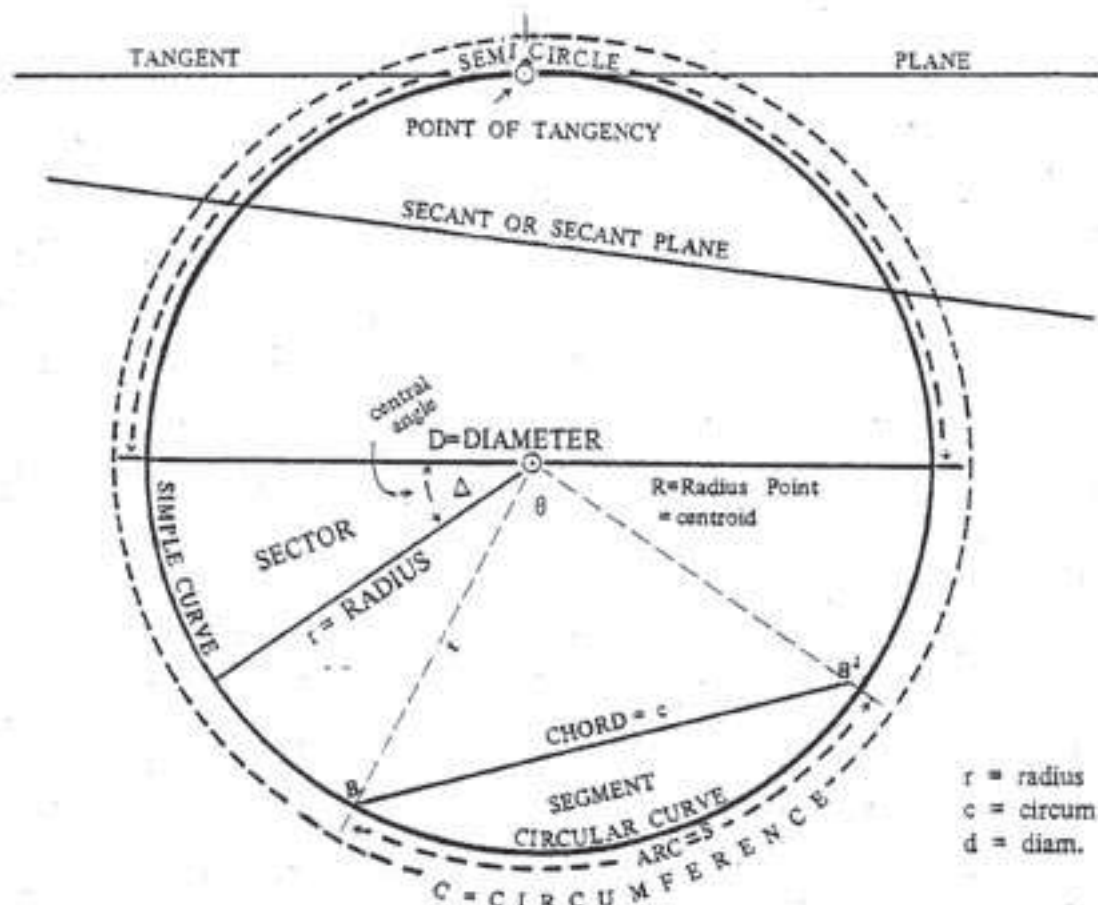
The degree of curve is determined by the amount of angle formed by the radius lines at the central angle by a measured distance of 100 feet along the arc of the curve. In the above illustration, the radius lines of a 100 foot arc along the curve form a 20° angle; therefore, the curve is a 20° curve.

The central angle of the curve, between the P.C., P.T., and the radius point, is always equal to Δ (the delta angle).

The total deflection angle of a curve is always equal to one-half of the delta angle ($\Delta/2$).

¹As designated in other countries. In the U.S. it is predominately defined by degree of curve.

ELEMENTS OF A CIRCLE



r = radius
c = circum.
d = diam.

To find the RADIUS of a CIRCLE

$$r = C \times 0.15915$$

To find the AREA of a CIRCLE

$$A = \frac{1}{2}rc = \pi r^2 \text{ or } A = 0.7854 D^2$$

To find the AREA of a SECTOR

$$A = \frac{1}{2} R s$$

or,

$$A = \pi \frac{(\text{radius}^2)(\text{angle } B R B^1)}{360^\circ} \text{ or } \frac{1}{2} R^2 \theta$$

To find the AREA of a SEGMENT

$$A = \frac{1}{2} R^2 (\theta - \sin \theta) \text{ or } \frac{1}{2} (R s - c d)$$

To find the DIAMETER of a CIRCLE

$$D = 2 \pi \text{ or } C/\pi$$

To find the CIRCUMFERENCE of a CIRCLE $C = \pi D$ or $C = 2 \pi r$

$$\pi = 3.14159265358979323846 \dots$$

π , or pi, is the ratio of the circumference of any circle to its diameter. It is a transcendental number.

NOTE: The term "simple curve" is synonymous with "circular curve."

MISCELLANEOUS FORMULA

AREAS

Let A = area
 b = base
 b1 = lower base
 b2 = upper base
 a = one side
 c = another side
 $\pi = 3.1416$

h = height (or altitude)
 s = one side
 $S = \frac{1}{2}(a + b + c)$
 $\angle C$ = angle between a & b
 r = radius
 C = circumference

TO FIND THE:

Area of a square
 Area of a rectangle
 Area of a parallelogram
 Area of a trapezoid
 Area of a triangle
 or
 or
 Area of a circle
 or

USE THE FORMULA

= $A = S^2$
 = $A = ab$
 = $A = bh$
 = $A = \frac{1}{2}h(b1 + b2)$
 = $A = \sqrt{s(s-a)(s-b)(s-c)}$
 = $A = \frac{1}{2}bh$
 = $A = bh \div 2$
 = $A = \frac{1}{2}rC$
 = $A = \pi r^2$

PERIMETERS

Let P = perimeter
 a = one side
 b = base

s = one side
 b1 = lower base
 b2 = upper base

TO FIND THE:

Perimeter of a square
 Perimeter of a rectangle
 Perimeter of an isosceles triangle
 Perimeter of an equilateral triangle
 Perimeter of a parallelogram
 Perimeter of a trapezoid

USE THE FORMULA

= $P = 4s$
 = $P = 2a + 2b$
 = $P = 2s + b$
 = $P = 3s$
 = $P = 2s + 2b$
 = $P = 2s + b1 + b2$

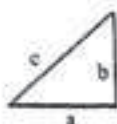
ANGLES

Let x, y and z represent angles.

Sum of angles in a triangle = $x + y + z = 180^\circ$
 Supplementary angles = $x + y = 180^\circ$
 Complementary angles = $x + y = 90^\circ$

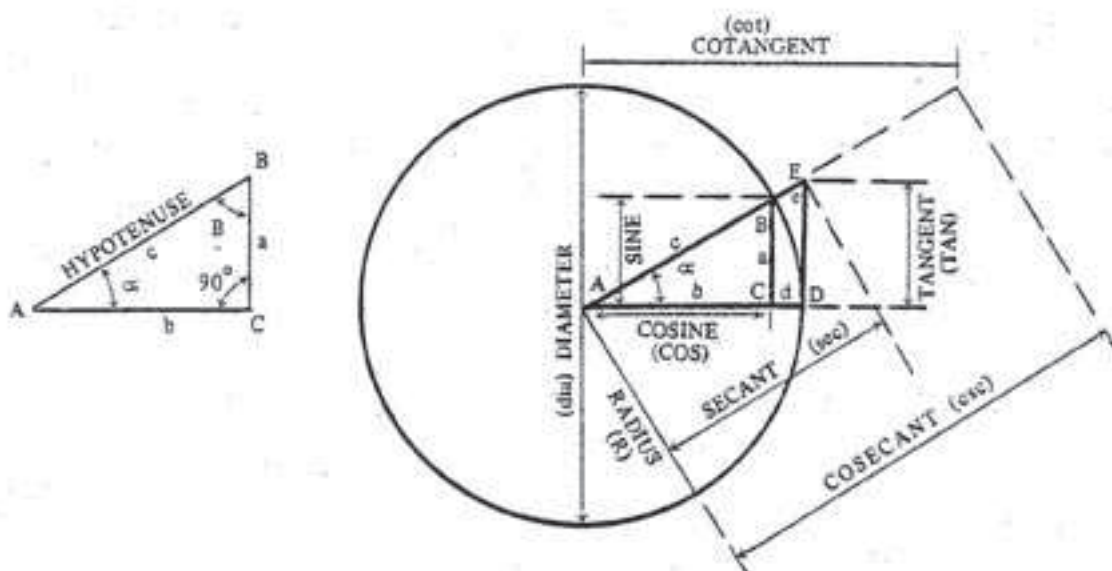
PYTHAGORAS RULE

$C^2 = a^2 + b^2$
 $a^2 = C^2 - b^2$
 $b^2 = C^2 - a^2$



The square of the hypotenuse equals the sum of the squares of the other two sides. $C^2 = a^2 + b^2$

FUNCTIONS OF A RIGHT TRIANGLE



FORMULAS FOR FINDING TRIGONOMETRIC FUNCTIONS

$$\text{SINE} = \frac{\text{SIDE OPPOSITE}}{\text{HYPOTENUSE}}$$

$$\text{COSINE} = \frac{\text{SIDE ADJACENT}}{\text{HYPOTENUSE}}$$

$$\text{TANGENT} = \frac{\text{SIDE OPPOSITE}}{\text{SIDE ADJACENT}}$$

$$\text{COTANGENT} = \frac{\text{SIDE ADJACENT}}{\text{SIDE OPPOSITE}}$$

$$\text{SECANT} = \frac{\text{HYPOTENUSE}}{\text{SIDE ADJACENT}}$$

$$\text{COSECANT} = \frac{\text{HYPOTENUSE}}{\text{SIDE OPPOSITE}}$$

SOLUTION OF A RIGHT TRIANGLE

TO FIND

USE THE FORMULAS

$$\text{side } a = \sqrt{c^2 - b^2} = \sqrt{(c+b)(c-b)} = b \times \tan A = b \times \cot B = c \times \sin A$$

$$\text{side } a = c \times \cos B = c/\sec B = c/\csc A = b/\tan B = b/\cot A = c \sin a$$

$$\text{side } b = \sqrt{c^2 - a^2} = \sqrt{(c+a)(c-a)} = c \times \cos A = c \times \sin B = a \tan B = c \cos a$$

$$\text{side } b = a \times \cot A = c/\csc B = c/\sec A = a/\cot B = a/\tan A$$

$$\text{side } c = \sqrt{b^2 + a^2} = a \times \csc A = a \times \sec B = b \operatorname{cosec} B = b \times \sec A$$

$$\text{side } c = a/\sin A = a/\cos B = b/\sin B = b/\cos A = d/\operatorname{vers} A = b/\cos a$$

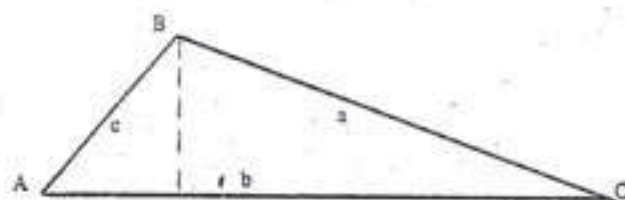
$$\text{angle } A = a/c = \sin A, \quad b/c = \cos A, \quad a/b = \tan A, \quad b/a = \cot A, \quad c/b = \sec A$$

$$\text{angle } A = c/a = \csc A, \quad = 90^\circ - B$$

$$\text{angle } B = b/c = \sin B, \quad a/c = \cos B, \quad b/a = \tan B, \quad a/b = \cot B,$$

$$\text{angle } B = c/a = \sec B, \quad c/b = \csc B, \quad = 90^\circ - A$$

TRIGONOMETRIC FUNCTIONS OBLIQUE TRIANGLES



TO FIND

USE THE FORMULAS

$$b = \left(\frac{a}{\sin A} \right) (\sin B) = \frac{c (\sin B)}{\sin C}$$

$$c = \left(\frac{a}{\sin A} \right) \sin (A + B) = \left(\frac{a}{\sin A} \right) (\sin C) = \frac{b \times \sin C}{\sin B}$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\sin \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{bc}} \quad \text{when } s = \frac{1}{2} (a + b + c)$$

$$\cos \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}} \quad \text{when } s = \frac{1}{2} (a + b + c)$$

$$\tan \frac{1}{2} A = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}} \quad \text{when } s = \frac{1}{2} (a + b + c)$$

$$\sin A = \frac{2 \sqrt{s(s-a)(s-b)(s-c)}}{bc} \quad \text{when } s = \frac{1}{2} (a + b + c)$$

$$\sin B = b \left(\frac{\sin A}{a} \right) = 180^\circ - (A + C)$$

$$\tan \frac{1}{2} (A - B) = \frac{a - b}{a + b} \tan \frac{1}{2} (A + B)$$

$$C = 180^\circ - (A + B)$$

$$a = \frac{b \times \sin B}{\sin A} = c \times \sin A \times \csc C = \frac{c (\sin A)}{\sin C}$$

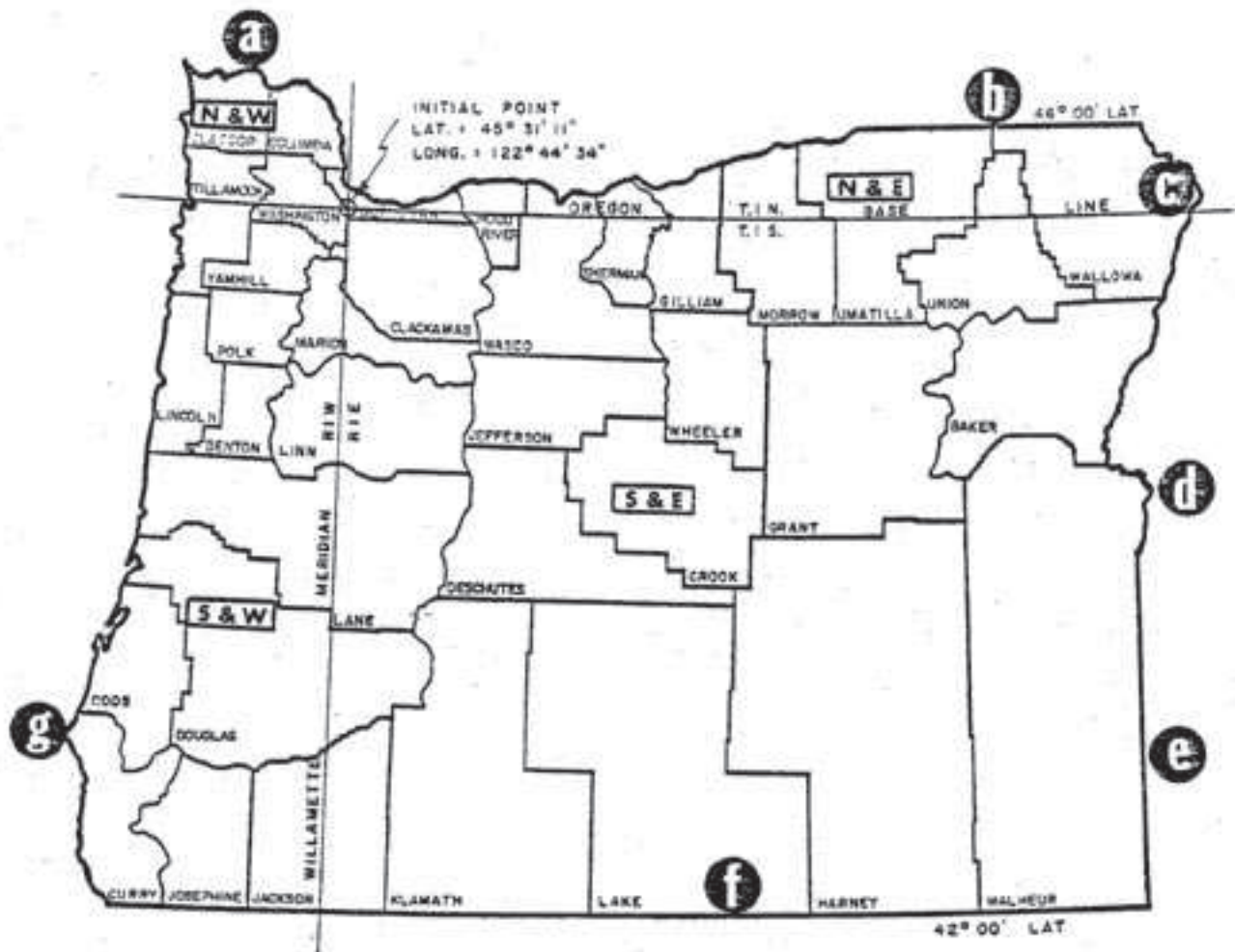
$$\sin A = \frac{a \times \sin B}{b}$$

$$\tan B = \frac{b \times \sin A}{c - (b \times \cos A)}$$

$$\cot C = \frac{b \times \csc A}{c} - \cot A$$

NOTE: If sufficient data is available, the oblique triangle can be divided into two right triangles, as shown by dashed line, and solved by solutions for right triangles.

RECTANGULAR SURVEY IN OREGON

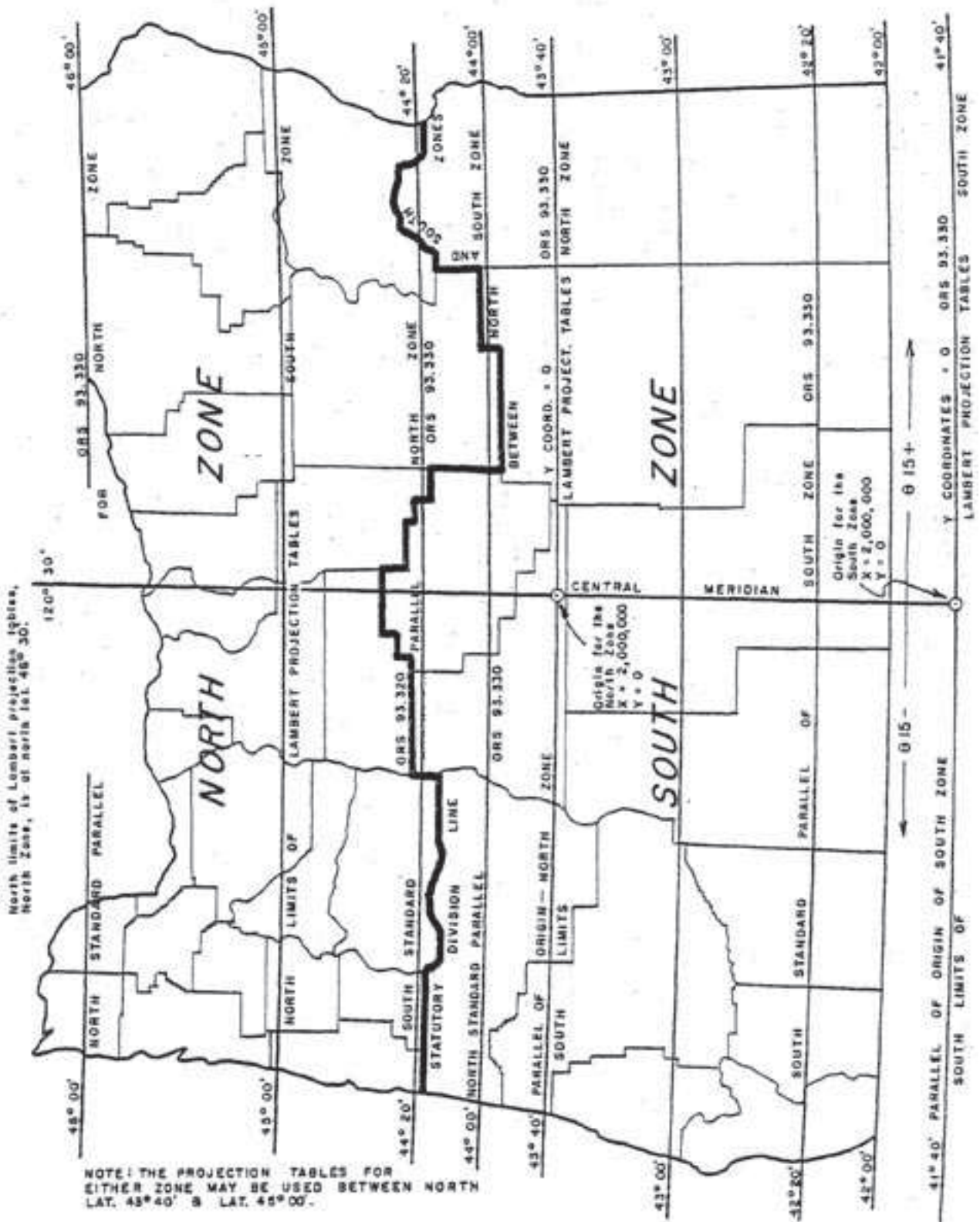


THE RECTANGULAR SURVEY IN OREGON

N & W, N & E, S & W, and S & E identify the four quadrants of the U.S. Rectangular Survey; the location of the north and south townships and the east and west ranges.

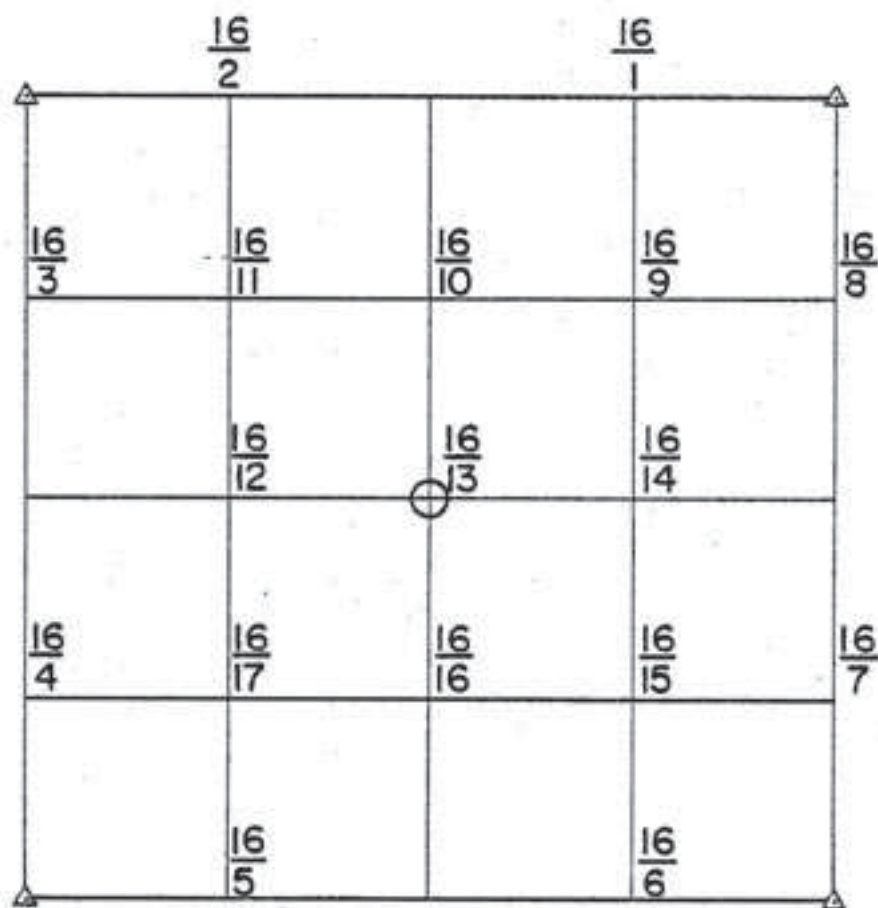
- The most northerly township in Oregon is T.9 N.
- 46° latitude runs through T.5 N.
- The most easterly range is R.31 E.
- This east point on the State line is the east line of R.47 E.
- The east line of range 46 east.
- State line at 42° latitude runs through T.41 S.
- The most westerly range is R.18 W.

ZONES OF THE LAMBERT PROJECTION OREGON COORDINATE SYSTEM



OREGON ZONES OF LAMBERT PROJECTION

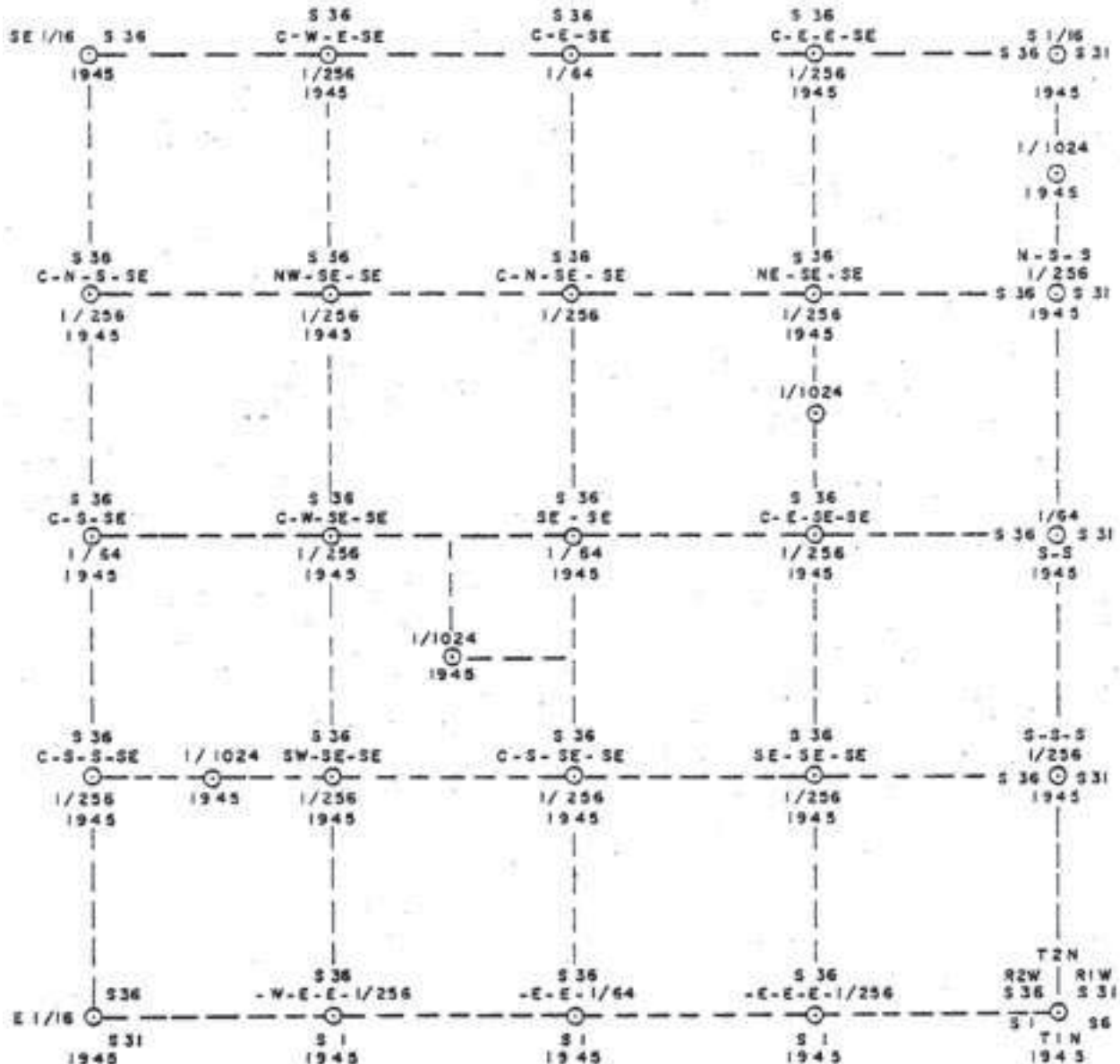
SIXTEENTH CORNER NUMBERING SYSTEM



NOTE: This diagram is to assist in reading deeds that refer to sixteenth (or quarter-quarter) corners by number. However, when writing descriptions, never use the above numbering system for corner reference.

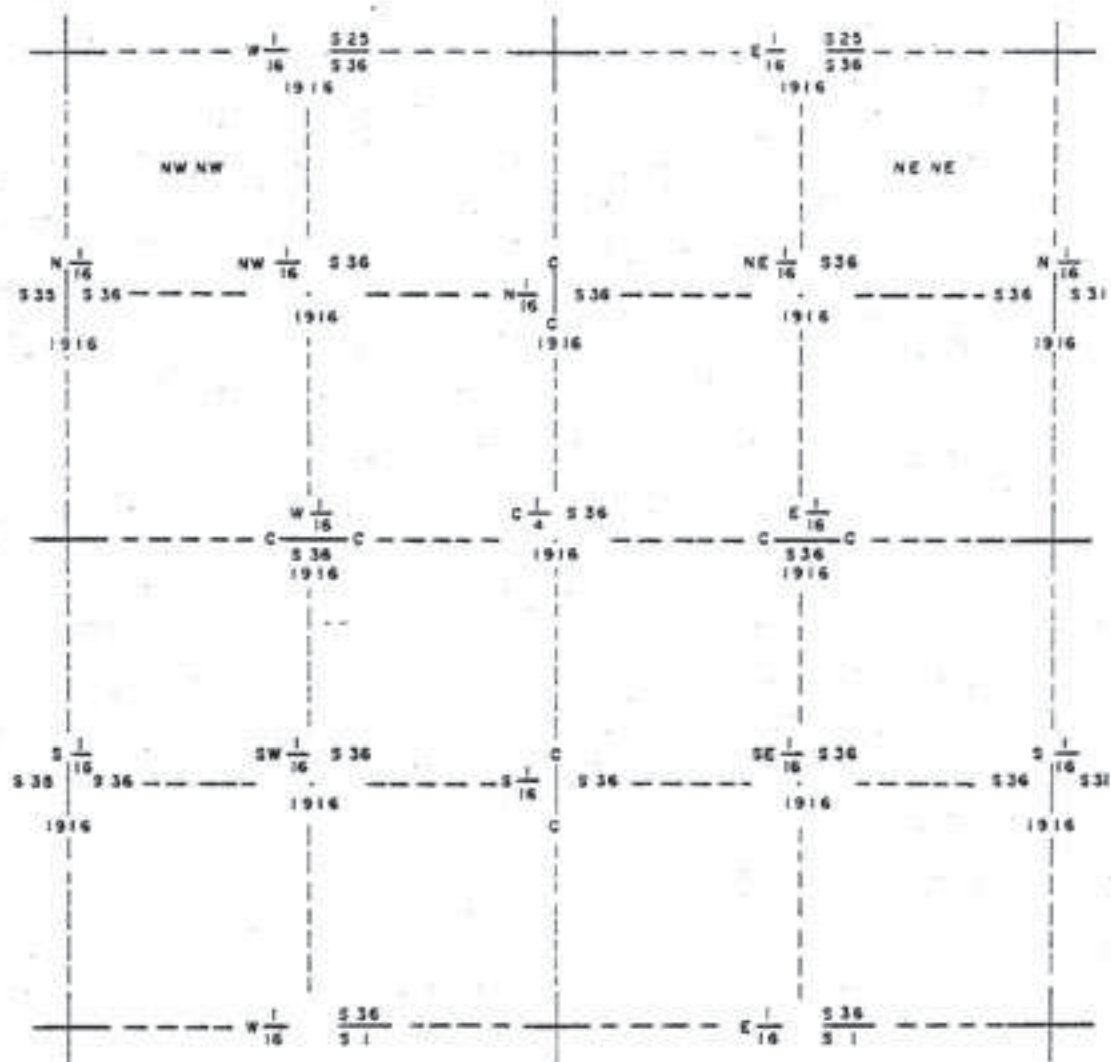
INDEX TO LABELING ALIQUOT PARTS OF A ONE QUARTER-QUARTER-SECTION

EXAMPLE - SE 1/4 SE 1/4 SECTION 36

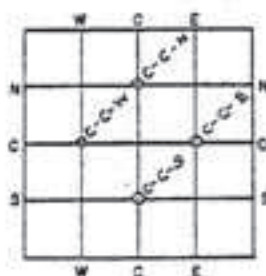


In surveys where $\frac{1}{4}$ sections are to be subdivided into $\frac{1}{16}$ sections ($\frac{1}{64}$ or 10 acre units), or aliquot parts as small as $\frac{1}{256}$ (2.5 acres) the required corners will be labeled as shown in the above illustration (however, markings will be different). If the 2.5 acre parts are quartered, only the fraction " $\frac{1}{1024}$ " will be used. The above labeling is used, occasionally to describe $\frac{1}{16}$, $\frac{1}{64}$, $\frac{1}{256}$, and $\frac{1}{1024}$ corners in deeds and surveys.

MARKING OF INTERIOR 1/4 CORNERS AND ALL 1/16 CORNERS



The above guide will be helpful in identifying one sixteenth-section corners and interior one quarter-section corners labeled on surveys and field notes. These corners are only set and marked in special surveys. 1916 is the date of the survey, and S36 means section 36. Occasionally, the above markings will be used in a description to designate a certain one sixteenth-section corner, such as C-C-W which designates the SE corner of the SW 1/4 NW 1/4 of a section. The chart below shows how the letters are determined.

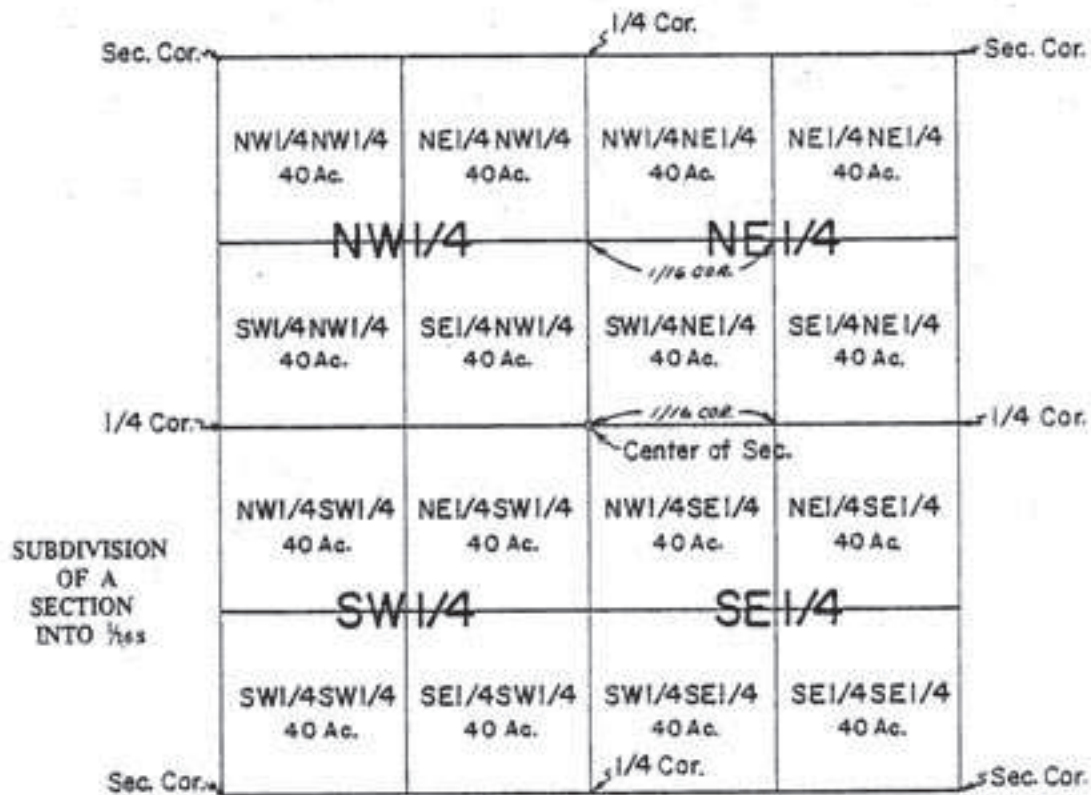
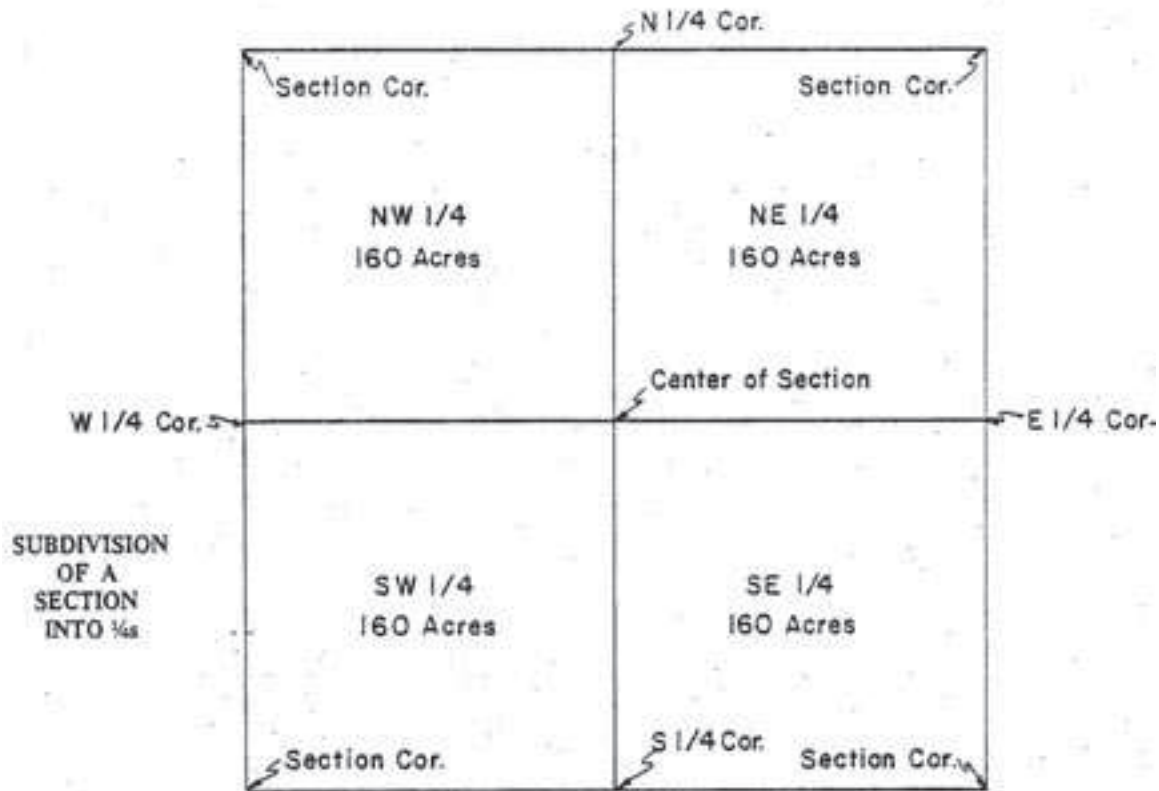


TRAVERSE COMPUTATIONS

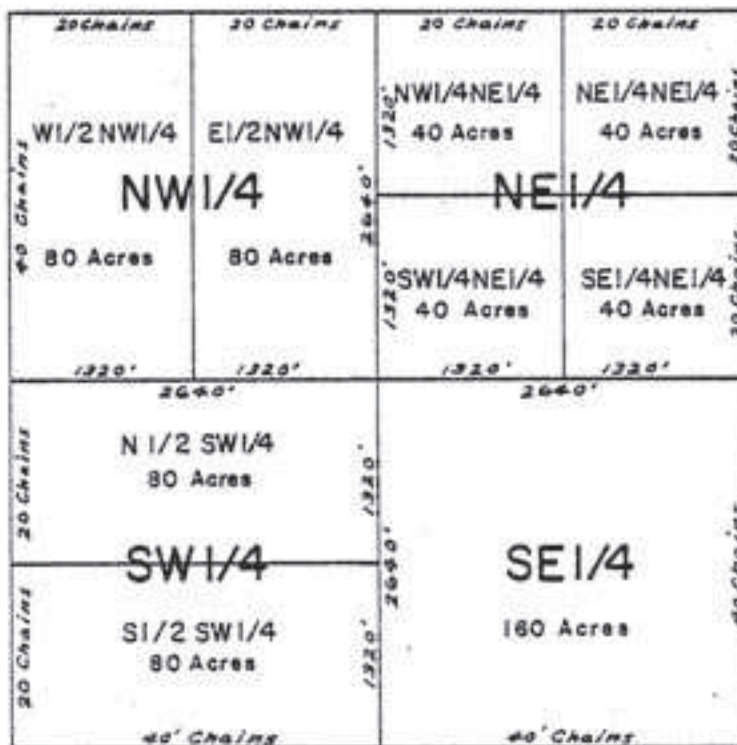
[illegible]

[illegible]

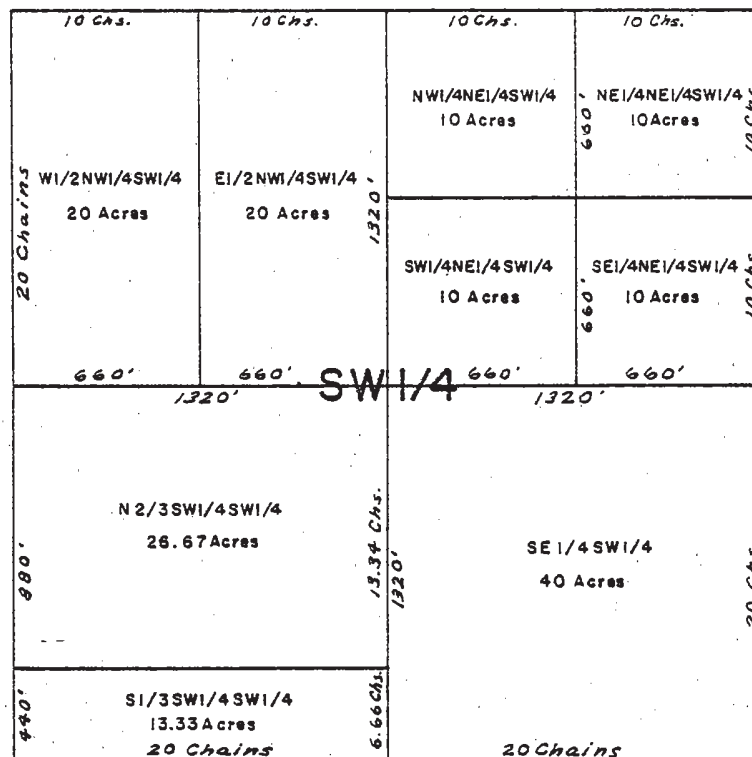
SUBDIVISION OF A SECTION



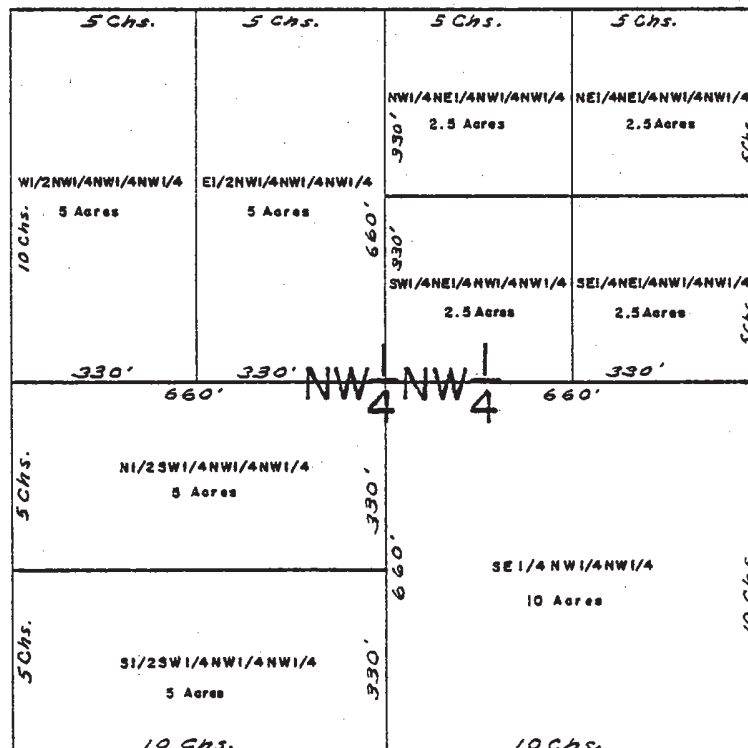
SECTIONS
POSSIBLE DIVISIONS



DIVISIONS OF QUARTER & QUARTER QUARTER-SECTIONS

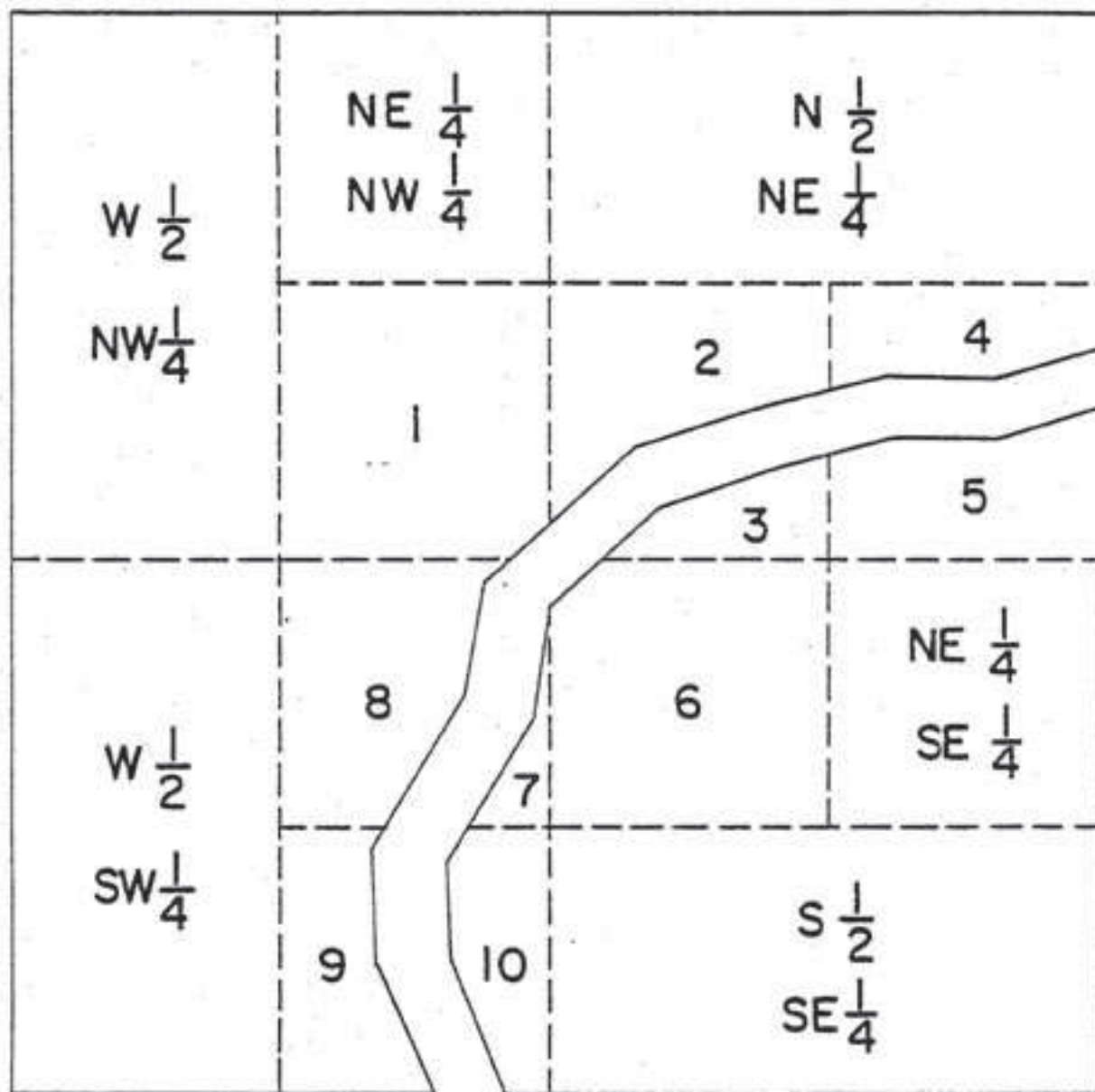


QUARTER SECTION



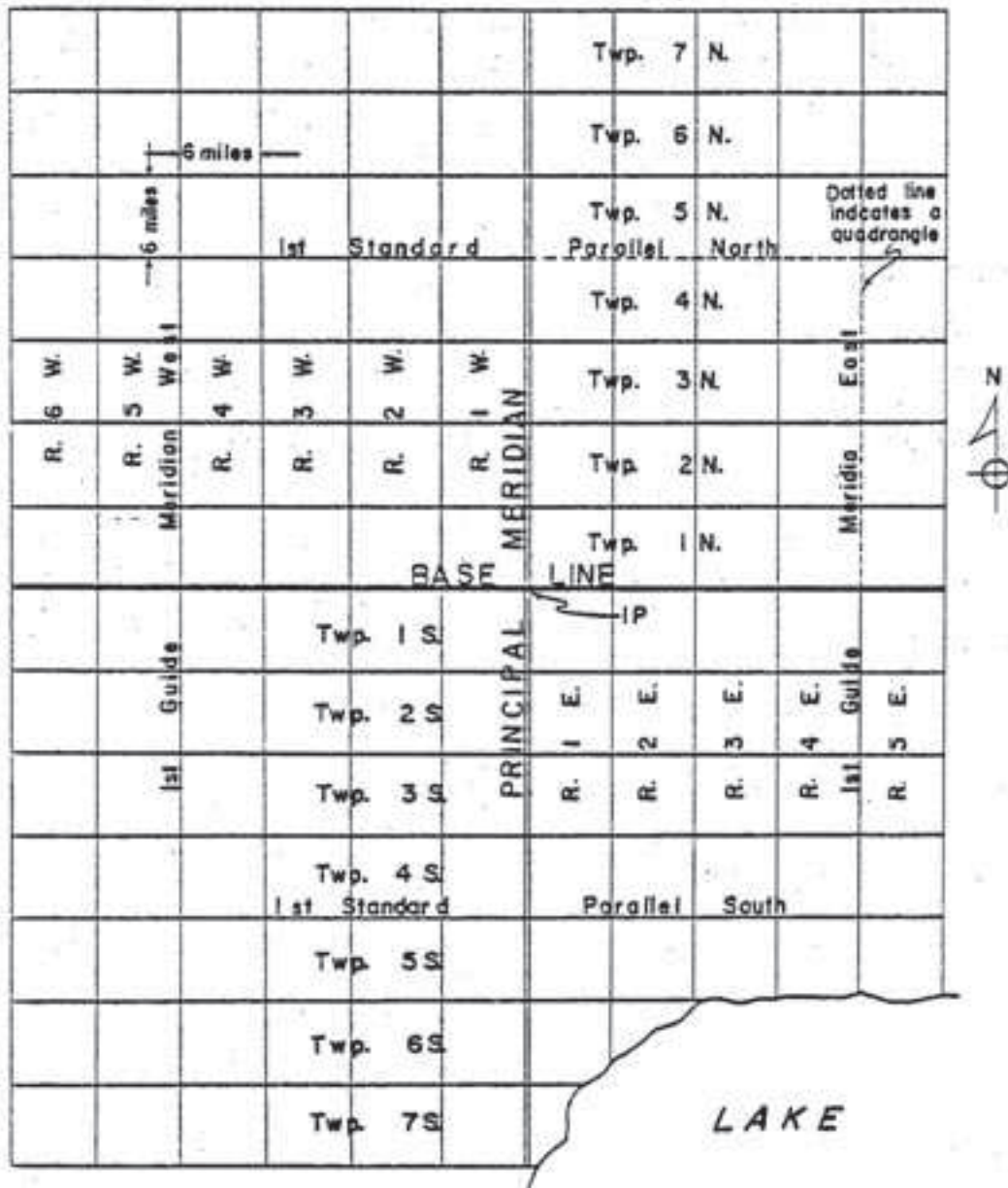
QUARTER-QUARTER SECTION

FRACTIONAL SECTION
DUE TO WATER



FRACTIONAL SECTION
DUE TO WATER

RECTANGULAR SUBDIVISION PATTERN

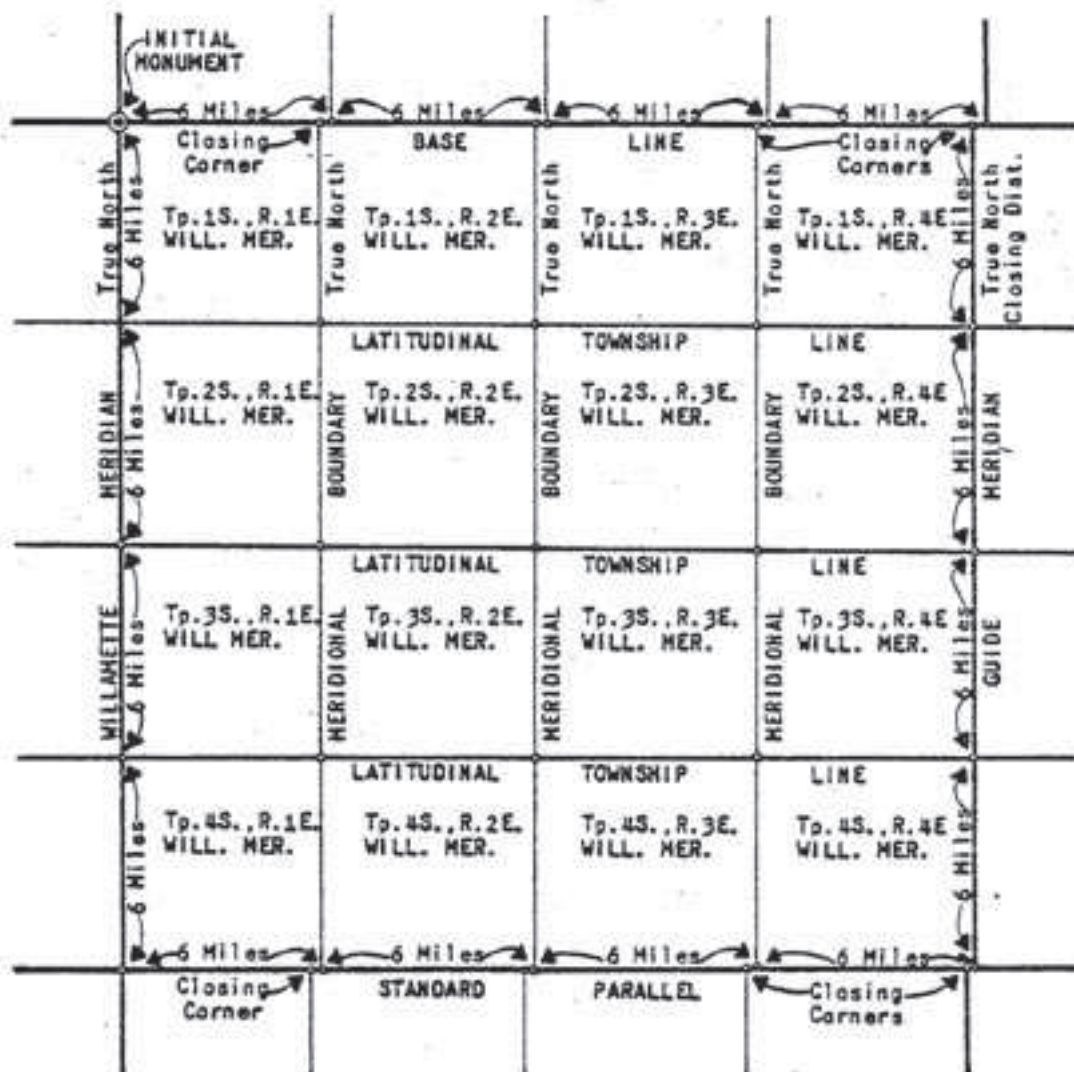


RECTANGULAR SUBDIVISION of U. S. PUBLIC LAND

Longitudinal and Latitudinal
Corrections not Shown

ESTABLISHING TOWNSHIPS

Example Showing MANNER OF ESTABLISHING TOWNSHIPS



ESTABLISHING SECTIONS

Example Showing
MANNER OF ESTABLISHING SECTIONS WHEN
BOUNDARIES OF TOWNSHIP ARE REGULAR.

4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1
5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

INDEX OF OREGON'S
NAVIGABLE WATERWAYS
As of January 1, 1977

The following is a list of the navigable waterways of Oregon. The list includes rivers, bays, channels, sloughs, inlets and lagoons; but it does not include navigable lakes.

WATERWAY	NAVIGABLE LENGTH IN MILES, OR TERMINATION POINT	REMARKS
Alsea Bay	—	Flows into Pacific at Waldport.
Alsea River	10.0	Flows into Alsea Bay at Waldport.
Big Creek Slough	1.5	Upstream end at Knappa.
Big Elk Creek	4.0	Mouth at Elk City.
Blind Slough	0.5	Part of Yaquina River 3 miles downstream from Toledo.
Blind Slough incl. Big Creek	2.5	Tributary of Knappa Slough. 10 mi. upstream from Astoria.
Bonneville Channel	4.0	Tributary of Willamette. 3 miles upstream from Corvallis.
Bradbury Slough	3.0	Side Channel of Columbia River 5 miles north of Clatskanie.
Butler Creek	1.0	Tributary of Smith River. Mouth is 1 mile from Reedsport.
Calapooya River	0.5	Mouth at Albany.
Calendar Slough	1.5	Side channel of Columbia. Upstream end 1 mile downstream from Knappa.
Cathlamet Bay	—	Part of Columbia. 3 miles upstream from Astoria.
Catching Slough	6.0	Tributary of Coos River. Mouth is 2 miles east of Coos Bay.
Chetco Cove	—	Bay of Pacific at Brookings.
Chetco River	3.0	Flows into Pacific at Brookings.
Clackamas River	0.2	Mouth at Willamette River in Oregon City.
Clatskanie River incl. Beaver Slough	5.0	Tributary of Columbia River at Clatskanie.
Clifton Channel	4.0	Side channel of Columbia River
Coalbank Slough	2.0	Tributary of Isthmus Slough at Coos Bay.
Columbia River	215.6	To NPP upstream limit. Contains Bonneville and The Dalles Locks.
Columbia Slough	7.7	Mouth 2 miles downstream from North City Limits of Portland (1965).
Coos Bay	—	Flows into Pacific 15 channel miles downstream from Coos Bay.
Coos River	14.7	Includes South Fork. Flows into Coos Bay at Coos Bay.
Cooston Channel	2.0	Part of Coos Bay. Mouth is opposite of North Bend.
Coquille River	36.0	Flows into Pacific at Bandon.
Depoe Bay	—	Cove of Pacific at Depoe Bay.
Depoe Slough	1.0	Tributary of Yaquina River at Toledo.
Dougherty Slough	1.0	Tributary of Hoquarton Slough at Tillamook.
Drift Creek	1.5	Tributary of Alsea River. Mouth 1 mile east of Waldport.
Drift Creek	1.0	Mouth in Siletz Bay 1 mile south of Taft (Lincoln City).
Driscoll Slough	0.2	At Westport.
Duncan Slough	5.0	Tributary of Siuslaw River 5 miles upstream from Florence.
Flesher Slough	0.5	Tributary of Yaquina River. Mouth 5 miles downstream from Toledo.
Frantz Creek	0.5	Tributary of Smith River. Mouth 2 miles from Reedsport.
Gardiner Channel	3.0	Part of Umpqua River at Gardiner.

INDEX OF OREGON'S NAVIGABLE WATERWAYS (Continued)

WATERWAY	NAVIGABLE LENGTH IN MILES, OR TERMINATION POINT	REMARKS
Gilbert River	3.0	On Sauvie Island.
Goble Channel	3.0	Side channel of Columbia River. Downstream end at Goble.
Government Island Channel	8.0	Part of Columbia River. Channel south of Government Island. Downstream end at International Airport.
Haynes Slough	2.0	Mouth 2 miles north of North Bend.
Hoquarton Slough	3.0	Tributary of Tillamook Bay at Tillamook.
Hudson Slough	1.0	Tributary of Smith River. Mouth is 3 miles northeast of Reedsport.
Isthmus Slough	9.0	Mouth at Coos Bay.
Joy Ney Slough	1.5	Tributary of South Slough. Mouth at Charleston.
John Day River	3.0	Mouth 3 miles east of Astoria.
John Day River (Eastern Oregon)	not navigable	
Kentuck Slough	0.5	Mouth opposite North Bend.
King Slough	1.4	Tributary of Yaquina Bay. Mouth 2 miles southeast of Newport.
Klaskanine River	2.0	Tributary of Youngs River. Mouth 7 miles southeast of Astoria.
Knappa Slough (Columbia River)	2.0	Mouth 9 miles east of Astoria.
Lawson Creek	0.5	Tributary of Siuslaw River. Mouth 3 miles upstream from Florence.
Lewis and Clark River	8.0	Tributary of lower Columbia River. Mouth in Youngs Bay.
McCaffery Slough	1.0	Tributary of Yaquina River. Mouth 3 miles southeast of Newport.
McIntosh Slough	1.0	Tributary of Umpqua River at Reedsport.
Miami Cove	—	Part of Tillamook Bay at Garibaldi.
Mill Creek	1.0	Tributary of Umpqua River. Mouth 12 miles upstream from Reedsport.
Millcoma River	8.5	Branch of Coos River. Upstream end at Allegany.
Multnomah Channel	21.0	Tributary of Columbia River. Upstream end at west city limits of Portland (June 1965).
Neawanna River	2.0	Tributary of Necanicum River at Seaside.
Necanicum River	3.0	Flows into Pacific at Seaside.
Nehalem Bay	Wheeler	Flows into Pacific Ocean.
Nehalem River	8.5	Upstream from Wheeler to 1 mile above Mohler.
North Fork, Nehalem River	5.0	Mouth 1 mile from Nehalem.
Nestucca Bay	—	Flows into Pacific.
Nestucca River (Big)	6.0	From 1 mile south of Pacific City to Cloverdale.
Nestucca River (Little)	1.6	Mouth is 2 miles southeast of Pacific City.
Netarts Bay	—	Flows into Pacific at Netarts.
North Slough	3.0	Tributary of Coos Bay. Mouth 2 miles north of North Bend.
Ollalie Creek	1.0	Tributary of Yaquina River at Toledo.
Oregon Slough	6.0	Part of Columbia River 1 mile south of Vancouver, Washington.
Otter Slough	1.0	Tributary of Smith River. Mouth 5 miles upstream from Reedsport.
Pony Slough	1.2	Tributary of Coos Bay at North Bend.
Pacific Ocean	—	Length of sailing course 257.0 miles.
Pooles Slough	2.0	Tributary of Yaquina River. Mouth 4 miles upstream from Newport.
Port Orford	—	Bay on Pacific Ocean at Port Orford.
Prairie Channel	10.0	Side channel of Columbia River. Mouth 3 miles east of Astoria.

INDEX OF OREGON'S
NAVIGABLE WATERWAYS (Continued)

WATERWAYS	NAVIGABLE LENGTH IN MILES, OR TERMINATION POINT	REMARKS
Randolph Slough	2.0	Side channel of Coquille River. 4 miles northeast of Bandon.
Rogue River	68.0	Flows into Pacific at Gold Beach.
Salmon River	3.0	Mouth 4 miles north of Oceanlake (Lincoln City). Classified as a minor waterway.
Sandy River	2.0	Mouth across Columbia River from Camas, Washington.
Santiam River	9.0	Mouth 23 miles upstream from Salem.
Scappoose Bay	—	Tributary of Multnomah Channel (and Columbia River) 1 mile from St. Helens.
Schofield Creek	6.0	Tributary of Umpqua River. Mouth at Reedsport.
Siletz Bay	—	Flows into Pacific Ocean at Taft (Lincoln City).
Siletz River	20.0	Flows into Siletz Bay at Kernville.
Siuslaw River	19.0	Flows into Pacific Ocean 5 miles downstream from Florence.
Siuslaw River (North Fork)	2.0	Mouth 1 mile upstream from Florence.
Skipanon Channel	2.6	Tributary of lower Columbia River at Warrenton.
Smith River	21.0	Mouth is 1 mile north of Reedsport. (Upper 6 miles inactive).
Smith River (North Fork)	1.0	Mouth 17 river miles from Reedsport.
South, or Burnside Channel	3.0	Side channel of Columbia River. Downstream end 3 miles east of Astoria.
South Inlet	1.0	Tributary of Siuslaw River. Mouth 2 miles upstream from Florence.
South Slough	5.0	Tributary of Lower Coos Bay. Mouth 1 mile north of Charleston.
Svenson Slough	2.0	Mouth 6 miles east of Astoria.
Swan Island Lagoon	1.5	Part of Willamette River at Portland.
Tillamook Bay	—	Flows into Pacific 2 miles west of Garibaldi.
Tillamook River	5.0	Tributary of Tillamook Bay.
Trask River	2.0	Tributary of Tillamook Bay.
Umpqua River	Scottsburg	Flows into Pacific 11 river miles from Reedsport.
Walker Island Channel	4.0	Side channel of Columbia River upstream end 2 miles downstream of Rainier.
Wallace Slough	3.0	Side channel of Columbia River. Upstream end 3 miles north of Clatskanie.
Westport Slough	4.5	Tributary of Columbia at Westport.
Willamette River	183.2	Upstream 51 miles not maintained.
Willamette Slough	1.0	Tributary of Willamette River at Salem.
Willanch Slough	0.5	Part of Coos Bay. Mouth is opposite North Bend.
Wood River	to Ft. Klamath	Klamath County.
Wilson River	3.0	Tributary of Tillamook Bay.
Winchester Bay	—	Tributary of Umpqua River at Winchester Bay.
Yamhill River	7.0	Mouth 29 river miles above Oregon City Locks.
Yaquina Bay	—	Flows into Pacific Ocean at Newport.
Yaquina River	19.0	Tributary of Yaquina Bay. Mouth 3 miles southeast of Newport.
Youngs Bay	—	Tributary to Lower Columbia River at Astoria. Classified as a minor waterway.
Youngs River	8.3	Tributary to Youngs Bay. Mouth at Astoria. Classified as a minor waterway.

NOTE: McKenzie River, Klamath River, John Day River (eastern Oregon), Snake River, Deschutes River, Schooner Creek, D River, Tualatin River, and the Grande Ronde River are not considered as navigable waterways at this time; some of these rivers, however, are under study.

INDEX OF OREGON'S MAJOR ESTUARIES & AREA OF TIDAL LANDS

ESTUARY 1972-1973 data	TOTAL AREA IN ACRES	RELATIVE SIZE	TIDELAND AREA IN ACRES	SUBMERGED LAND IN ACRES
Columbia*	93,782	1	24,507	69,275
Oregon & Wash.				
Necanicum	278	15	149	129
Nehalem	2,309	7	1,708	1,231
Tillamook	8,289	3	4,163	4,126
Netarts	2,325	6	1,513	812
Sand Lake	528	14	397	131
Nestucca	1,000	11	578	422
Salmon River	204	16	126	78
Siletz	1,187	10	775	412
Yaquina	3,910	5	1,353	2,557
Alsea	2,146	9	979	1,168
Siuslaw	2,245	8	756	1,489
Umpqua	6,830	4	1,531	5,298
Coos Bay	12,380	2	6,200	6,180
Coquille	771	12	301	470
Rogue	627	13	149	478
Chetco	102	17	12	90
Totals.	138,913		44,567	94,346

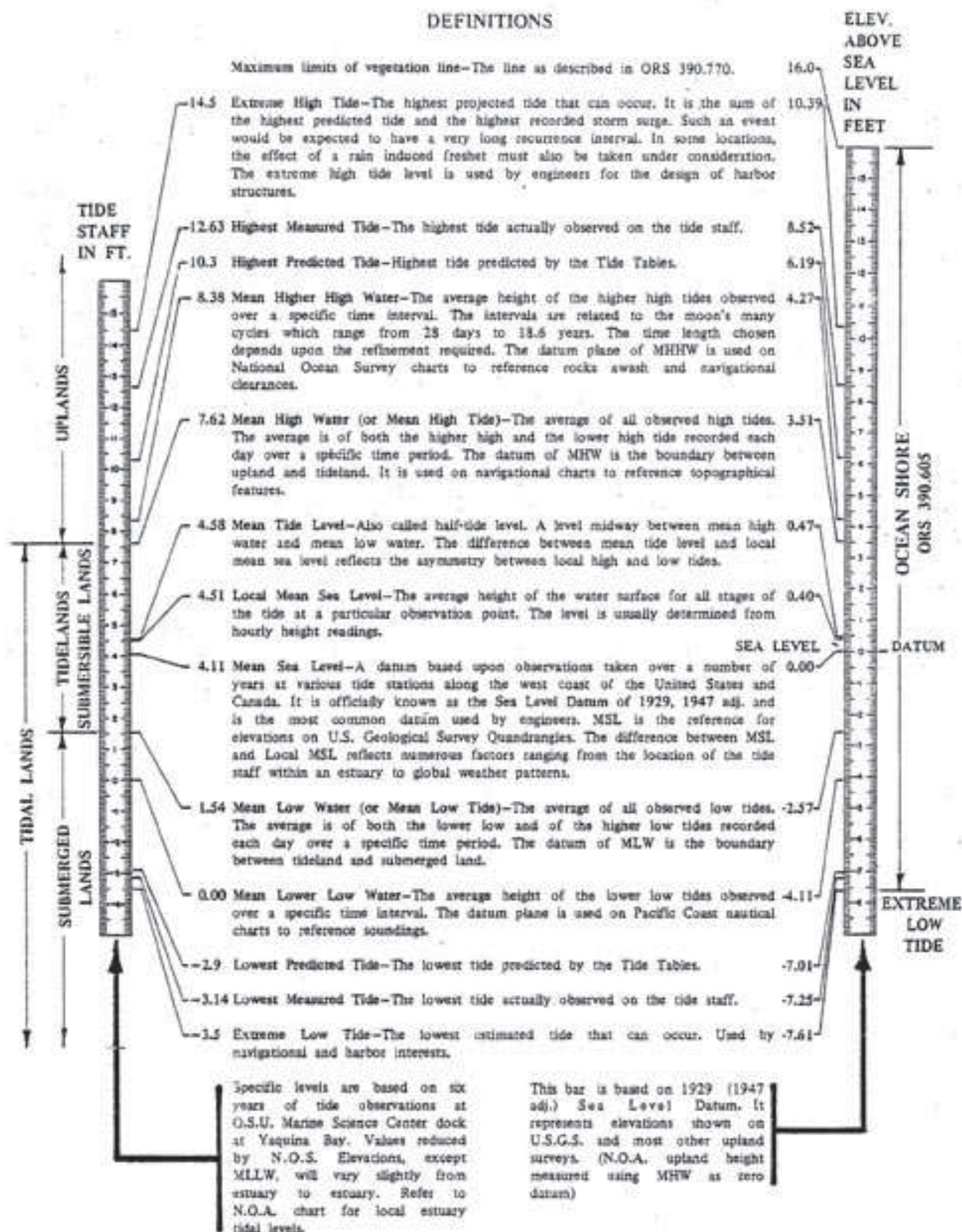
Values determined by Division of State Lands. Areas were planimetered from Division tideland maps at a scale of 1" = 1000'. The estuary areas measured extended from a line across the entrance to the upper extent of the tideland, which usually coincided with the point of continuous diking along the river edge — not necessarily at the head of tide.

The area of the Columbia River estuary was computed from U.S.C. & G.S. (now N.O.A.) charts 6151 and 6152. The limits extend from the entrance jetties to the lower tip of Puget Island. The C. & G.S. line of mean lower low water was used for the computation. Tideland and submerged land in both Oregon and Washington are included in the figures.

Minor Oregon Estuaries not included are: Elk Creek, Neskowin Creek, Yachats River, Ten Mile Creek, Sixes River, Elk River, Hunter Creek, Pistol River and the Winchuck River.

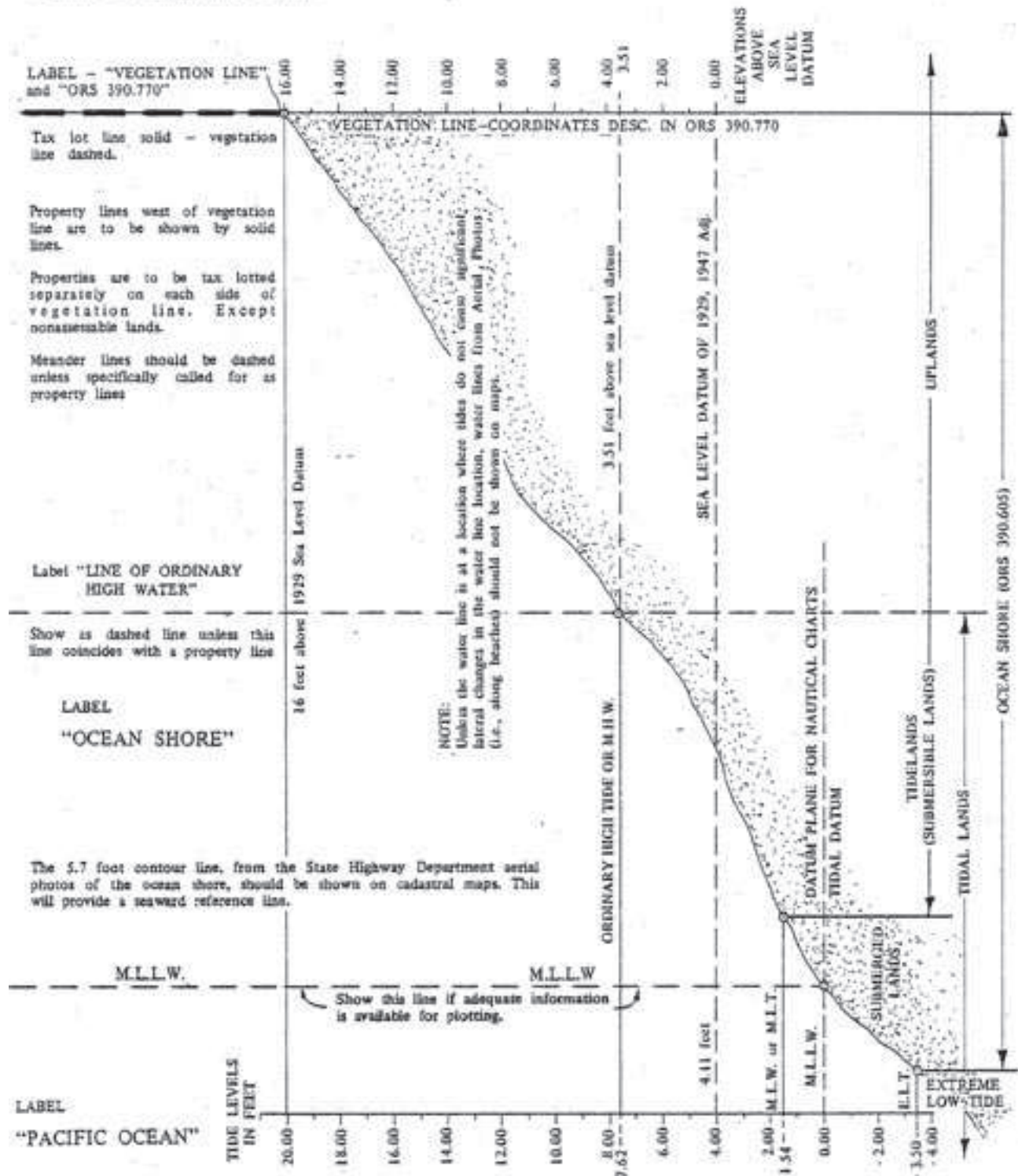
TIDAL AND SEA LEVEL ELEVATIONS AND DEFINITIONS

DEFINITIONS



PROFILE - OCEAN SHORE

Note: As per ORS 307.450, the land, but not the improvements to the land, within the area seaward of the vegetation line, is exempt from taxation.



Note: Government meander lines are only property lines when specifically called for.

Appendix F

DIVISION OF STATE LANDS

May 24, 1996 MEMORANDUM
TO: Interested Persons
FROM: Paul R. Cleary, Director

SUBJECT: State Ownership of Navigable Waterways

Introduction

The Division of State Lands (Division) receives many inquiries from the public concerning which waterways are publicly owned or claimed. People often want to know where the bed and banks of waterways have been declared publicly owned so they can use the waterways for fishing, swimming, boating, etc. without fear of trespassing on private property.

This memorandum:

- Discusses your rights to use state-owned submerged and submersible land,
- Contains several lists which identify where the State of Oregon owns or claims the bed and banks of a waterway because of federal court adjudication, tidal influence, and/or as the result of state law, State Land Board policy, or administrative rule.
- Briefly describes the impact of recently enacted legislation (HB 2697) on the determination of state ownership to the bed and banks of waterways.

Please be aware that this memorandum deals only with the issue of state navigability ownership claims. The bed and banks of waterways flowing through public lands (i.e., local, state or federal) may also be available to the public. You should consult with the appropriate public land management agency to determine what limitations, if any, exist on public use.

Your Rights and Responsibilities to Use State-Owned Waterways

The rules controlling public use of state-owned waterways are simple. The Public Trust Doctrine gives you the right to use state-owned waterways (including submerged and submersible lands) for a wide variety of authorized uses including navigation and recreation. However, this doctrine is not a license to trespass on private land. Although the public has a right to navigate on waters where the bed is privately owned, this may not include the right to wade or otherwise use the bed and banks of privately owned uplands. Anyone crossing private land to reach state-owned public land and waterways must have permission from the landowner. The landowner is under no obligation to grant this permission.

Be a Responsible User

Recreational use of state-owned waterways is a privilege enjoyed by many Oregonians and visitors. However, misuse and abuse of this privilege can lead to restrictions. The Division and the State Land Board urge you to be a responsible user of public lands and waterways, obey all authorized closures, restrictions and postings, and exercise basic common sense, courtesy, and consideration for others.

When using Oregon's state-owned waterways:

- Always get the landowner's permission to cross private land to get to the waterway.
- Be sure to launch and take out your boat at public launches or parks.
- Avoid conflicts with landowners.
- If you see trash, pick it up and carry it out, but avoid trespass to do so.
- Obey laws and common rules of decency at all times.

Illegal Acts on Public Lands and Waterways

The Division is often asked what acts are illegal on public land and waterways. As a general rule, any act which is illegal on private land is also illegal on public land. Some of the illegal activities which are frequently reported to the Division as occurring on state owned land are as follows:

<i>Offensive littering</i>	ORS164.805	Class C Misdemeanor (30 days; \$1000)
<i>Littering in or within 100 yards of state waters</i>	ORS 164.775	Class B Misdemeanor (6 months; \$2000)
<i>Trespass onto private land</i>	ORS164.245	Class C Misdemeanor (30 days; \$1000)
<i>Possession use of a controlled substance</i>	ORS Chapter 475	Varies
<i>Interference with property</i>	ORS 164.345	Class C Misdemeanor (30 days; \$1000)
<i>Damaging property less than \$500</i>	ORS 164.354	Class A Misdemeanor (1 year; \$5000)
<i>Damaging property, more than \$500</i>	ORS 164.354	Class C Felony (5 years; \$100,000)
<i>Damaging livestock</i>	ORS 164.365	Class C Felony (5 years; \$100, 000)
<i>Pointing firearm at another</i>	ORS 166.190	6 months; \$500
<i>Firing at person or building within range of weapon</i>	ORS 166.220	Class C Felony (5 years; \$100, 000)
<i>Reckless burning</i>	ORS 164.335	Class A Misdemeanor (1 Year; \$5000)

The Impact of HB 2697 on State Ownership of Waterway Bed and Banks

In 1995, the Oregon State Legislature enacted BB 2697 (codified as ORS 274.400 to 274.412). This legislation establishes a process for the Division and the State Land Board to follow in undertaking any future navigability studies to determine state ownership of the bed and banks of waterways. **Pending completion of such navigability studies, the Division and State Land Board may neither assert nor waive potential** waterway ownership claims.

It is important to note that HB 2697 is prospective, affecting only the State Land Board's ability to assert future claims. Therefore, the Division and State Land Board's pre-BB 2697 ownership claims on the waterways listed in the attached tables are not affected by the requirements of this legislation.

Ownership Data

The waterways to which the state has asserted an ownership claim are listed in Tables 1-3:

Table 1 lists those areas where the state owns or claims the bed and banks of a waterway because of federal court adjudication, tidal influence, and/or as the result of state law, Land Board policy, or administrative rule.

Table 2 lists those areas where the state owns the bed and banks of a waterway strictly because of tidality.

Table 3 concerns state ownership of meandered lakes and references ORS 274.430(1) which states that all meandered lakes are declared navigable and therefore "public" and that the submerged and submersible lands are vested in the state.

The ownership data contained in these tables are current as of the date of this memorandum. **However, as new information is developed, these lists will be periodically updated** as navigability studies and related **ownership claims** are completed.

Limits of Public Ownership

With reference to the waterways listed in Tables 1-3, the state usually owns to the line of ordinary high water (OHW) or mean high tide (MM).

However, in tidal areas and the bed and banks of grant rivers, state ownership may be different.

- In tidal **areas**, the state may only own to ordinary low water (OLW) or mean low tide (MLT) as the result of land sales authorized by statute in 1872.
- Along the **Willamette River**, a 1874 statute provided that state title to any "...tide or overflowed lands upon said Willamette River is hereby granted and confirmed to the owners of the adjacent lands, or when any such tide of overflowed lands have been sold ... to the purchaser ... from such owner of such adjacent lands, or some previous owner."
- An 1876 statute expanded the provisions of the 1874 statute to include the **Coquille, Coos, and Umpqua Rivers**.

Because of these statutes, the Willamette, Coquille, Coos and Umpqua Rivers are commonly referred to as “grant rivers.” You will need to check deed records for each property along tidal areas and these grant rivers to determine the extent of state submerged and / or submersible land ownership.

Want More Information?

For additional information contact one of our agency’s Resource Coordinators listed in the attached *Resource Coordinator Assignments* display, or call or write to the Division’s Salem office:

Oregon Division of State Lands

775 Summer Street N.E.

Salem, Oregon 97310-1337

Telephone: (503) 378-3805

FAX: (503) 378-4844

Attachments: *Table 1- Waterway Specific Information*

Table 2 - Tidally Influenced Waterways

Table 3 - Meandered Lakes Resource Coordinator Assignments

“Who Owns the Waterways”

Table 1
(Revised 5122196)

Waterway Specific Information
(See also Tidally Influenced Waterways Table 2)

Chetco River—River Mile 3.3 to “at least” 11 (approximately 1 mile upstream from the confluence of Elk Creek and the Chetco River).

Authority: Tidal.

Oregon v. Tidewater Contractors, Inc., Order on Motion for Summary Judgment, August 10, 1994, U.S. District Court, Oregon

Columbia River—River Mile 0.0 to 309 (Oregon-Washington border).

Authority: Tidal.

State assertion by management.

Historical use (for example, by Lewis and Clark Native Americans).

Admissions Act.

Coos River—River Mile 0.0 to 4.5 (at the confluence of the Millicoma River and the South Fork of the Coos River).

Authority: Tidal.

Grant river.

Coquille River—River Mile 0.0 to 36.3 (confluence of the North Fork and Middle Fork of the Coquille River).

Authority: Tidal.

Grant river.

Klamath River—River Mile 200.0 (California border) to 233.0 (Keno).

Authority: Land Board declaration, December 1986.

McKenzie River—River Mile 0.0 to 37 (Dutch Henry Rock).

Authority: Land Board declaration, July 1976.

OAR 141-81-050(2).

State of Oregon v. Riverfront Protection Association, 672 F.2d 792 (1982).

Rogue River—River Mile 0.0 to 68.4 (Grave Creek).

Authority: Land Board adoption of permanent rule, August 1975. OAR 141-81-050(1).

Snake River—River Mile 176 to 409.

Authority: Scott v. Lattig, 227 US. 229, 1913.

Historical use (for example, Lewis and Clark Native Americans). Admissions Act.

Umpqua River—River Mile 0.0 to “approximately” 111.5 (at the confluence of the North and South Forks of the Umpqua River).

Authority: Tidal.

*Land Board adoption of permanent rule, December 1976. OAR 141-81-050(3).
Grant river.*

Willamette River—River Mile 0.0 to 187.0 (at the confluence of the Coast and Middle Forks of the Willamette River).

Authority: Tidal.

*Corvallis Sand & Gravel Company v. Oregon, 429 U.S. 363 (1977). ORS
274.036.
Grant river.*

Table 2**Tidally Influenced Waterways**

County	River Name	Location of Head of Tide
Clackamas	Willamette River	RM26.5 @ Willamette Falls
Clatsop	Logan Creek	T5N-R1 OW W. line of Sec. 20
Clatsop	Neacoxie Creek	T6N-R1 OWN. line of Sec. 10
Clatsop	Neawanna Creek	T6N-R1 OW S. line of Sec. 22
Clatsop	Neawanna Creek	T6N-R1OW Sec. 22 (Unnamed Tributary)
Clatsop	Necanicum River	RM 4.0 @ T6N-R1 OW Sec. 22
Clatsop	Nehalem River	RM 8.9 @ T3N-R9W Sec. 31
Clatsop	Nehalem River N. Fork	RM 6.2 @ T4N-R9W Sec. 32
Clatsop	Stanley Lake Creek	T6N-RIOW Sec.15
Coos	Bear Creek	T28S-RI4W Sec. 27
Coos	Beaver Slough	RM 5.0 @ T12S-13W Secs. 15&17
Coos	Boone Creek	T26S-12W Sec. 32
Coos	Catching Slough	T26S-12W Sec. 32
Coos	China Creek	T29S-15W Sec. 11
Coos	Coalbank Slough	T26S-13W Secs. 3 & 10
Coos	Coos River	ALL
Coos	Coos River S. Fork	RM 10.2 @ T25S-RI I W Sec. 27
Coos	Coquille River	ALL
Coos	Coquille River N. Fork	RM 0.5 @ T29S-R12W S. line of Sec. 4
Coos	Coquille River S. Fork	RM 3.0 @.T29S-R12W Sec. 20
Coos	Cox Canyon	T26S-R14W Sec. 36
Coos	Croft Lake	T30S-R15W E. line of Sec. 10
Coos	Crooked Creek	T29S-R15W Sec. 12
Coos	Cut Creek	T27S-R14W Sec. 31
Coos	Daniels Creek	T25S-12W S. line of Sec. 35
Coos	Davis Slough	T26S-R13W Secs. 27 & 28
Coos	Day Creek	T26S-R14W Sec. 13
Coos	Deton Creek	T25S-R12W Sec. 13
Coos	Elliott Creek	T26S-R13W Sec. 19
Coos	Ferry Creek	T28S-R14W Sec. 29
Coos	Fivemile Creek	T27S-RI4W Sec. 5
Coos	Fourmile Creek	T30S-R15W Sec. 2
Coos	Hatchet Slough	T28S-R13W Sec. 7
Coos	Haywood Creek	T26S-R14W Sec. 14
Coos	Iowa Slough	T28S-R13W Sec. 7
Coos	Isthmus Slough	T27S-RI3W Secs. 2&3
Coos	Joe Ney Slough	T26S-R13W Secs. 6&7
Coos	John B. Creek	T26S-R14W Sec. 25

Coos	Johnson Creek	T29S-R15W Sec. 1
Coos	Kentuck Slough	T25S-R12W Sec. 6
Coos	Lampa Creek	T28S-R13W Sec. 30
Coos	Larson Creek	T24S-R12W Sec. 30
Coos	Lillian Creek	T25S-R12W Sec. 32
Coos	Lowe Creek	T28S-R14W Sec. 23
Coos	Mart Davis Creek	T25S-R12W Sec. 23
Coos	Millicoma E. Fork	RM 13 @ T25S-R11 W Sec. 4
Coos	Millicoma River	ALL
Coos	Millicoma W. Fork	RM 1.1 @ T25S-R1 1W Sec. 6
Coos	New Lake	T30S-R15W S. line of Sec. 15
Coos	New River	T30S-R15W S. line of Sec. 15
Coos	Noble Creek	T27S-R13 W Sec. 2
Coos	North Slough	T24S-R13 W Sec. 12
Coos	Offield Slough	T28S-R14W Sec. 11
Coos	Paloose Creek	T24S-R12W Sec. 18
Coos	Ross Slough	T26S-R13W Sec. 12
Coos	Seelander Creek	T26S-R12W Sec. 29
Coos	Sevenmile Creek	T28S-R14W Sec. 3
Coos	Shinglehouse Slough	T26S-R13W Sec. 15
Coos	South Slough	ALL
Coos	Stock Slough	T26S-R12W Sec. 9
Coos	Talbot Creek	T26S-R13W Sec. 30
Coos	Threemile Creek	T27S-R14W Sec. 5
Coos	Twomile Creek	T27S-R14W Sec. 17
Coos	Vogle Creek	T25S-R12W Sec. 29
Coos	Wasson Creek	T26S-R14W Sec. 35
Coos	Willanch Slough	T25S-R13W Sec. 13
Coos	Wilson Creek	T26S-R12W Sec. 29
Coos	Winchester Creek	T27S-R14W Sec. 2
Coos	Wiskey Run Creek	T27S-R14W Sec. 20
Curry	Bowman Creek	T40S-R14W Sec. 3
Curry	Burnt Hill Creek	T39S-R14W Sec. 5
Curry	Chetco River	RM 3.3 @ T40S-R13W Sec. 34
Curry	China Creek	T39S-R14W Sec. 28
Curry	Coon Creek	T40S-R14W Sec. 3
Curry	Elk River	T32S-R15W Sec. 19
Curry	Euchre Creek	T35S-R14W Sec. 8
Curry	Floras Creek	T31S-R15W
Curry	Garrison Creek	T33S-R15W
Curry	Harris Creek	T40S-R14W Sec. 36
Curry	Horse Prairie Creek	T39S-R14W Sec. 21
Curry	Housetender Creek	T39S-R14W Sec. 9

Curry	Hubbard Creek	T33S-R15W Sec. 9
Curry	Hunter Creek	T37S-R14W Sec. 7
Curry	Lone Ranch Creek	T40S-R14W Sec. 22
Curry	Macklyn Creek	T41S-R13W Sec. 6
Curry	Mill Creek	T41S-R13W Sec. 6
Curry	Miller Creek	T39S-R14W Sec. 16
Curry	Miner Creek	T39S-R14W Sec. 16
Curry	Mussel Creek	T34S-R14W Sec. 19
Curry	Myers Creek	T38S-R14W Sec. 7
Curry	Pistol River	RM 1.4 @ T39S-R14W W. line of Sec. 20
Curry	Ram Creek	T40S-R14W Sec. 22
Curry	Ransom Creek	T41 S-R14W Sec. 1
Curry	Retz Creek	T33S-R15W Sec. 15
Curry	Rinehart Creek	T4S-R14W Sec. 18
Curry	Rogue River	RM 4.5 @ T36S-R14W Sec. 17
Curry	Shy Creek	T40S-R14W Sec. 26
Curry	Sixes River	RM 2 @ T31 S-R1 5W Sec. 31
Curry	Spruce Creek	T39S-T14W Sec. 21
Curry	Taylor Creek	T40S-R14W Sec. 26
Curry	Thomas Creek	T39S-R14W Sec. 28
Curry	Whalehead Creek	T40S-R14W Sec. 3
Curry	Winchuck River	RM 1.1 @ T41 S-R13 W Sec. 25
Douglas	Brainard Creek	T21 S-R11 W Sec. 17
Douglas	Butler Creek	RM 1.1 @ T21S-R11W Sec. 30
Douglas	Eslick Creek	T20S-R1 I W Sec. 35
Douglas	Frantz Creek	RM 0.5 @ T21 S-R1 2W Sec. 14
Douglas	Hudson Slough	ALL
Douglas	Joyce Creek	T21 S-R1 I W Sec. 8
Douglas	Noel Creek	T21 S-R1 I W Sec. 3
Douglas	Oar Creek	T22S-R1 I W Sec. 7
Douglas	Otter Slough	RM 1.0 @ T21 S-R1 I W Sec. 27
Douglas	Providence Creek	T21S-R12W Sec. 28
Douglas	Scholfield Creek	RM 53 @ T22S-R12W Sec. 11
Douglas	Silver Creek	T22S-R12W Sec. 8
Douglas	Smith River	RM 23.1 @ T20S-R1 OW Sec. 34
Douglas	Smith River N. Fork	RM 3.0 @ T20S-R1 OW Sec. 30
Douglas	Tahkenitich Creek	T20S-R12W Sec. 19
Douglas	Threemile Creek	T21S-R12W Sec. 18
Douglas	Umpqua River	RM 29.2 @ T22S-R9W Sec. 7
Douglas	Winchester Creek	T22S-R12W Sec. 8
Lane	Agate Creek	T15S- R2W Sec. 27
Lane	Berry Creek	T17S-R12W Sec. 15
Lane	Blowout Creek	T16S-R12W Sec. 22

Lane	Bob Creek	T15S-R12W Sec. 22
Lane	Cape. Creek	T16S-R12W Sec. 34
Lane	China Creek	T16S-R12W Sec. 22
Lane	Cummins Creek	T15S-R12W Sec. 10
Lane	Gwynn Creek	T15S-R12W Sec. 10
Lane	Hadsall Creek	T18S-R10W Sec. 12
Lane	Haring Creek	TI 8S-R11 W Sec. 7
Lane	Hoffman Creek	TI 8S-R1 I W Sec. 13
Lane	Knowles Creek	T18S-R10W Sec. 1
Lane	Lawson Creek	T18S-R11 W Sec. 28
Lane	Lindsley	TI 8S-R12W Sec. 12
Lane	Morris Creek	TI 8S-R11W Sec. 5
Lane	Munsel Creek	T18S-R12W Sec. 26
Lane	Nancy Creek	T16S-R12W Sec. 10
Lane	Rock Creek	T16S-R12W Sec. 15
Lane	Siltcoos River	T19S-R12W Sec. 34
Lane	Siuslaw N. Fork	RM 10.5 @ TI 8S-R11 W Sec. 4
Lane	Siuslaw River	RM 22.8 @ TI 7S-R1 OW Sec. 34
Lane	South Inlet	T18S-R11W Sec. 31 T19S-R11W Sec.
Lane	Squaw Creek	T16S-R12W Sec. 3
Lane	Sutton Creek	RM 0.4 @ T17S-R12W Sec. 28
Lane	Sweet Creek	TI 8S-R10W Secs. 16 & 21
Lincoln	King Slough	TI I S-R1 I W Sec. 28
Lincoln	Alsea River	RM 11.5 @ T13S-R10W Sec. 34
Lincoln	Beaver Creek	T12S-R11 W Sec. 20
Lincoln	Beaver Creek S.	T12S-R1 1W Sec. 20
Lincoln	Big Creek	T10S-R1 1 W Sec. 32
Lincoln	Boone Slough	T1 1 S-R1 1 W Sec. 25
Lincoln	Buckley Creek	T13S-R12W Sec. 1
Lincoln	Cape Creek	T15S-R12W Sec. 3
Lincoln	Coal Creek	T1 OS-R11 W Sec. 17
Lincoln	Collins Creek	T12S-R12W Sec. 36
Lincoln	D River	TI 7S-R1 I W Sec. 15 (50 yds. W. of Hwy. 101 bridge)
Lincoln	Deer Creek	T12S-R12W Sec. 24
Lincoln	Depot Creek Slough	RM 5.0 @ T11S-R10W Sec. 6
Lincoln	Drift Creek	RM 2.7 @ T13S-R1 1W Sec. 23
Lincoln	Drift Creek	T7S-R11 W Sec.' 6
Lincoln	Eckman Slough	T13S-R11W Sec. 28
Lincoln	Elk Creek	RM 4.5 @ TI I S-R1 OW Sec. 25
Lincoln	Flesher Slough	TI 1S-R11W Sec. 35
Lincoln	Fogarty Creek	T8S-R11 W Sec. 32
Lincoln	Fox Creek	T13S-R12W Sec. 1
Lincoln	Grant Creek	TI 1S-R11W Sec. 30

Lincoln	Henderson Creek	T11S-R11W Sec. 30
Lincoln	Hill Creek	T12S-R12W Sec. 25
Lincoln	Johnson Creek	Ti OS-RI 1W Sec. 5
Lincoln	Lint Slough	T13S-Ri I W Sec. 30
Lincoln	Little Creek	TI OS -RI I W Sec. 32
Lincoln	Little Creek	T13S-R12W Sec. 36
Lincoln	Lost Creek	TI 2S-RI I W Sec. 7
Lincoln	McCaffery Slough	T12S R11 W Sec. 3
Lincoln	McKinney Slough	T13S-R1 I W Sec. 20
Lincoln	Mill Creek	T1S-RIOW Sec. 27
Lincoln	Moolack Creek	TIOS-RI 1W Sec. 17
Lincoln	Moore Creek	TI I S-RI I W Sec. 31
Lincoln	North Cape Creek	T15S-R12W Sec. 3
Lincoln	Nute Slough	TI I S-RI OW Sec... 30
Lincoln	Ollala Slough	TI I S-R1 OW Sec.17 Secs. 8 & 5
Lincoln	Parker Slough	TI I S-R1 I W Sec. 27
Lincoln	Pooles Slough	T12S-Ri I W Sec. 1
Lincoln	Pumphouse Creek	T12S-RI I W Sec. 18
Lincoln	Rowdy Creek	T6S-RI I W Sec. 25
Lincoln	Salmon Creek	Tidegate Three Rocks
Lincoln	Salmon River	T6S-R1OW Sec. 29
Lincoln	Schoolhouse Creek	T8S-R1 I W Sec. 16
Lincoln	Schooner Creek	TI OS-RI 1 W Sec. 19
Lincoln	Sijota Creek	T8S-R1 I W Sec. 10
Lincoln	Siletz River	RM 22.6 @ T9S-Ri OW Sec. 8
Lincoln	Spencer Creek	TI OS-RI I W Sec. 5
Lincoln	Starr Creek	T14S-R12W Sec. 23
Lincoln	Thiel Creek	T12S-RI 1 W Sec. 6
Lincoln	Vingie Creek	T14S-R12W Sec. 14
Lincoln	Wade Creek	TI OS-RI 1 W Sec. 8
Lincoln	Yachats River	RM 1.5 @ T14S-RI2W Sec. 26
Lincoln	Yaquina River	RM 21.8 @ TI I S-RI OW Sec. 1
Multnomah	Columbia Slough	T2N-RI W Sec. 23 to T1N-R3E Sec. 19 (Note that the limit of state ownership in a portion of the channel in TIN-R2E Sec. 23 TIN-R2E Sec. 24 and TIN-R3E Sec. 19 is still uncertain.)
Multnomah	Columbia River	RM 145.5 @ Bonneville Dam T2N-R7E Sec. 21
Tillamook	Alder Creek	T3N-R1OW Sec. 27
Tillamook	Anderson Creek	T3N-RI OW Sec. 14
Tillamook	Anderson Creek	T2S-R9W Sec. 6
Tillamook	Beaver Creek	T2S-RIOW Sec. 12
Tillamook	Clear Lake Creek	TIN-RI OW Sec. 5
Tillamook	Coal Creek	T3N-RIOW Sec. 14
Tillamook	Crescent Lake Creek	T2N-R1 OW Sec. 29

Tillamook	Daley Lake Creek	T5S-RIIW Sec. 13
Tillamook	Dougherty Slough	TI S-R9W Sec. 20
Tillamook	Esther Creek	TIS-RI OW Sec. 26
Tillamook	Fall Creek	TIS-R1 OW Sec. 31
Tillamook	Flower Pot Creek	TI S-R1OW Sec. 8
Tillamook	Foley Creek	T3N-R1 OW Sec. 36
Tillamook	Gallagher Slough	T3N RIOW Sec. 35
Tillamook	Hall Slough	T1S-RIOW Sec. 24
Tillamook	Hathaway Slough	T1S-RIOW Sec. 12
Tillamook	Hoquarten Slough	TIS-R9W Sec. 30
Tillamook	Illingsworth Creek	T1N-RIOW Sec. 23
Tillamook	Jackson Creek	T2S-R10W Sec. 30
Tillamook	Kilchis River	RM 2.0 @ TIS-R9W Sec. 7
Tillamook	Little Nestucca River	RM 3.2 @ T5S-RIOW Sec. 9
Tillamook	McCoys Cove	TI S-RI OW Sec. 9
Tillamook	Messhouse Slough	T2N R10W Sec. 17
Tillamook	Miami River	RM 0.8 @ TIN-R1OW Sec. 14
Tillamook	Neskowin Creek	T5S-RI 1 W Sec. 36
Tillamook	Nestucca River	RM 8.5 @ T4S-RI OW Sec. 14
Tillamook	Nolan Slough	TIS-RIOW Sec. 24
Tillamook	Patterson Creek	TIN-RIOW Sec. 34
Tillamook	Rice Creek	T2S-RIOW Sec. 5
Tillamook	Short Creek	T1S-RIOW Sec. 24
Tillamook	Spring Lake Creek	TIN-RIOW Sec. 6
Tillamook	Squeedunk Slough	TIS-R10W Sec. 13
Tillamook	Sutton Creek	T2S-RIOW Sec. 12
Tillamook	Tillamook River	RM 6.0 @ T2S-R9W Sec. 7
Tillamook	Tomlinson Slough	TIS-RIOW Sec. 26
Tillamook	Trask River	RM 4.3 @ T2S-R9W Sec. 6
Tillamook	Watseco Creek	TIN-RI OW Sec. 7
Tillamook	Wilson River	RM 3.1 @ T1S-R9W Sec. 20
Tillamook	Wiskey Creek	T2S-RIOW Sec. 17
Tillamook	Yagar Creek	12S-RIOW Secs. 8 & 9

NOTE: The head of tide indicated in Table 2 is approximate and is based on inspection or other evidence obtained by Division staff prior to 1989. The location of the head of tide of any particular waterway may have changed since that time of determination.

Some waterways in Clatsop, Columbia and Multnomah Counties which flow into the Columbia River and may in part be affected by tidal influence have not been investigated by Division staff. Therefore, they are not included in Table 2.

Table 3

Meandered Lakes

ORS' 274.430 State Ownership Of Meandered Lakes; Status As Navigable And Public Waters.

(1) All meandered lakes are declared to be navigable and public waters. The waters thereof are declared to be of public character. The title to the submersible and submerged lands of such meandered lakes, which are not included in the valid terms of a grant or conveyance from the State of Oregon, is vested in the State of Oregon.

(2) ORS 274.430 to 274.450 shall not apply to any nonnavigable lakes lying within the boundaries of any duly organized and incorporated drainage district which was in existence on January 1, 1921.

(3) Nothing in this section impairs the title of any upland or riparian owner to or any vested rights in land which was added prior to May 25, 1921, by natural accretion or reliction to the lands of such upland owner.

Note:

- However, see United States v. State of Oregon, 295 U.S. 1 (1935) which found that Malheur Lakes (Malheur, Mud and Harney) are meandered, but not navigable.
- To date, the Division has issued leases on the following lakes:

Devil's Lake
Klamath Lake
Mercer Lake
North Tenmile Lake
Siltcoos Lake
Tenmile Lake
Upper Klamath Lake
Woahink Lake

GLOSSARY

**A Guide to Terminology Encountered
in the Cadastral Map Program**

INTRODUCTION

In preparing this glossary, the fields of surveying, realty, micrographics, geodesy, computer mapping, mathematics, engineering, photogrammetry, drafting, geography, assessment and taxation, and real property law have been culled for terminology significant to cadastral cartography. In the mapping process every term defined in this glossary, will eventually be encountered.

The surveying terminology is essential because the language of cartography is, to a certain extent, the language of surveying. The definitions are basic explanations only; the technical parts, essential to only the surveyor, have been eliminated.

The statutory and common law terms relating to cadastral cartography, deeds, estates, etc. have been defined in the glossary. They are not intended as a substitute for legal counsel, nor have they been included to encourage the dispersal with the advice and consultation that must be provided by an attorney. Their inclusion

is to assist in solving deed and survey ambiguities for mapping purposes. In addition, the definitions will assist in identifying situations where legal counsel is warranted. It is hoped that a real appreciation of the complexity of real property law, not to be confused with a false sense of comprehension, can be obtained by studying the definition of each term.

The user of this glossary must understand that legal terms seldom have exact meanings; it would require many pages of written text to describe the total legal significance of some of the terms included in this glossary. More important, the definition of most terms is not applicable in all situations. Although, in common use the word "contiguous" means "touching," a court of law, given the evidence, might be of the opinion that the intent was to mean "in close proximity."

IMPORTANT NOTE

The ORS included here are for reference only and are not intended to supercede, replace, or serve as a substitute for the official statutes published by the Oregon Legislature.

ABANDONMENT (GENERAL) An action involving relinquishment of right, title or interest in real property, by an owner or servient tenant, for the sole purpose of permanently terminating his or her right, title or interest. The following principles and rules of law will put the doctrine of abandonment, as it is applied in this state, in proper perspective:

1. *Time* is not an essential element of abandonment, although the lapse of time may be evidence of an intent to abandon. Where it is accompanied by acts manifesting such an intention, the courts have allowed it to be considered in determining whether there has been an abandonment. *Black's Law Dictionary*, rev. 4th ed., *supra*, *cit'* *Ullman ex tel Eramo v. Payne*, 127 Conn. 239, 16A.2d 286, 287.
2. "Mere *nonuser* is not necessarily an abandonment" (*Black's, supra, cit: Barnett v. Dickenson*, 93 Md. 258). That principle is reinforced in Oregon by the Supreme Court decisions to the effect: "Neither the lapse of time, nonuser by the public, nor levying and assessment of taxes will constitute an estoppel." *Dabney v. City of Portland*, 124 Or., *cit: City of Clatskanie v. McDonald*, 85 Or. 670, 167 P. 560.
3. Land cannot be abandoned in favor of a specific party.

4. The act of abandonment must be voluntary and intentional "*Abandonment in law depends upon concurrence of intention to abandon and some overt act or failure to act which carries implication that the owner (or servient tenant) neither claims or retains any interest.*" *Black's supra, cit.: Stinnett v. Kinslow*, 238 Ky. 812, 38 S.W.2d 920, 922.
5. Regarding public ways in Oregon, the doctrine of abandonment does not apply in an action to quiet title to a public way. See: "Abandonment, common law."
6. Abandonment, in its usual and ordinary meaning, is not synonymous with the more technical term "vacation." However, a statutory vacation is often referred to as a (formal) abandonment of the vacated way. But applied in its correct use, "vacation" is the statutory extinguishment of the public's easement to use land for the purpose of travel by the public from place to place.
7. Abandonment is not synonymous with "surrender" and differs from the latter term in that "surrender" requires an agreement (*Noble v. Sturrrn*, 210 Mich. 462).

See: *Black's Law Dictionary* rev. 4th ed., St. Paul, Minn., West Publishing Co., regarding: Abandonment, re: easement; ditches; property, railroad property; rights in general, etc.

ABANDONMENT, COMMON LAW The term has no precise meaning, but it is usually used to denote an informal abandonment effected by other than statute, ordinance, resolution or other formal methods. However, in certain cases before the courts, common law abandonment has been the result of formal proceedings that were enacted for purposes other than abandonment. For example, where a city official issued a permit to build a private improvement on a public street, it was found to show an intent to relinquish the public's right to the use of the street. However, the Oregon Supreme Court no longer recognizes that principle of law of the pioneer era. The court now holds to the principle that public ways in this state cannot be extinguished by a common law abandonment. See: *Martin v. Klamath County*, 39 Or. App. 455 (1979).

ABANDONMENT, HIGHWAY Where the public ceases to use a street or highway under circumstances indicating intent to abandon (*Black's supra, cit: Grand Trunk Western R. Co. v. City of Flint*, D.C. Mich., 55 F.2d 384, 386). A vacation made in accordance with the laws of this state could be considered a "highway abandonment." However, the term "vacation" is the more precise term, and should always be used to denote a statutory vacation. Nevertheless, the term "highway abandonment" is applicable when used in reference to an abandonment of a state highway. See: "Vacation" and "Abandonment, state highway" in this glossary.

ABANDONMENT, STATE HIGHWAY An action whereby the Oregon Department of Transportation, when, in its opinion, the interests of the state will be best served, abandons eliminated sections of an old right of way which are no longer needed or valuable for highway right of way purposes or any other public road use. However, such an abandonment does not relinquish title to any land owned by the department in fee. ORS 366.295 provides, however, that abandoned sections not held in fee by the department "shall, except as otherwise provided in this section, revert to and title thereto shall rest in the abutting owner or owners." Where certain eliminated sections of old right of way are needed or are valuable for public road use, then ORS 366.295(2) requires the department to, by appropriate action, "declare the purpose of the department is to preserve the same for public road use." ORS 366.290 makes provision for the department to surrender jurisdiction to such sections of highway to the county (or counties).

ABSTRACT As regards property title, synonymous with "abstract of title."

ABSTRACT OF TITLE A summary of facts relied on as evidence of title. It is the history of a title, which consists of a concise statement of the conveyances and encumbrances, which appears on the public records affecting title.

ABUTTING Touching, being contiguous with.

ABUTTING OWNER The owner of land, which adjoins, or touches, the land of another. When used in reference to public ways, streets, alleys, county roads, etc., it ordinarily denotes one whose land adjoins the public way, street, alley, *county road*, etc.; that is, where the land abuts the side line or right-of-way line. See: *Sweet et al v. Irrigation Canal Co.*, 198 Or. 166.

ABUTTING LAND Land abutting the land, feature, thing, interest, easement, boundary, road, right of way referred to. When used to denote land abutting a public road, highway, street, alley or other public way, it denotes the land that touches the side line or right-of-way line of the public road, highway, street, alley or other public way. In *Cross v. Talbot*, 121 Or. 270, 254 P. 827, the Supreme Court held, "Where land described by metes and bounds actually abuts on the highway, the grantee, in absence of intention of the grantor or otherwise to limit the description, takes to the center of the highway, even when the highway is not mentioned as a boundary." This same principle applies, as well, to land (that the grantor owned at the time of the conveyance) abutting a non-navigable body of water.

ACCEPTANCE By a county or city may be express (necessary to a statutory dedication) or implied (suffices for a common-law dedication). In *Harris v. St. Helens*, 72 Or. 377, 143 P. 941, the Oregon Supreme Court held, "No formal acceptance of a (common-law) dedication is necessary" (see: *Christian v. Eugene*, 49 Or. 170, 89 P. 420; *Oregon City v. Oregon C.R. Co.*, 44 Or. 165, 74 P. 926; *Carter v. City of Portland*, 4 Or. 339). Except in cases where a municipality may not have the charter powers to accept a dedication, an acceptance by a municipality by its duly authorized officers may be express by deed or by some matter of record, or unless prohibited by statute or ordinance, the acceptance may be *implied* from some act or acts showing that the municipality has assumed control and possession of the property dedicated, or the like acts: 13 Cyc. 469.

A common-law dedication requires some form of acceptance to become an irrevocable dedication. However, such acceptance need not be formal, nor does it need to be by a county or a city. In *Carter*, the court said, "A formal acceptance is not

necessary. The acts of inhabitants in the purchase of lots, the improvement of streets, etc., and their use, conclude the owner and the corporation may insist on every right which any of its inhabitants acquired by virtue of the original dedication .." And in *Douglas Co. v. Umpqua Valley Grange, Inc.*, 4S Or. App. 737, 609 P.2d 415, the Oregon Court of Appeals held, "Dedication to the public is impliedly accepted when lots are sold with reference to a plat which shows the dedication (by express or implied dedication)." See also, *Johnson v. Crawlford*, 88 Or. The purchase of a single lot will suffice as acceptance, *McCoy v. Thompson*, 84 Or. 151.

ACCEPTANCE (DEED) The act by which a vendee vests himself or herself with title to *land*. *Black's, cit. Hardin v. Kazee*, 238 Ky. 526, 38 S.W.2d 438. In Oregon, title is not transferred until accepted by the grantee.

ACCEPTANCE (EXPRESS) A clear, definite, explicit, unmistakable acceptance. The term is usually contrasted with "implied acceptance."

ACCEPTANCE (IMPLIED) An acceptance not manifested by explicit, clear, direct wording, but is by implication or necessary deduction from the circumstances, the general language, act or conduct of the parties.

ACCESS In real property law, the right of every landowner to go from and return to his or her land. As explained in *Elliott's Roads & Streets*, "An abutting owner, however, is not necessarily entitled as against the public to access to his land at all points, and it is held that it is sufficient if he has free and convenient access to his land and improvements thereon even though not at all points where it abuts upon the highway."

ACCIDENTAL ERROR In surveying and cartography, any small error accidentally incurred in measuring a distance or angle.

ACCOUNT NUMBER A number assigned to each property by which it is listed and identified on the assessment roll and tax roll. ORS 308.215 requires that property be listed in sequence by account number. Any number permanently assigned to a property can serve this purpose. The Oregon State Standard Tax Lot Number is recommended as the permanent account number. This is the number used by most Oregon counties.

A few counties having electronic data processing systems use a permanent computer-generated number as an "account number." In these counties, the State Standard Tax Lot Number serves as a condensed property description on the assessment roll, tax roll, tax statement, and other docu-

ments. In counties with computer account numbers, records are still filed in tax lot number order. The account number appears only as a notation on the records. The tax lot number can be used in the computer. However, the shorter account number expedites date entry and retrieval.

ACCRETION The gradual and perceptible increase of riparian land by the gradual deposit, by water, of solid material, whether mud, sand, or sediment, so as to cause that to become dry land which was before covered by water. See Chapter 10.

ACCRETIONS become part of the land to which it was added (subject to Oregon law) and follows whatever title covers the main land. To be an accretion, the gradual deposit of material must be by natural causes.

ACCRETION The gradual and perceptible increase of riparian land by water deposition of mud, sand, or sediment. An area formerly covered by water thus becomes dry land.

ACCURACY The degree of conformity of a measure to a standard, or the degree of perfection attained in a measurement of distances and angles. The term pertains to the result of an operation rather than the operation. See Chapter 6.

ACKNOWLEDGMENT An act in which a party executing an instrument of conveyance as a grantor goes before a competent officer (usually a notary public) and acknowledges the instrument to be his genuine and voluntary act or deed.

ACRE A quantity of lands containing 43,560 square feet, or .4047 hectares of land.

ACTION BY TENANT IN COMMON AGAINST CO-TENANTS ORS 105.615. An action may be brought under ORS 105.605 by a tenant in common of real property to establish adverse possession as against all other cotenants if the tenant in common (1) has been in possession of the real property, exclusive of all other cotenants, (2) for an uninterrupted period of 20 years or more, and (3) has paid all taxes assessed against such property while in possession.

ACTUAL NOTICE The knowledge of facts which would naturally lead an honest and prudent person to make an inquiry. The filing of an unrecorded deed with the assessor would be actual notice that the ownership of a parcel of land has changed hands.

ACUTE ANGLE An angle less than 90°.

ACUTE TRIANGLE A triangle in which all angles are less than 90°.

ADJACENT Lying near, close to, in close proximity, neighboring, or bordering. Adjacent can mean, but does not necessarily mean, abutting.

ADJOINING Touching, abutting, contiguous with.

ADJUSTED POSITION An adjusted value for the horizontal or vertical position of a survey station; in which discrepancies due to errors in observed data are removed.

ADMINISTRATION (Probates) Any proceeding relating to the estate of a decedent, whether the decedent died testate, intestate, or partially intestate. ORS 111.005.

ADMINISTRATOR (Probates) A personal representative lawfully appointed to manage and settle the estate of a deceased person.

ADMINISTRATOR DE BONIS NON (Probates) A personal representative appointed by the court to administer an estate left unsettled by the former administrator.

AD VALOREM (LATIN) . According to value.

ADVERSE POSSESSION A right to acquire title by the possession of land. In the 1970 case of *Grimstad v. Dordan*, 256 Or. 135, 471 P.2d 778, the Supreme Court held, to establish ownership of land by adverse possession, it must be shown that possession was actual, open, notorious, hostile, continuous, exclusive, and under claim of right or color of title for a period of ten years (ORS 12.050).” An “element of adverseness or hostility is established for purposes of adverse possession when it is shown that land was occupied under the mistaken belief on part of the occupier that land in question belonged to him (or her). Possession need not be absolutely exclusive to establish title by adverse possession if it is of kind to be expected of an owner under circumstances.” See: *Nevin v. Smith*, 238 Or. 347, 584 P.2d 251. In *Whitley v. Jacobs*, 278 Or. 541, 564 P.2d 1057, the court said, “An adverse possessor has a heavy burden to establish his claim of ownership.” Also, it was held in *Nedry v. Morgan*, 284 Or. 65, 584 P.2d 1381, “Knowledge of an outstanding interest in property does not preclude possessor from exercising claim of right required for adverse possession. For purposes of adverse possession, a ‘claim of right’ meaning their possession is not permissive and that the part in possession has not led the true owner to believe that he (or she) recognizes the owner’s rights.” See: “Prescription.”

ADVERSE USER A use or enjoyment of property, under a claim of right, as the owner would make, asking no permission, and disregarding all other claims. to it, so far as they conflict with this use.

An important element of adverse possession and prescription.

AERIAL MOSAIC See “mosaic”.

AERIAL PHOTOGRAPH A photograph of a part of the earth’s surface; taken by special cameras mounted in aircraft.

AERIAL PHOTO INTERPRETATION See “photo interpretation.”

AERIAL PHOTO OVERLAP The amount, expressed as a percentage, that one aerial photo overlaps the area of the adjoining photograph. There are two basic types of overlap: “end lap” and “side lap.” End lap is the overlapping of aerial photos in the same flight; side lap is the overlapping of aerial photos in adjoining flights.

AERONAUTICAL CHART A map used by pilots, that shows topography, obstructions, and other data essential to navigation.

AEROTRIANGULATION An instrumental process for establishing the coordinate values of photo targets by orientation to ground control targets. Often referred to as phototriangulation.

AFFIDAVIT OF TITLE A sworn statement of the owner of a parcel of real property stating that: (1) he is the owner of the parcel, (2) his possession has not been disturbed, (3) his title is free and clear of encumbrances, and (4) no repairs, alterations, or improvements, which have not been completed for longer than the period of filing a mechanic’s lien prior to the date of the instrument, have been made to the premises.

AFFIRMATIVE EASEMENT An easement that gives an owner access to landlocked property, by court of order.

AGONIC LINE The line drawn through points having zero declination.

AGREEMENT A mutual contract or consideration wherein the parties must have an intention common to both, without doubt or difference. An instrument that is evidence of an agreement.

AGREEMENT OF SALE A contract to sell, or a contract obligating one party to sell and obligating the other party to purchase. An agreement of sale does not transfer property.

ALIENATION The voluntary and complete transfer of real property from one person to another.

ALLODIAL Means, “Free; not holden of any lord or superior,, owned without obligation or vassalage or fealty; the opposite of feudal.” Department of

Justice opinion (150-303-4-00913; 83-261, “allodium” deeds).

The most recent reference to the term, by the courts, was in a 1965 Maryland case where owners of corner lots contended that a zoning ordinance, requiring them to remove sight obstructions at their own expense, constituted an unconstitutional “taking” of property without just compensation. The court held that the ordinance could validly limit the height of barriers, but could not require removal of existing barriers at the owner’s expense. The court said that although property in the United States is held by “allodial tenure” (meaning land owned absolutely, and not subject to any rent, service or other tenurial right of an overlord), it is uniformly recognized throughout this country that the ownership of property is subject to the rights of government to tax the property, to regulate reasonably its use and enjoyment under the police power of the states, and to take the same, upon payment of value thereof, when needed for a public use. *See: Stephens v. City of Salisbury*, 340 Md. 556, 214 A.2d 775, 778, 1965.

ALLODIUM DEED Synonymous with “allodium freehold title deed at common law.”

ALLODIUM Freehold title deed at common law. An instrument of no legal significance; a nullity that should be ignored by the assessor; Department of Justice (150-303-4-00913; 83-261; “allodium deeds”).

These “allodium deeds” are being filed or recorded with the apparent purpose of placing the land beyond the reach of the tax collector and government regulations. The document is based on the principal that since land is “allodial” in nature, or is held by “allodial tenure,” it is not holden or any lord or superior (or government). But the declaration that the land is the owners “allodium” adds nothing to an owner’s rights, and does not exempt it from taxation. *See: “Land patent” and opinion 150-303-04-00913; 83-261.*

ALLUVION (1) The wash and flow of water against a shore, (2) inundation, flood, (3) an accession to land by the gradual addition of alluvium. The term is often referred to as accretion. See Chapter 10.

ALLUVIUM Soil, sand, gravel, etc., deposited by running water. See Chapter 10.

ALTITUDE (Geography) The reference points or objects above the earth’s surface. It does not mean elevation, but it, can mean elevation above datum.

ALTITUDE (Geometry) The distance between the base and uppermost side, or point of, a parallelogram, trapezoid, rectangle, square, rhombus, and trape-

zium. The altitude is always measured perpendicular to the base.

AMBIT A boundary line.

ANALYTICAL BRIDGING The assembly, evaluation, mathematical analysis, selection and rejection of all horizontal surveys. The purpose is to build a continuous network of survey quadrilaterals to bridge as many cadastral map elements as possible. See Chapter 12.

ANCIENT DEED A deed thirty years old or older, that comes from proper custody and being held non-suspicious in nature.

ANGULAR ERROR OF CLOSURE See “closing the horizon.” See Chapter 6.

ANNEX To attach, unite, or subjoin.

ANNUAL VARIATION The annual changes in magnetic declination.

APPARENT SHORELINE A line drawn on a map or chart in lieu of the mean high water line (MHWL) or the mean water level (MWL) in areas where either may be obscured on aerial photos by marsh, overgrowth, or marine vegetation.

APERTURE CARD (Micrographics). A card with one or more rectangular holes for mounting or inserting microfilm.

APEX The uppermost point; vertex.

APPORTION To distribute proportionally. See Chapter 9.

APPROXIMATE An estimate meaning very nearly, but not absolutely. The term denotes uncertainty of measurement. Approximate is considered closer than “more or less” but not as close as “about.”

APPURTENANCE Incidental to the land; a building, water rights, easement, etc.

ARC A portion of a curved line.

ARC SECANT The inverse function to a secant (sec). See Chapter 9.

ARC SINE The inverse function to the sine (sin). See Chapter 9.

ARC TANGENT The inverse function to the tangent (tan). See Chapter 9.

ACRE A metric unit of square measures; 100 square meters; 119.60 square yards. Abbreviated “a.”

AREA The surface of land included within a set of lines or boundaries; the number of unit squares equal in measure to the surface of land.

ARITHMETIC MEAN A value that is computed by dividing the sum of a set of terms by the number of terms.

ARM An inlet of water.

ARPENT A unit of land area equals to 0.85 acres.

ARTERIAL A through street or highway.

ASPECT RATIO (Micrographics) The ratio of width to height of an image, document, or other material.

ASSESSMENT CADASTRE The inventory of real property, cadastral maps, map records, appraisal records, ownership lists, assessment roll, statements of value, etc.; used for the purpose of justly apportioning ad valorem taxes on such property. See discussion in Chapter 1.

ASSETS Real, personal and intangible property. See OPUS 111.005.

ASSIGNEE The person to whom an assignment has been made.

ASSIGNMENT The transfer of the interest one has in real estate.

ASSIGNOR The party making the assignment.

ASSIGNS The party to whom property should have been transferred.

ASTORIA SEA WALL CHARTER ACT (of 1891) "An act to be entitled an Act to Authorize the City of Astoria to Erect a Sea Wall and to Grade the Streets, and Construct Sewers in Connection Therewith, and to Issue Sea Wall Bonds." (1891 Special Laws, p. 594, from 21-81-1891, HB 67). Repealed by the 1893 Legislature.

AUTOPOSITIVE FILM A transparent reproduction mylar-based film, that gives a positive print from a positive original or a negative print from a negative original.

AUTOTAPE An electronic distance-measuring instrument applied in precision hydrographic surveying. The range of the autotape is line-of-sight.

AVERAGE Equaling "arithmetic mean."

AVULSION A sudden and perceptible action of water resulting in the separation of land from the land of one owner and the deposit of it onto the land of another owner, i.e., a stream leaving its old bed and creating a new bed. The title to the lands is seldom destroyed by avulsion. See Chapter 10.

AZIMUTH The horizontal angle measured clockwise between North or South and the line to an observed or described point. Azimuths may be true, magnetic, or assumed, depending on meridian. See Chapter 4.

AZIMUTH CIRCLE A circle passing through the zenith and cutting the horizon perpendicularly. See Chapter 4.

BACK AZIMUTH The azimuth of line B to C, in Figure 44, is the forward azimuth. The azimuth of the same line from C to B is the back azimuth. The forward and back azimuths of a line always differ by 180°. See Chapter 4 and Figure 4-4.

BACKLANDS An indefinite description of lands lying back from a body of water or highway.

BACKSHORE That part of a beach which is usually dry, being reached only by the highest tides, and by extension, a narrow strip of relatively flat coast bordering the sea.

BACKSIGHT A sight on a previously established traverse or triangulation station, which is not the closing sight of the traverse. In leveling, backsight relates to a reading taken on a point of known elevation.

BAD TITLE A title that is so defective as to not convey property. It is not marketable title.

BALANCING A SURVEY Correcting the error of closure of a traverse and obtaining an adjusted position for each traverse station

BANK Edge of a cut or fill; the margin of a watercourse.

BARGAIN A contract or agreement between two parties; one to sell lands and the other to purchase them.

BARGAIN AND SALE DEED An instrument that conveys "...the entire interest in the described property at the date of the deed, which the deed purports to convey." ORS 93.860. The bargain and sale deed reads almost the same as a warranty deed, but does not usually contain warranties against encumbrances, or of any kind. See Chapter 13.

BARGAINEE The grantee of an estate in a bargain and sale deed.

BARGAINOR Party making the bargain.

BASE LINE A surveyed line established with more than usual care, used as the known length of a triangle (in triangulation) for computing other triangle sides.

BASE LINE, OREGON A line running east and west, through Oregon, on a true parallel of latitude based on an independent initial point (the point being at lat. 45° 31' 11" and long. 122° 44' 34", the initial point of the Willamette Meridian). The base line serves as the north-south origin for rectangular surveys in Oregon. See Chapter 5.

BASE LINE (TRIANGULATION) One side of a series of connected triangles, the length of which is measured with prescribed accuracy and precision, and from which the lengths of the other triangle sides are obtained by computation. Important factors in the accuracy and precision of base measurements are the use of standardized invar tapes, controlled conditions of support and tension, and corrections for temperatures, inclination, and alignment. Base lines in triangulation are classified according to the character of the work they are intended to control, and the instruments and methods used in their measurement are such that prescribed probable errors for each class are not exceeded. These probable errors, expressed in terms of the lengths, are as follows: first order, 1 part in 1,000,000; second order, 1 part in 500,000; and third order, 1 part in 250,000.

BASE NET A small net of triangles and quadrilaterals used to expand from a base line to a line of the main scheme of a triangulation net.

BASIC CONTROL In cadastral cartography, the horizontal control of the base control map. The basic control is the position of points which has been accurately coordinated and correlated by a method called analytical bridging, forming a network of lines to which other surveys and deeds are adjusted. See Chapter 12.

BASIC CONTROL MAP A graphic-geometric network of primary survey quadrilaterals that serve as a base for: secondary surveys, the lines and points to be plotted from instruments of conveyance, and the natural and cultural features to be supplied by aerial photography. Generally, synonymous with basic map control, control map base or control. See Chapter 12.

BASIC LAND UNIT (*Oregon Standard Cadastral Map System*). The parcel, or land parcel.

BATHIMETRY Science of measuring water depths to determine the topography of the bed.

BEACH BERM The nearly horizontal part of a beach or backshore formed by the deposit of material by wave action. Some beaches have no berms, others have one or several.

BEACH EROSION Carrying away of beach materials by wave action, tidal or littoral currents, or wind.

BEACH ZONE LINE The line of vegetation that borders Oregon's beaches. The official beach zone line, or vegetation line, is established and described by ORS 390.770.

BEAM COMPASS A drafting tool used for constructing simple curves with long radii. The beam com-

pass can usually be extended by the insertion of extra linkage.

BEARING The direction of a line within a quadrant, with respect to meridian.

BEARING TREES A tree, which is used as a reference to the position of a corner.

BED OF A BODY OF WATER (1981) The land that is covered by water in its ordinary low stage. Oregon Statutes use the phrase "submerged lands" to describe the land lying below the low-water mark, whether in tidal or nontidal waters. See ORS 274.705(7) and ORS 274.005(5).

BED OF A BODY OF WATER (GENERAL) The land that is covered by water in its ordinary high water or mean high water stage.

BENCH MARKS A point whose elevation above or below some definite or assumed datum is known. A benchmark can be natural or artificial; and, it can be either permanent or temporary.

BENCHMARKS, TIDAL Benchmark set to reference a tide staff at a tidal station, the elevation of which is determined with relation to the local tidal station.

BENEFICIARY (Trust Deeds) ORS 86.705(1): "Beneficiary means the person named or otherwise designated in a trust deed as the person for whose benefit a trust deed is given, or his successor in interest, and who shall not be the trustee unless the beneficiary is qualified to be a trustee under paragraph (d) of subsection (1) of ORS 86.790."

BEQUEATH To give or leave, by will, personal property to another. Often used synonymously with devise; however, devise is the term used to will realty.

BERM The nearly horizontal portion of a beach or backshore having an abrupt fall and formed by wave deposition of material and marking the limit of ordinary high tides.

BERM CREST (or Berm Edge) The seaward limit of a berm.

BETTER DESCRIBED Clearly delineated.

BETWEEN A space which separates.

BLANKET ENCUMBRANCE, ORS 91.500. (HB2968, 1979 Laws Relating to Condominiums) A trust deed or mortgage or any other lien or encumbrance, mechanic's lien or otherwise, securing or evidencing the payment of money and affecting more than one unit in a condominium, or an agreement affecting more than one such unit by which the developer holds such condominium under an option, contract to sell or trust agreement.

BLOCK A square or portion of a city, town, town-site or subdivision that is usually surrounded by streets. However, one or more sides of a block may abut an alley, railroad, highway, rim of a cliff, a subdivision line, another parcel of land, body of water, another block, or subdivision, etc.

BODY OF AN INSTRUMENT The operative part; as distinguished from recitals, title, etc.

BORDER See "boundary."

BORROW PITS A source for materials used for land-fills or embanking.

BOTTOM LAND The land formed by alluvial deposits along a river or valley.

BOUNDARY "Every separation, natural or artificial, which marks the confines or line of division of two contiguous estates:" *Black's*. A bounding or separating line that fixes a limit or extent of an estate, city, county, taxing district, etc.

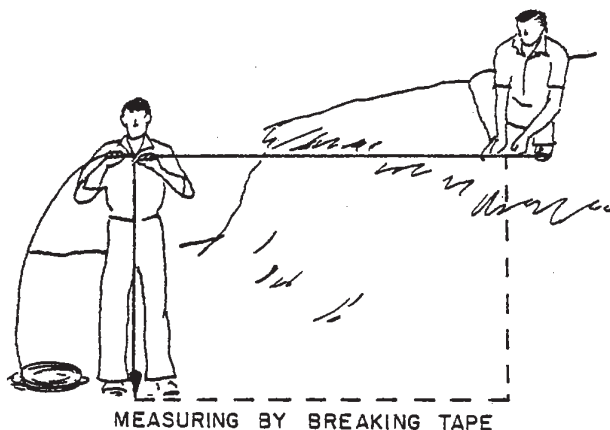
BOUNDARY MONUMENT A material object placed on or near a boundary line to preserve and identify the location of the boundary line on the ground.

BOUNDARY, NATURAL "Any formation or product of nature which may serve to define and fix one or more of the lines enclosing an estate or piece of property." *Peuker v. Cantor*, 62 Kan. 363, 63 P. 617; *Black's*.

BOUNDARY SURVEY A survey made to establish or re-establish a boundary line on the ground, or to obtain data for constructing a map or plat showing a boundary line.

BOUNDS The boundaries of parcels of land. See "metes and bounds."

BREAKING TAPE A method of determining distances between points on uneven or sloping ground. To accurately determine the distance, short, horizontal measurements are taken at intervals, up or down the slope or uneven ground.



BUTTALS The bounding lines of land at the end. See "metes and bounds."

BUTTED AND BOUNDED Sometimes used in a deed to introduce the traverse of real property boundaries.

BUTTS AND BOUNDS Means the same as "metes and bounds."

CADASTER English spelling of the French cadastre. See "cadastre." The French spelling is preferred. See Chapter 1.

CADASTRAL Relating to a cadaster, cadastre, or survey. See Chapter 1.

CADASTRAL CARTOGRAPHY The science and art of making cadastral maps. See Chapter 1.

CADASTRAL MAP The base of the assessment cadastre. A map that shows the size, shape and extent of each land, parcel in a prescribed geographical area. See Chapter 1.

CADASTRAL SURVEYS The establishment of land boundaries and subdivisions by the running and marking of the lines that are required by the plan of the cadastral surveys of the United States. In general, it is any survey executed to measure the boundaries of land parcels.

CADASTRE See the following definitions. Synonymous with "cadaster."

CADASTRE, ASSESSMENT The inventory of real property, cadastral maps, map records, appraisal records, ownership lists, assessment roll, statements of value, etc.; used for the purpose of justly apportioning ad valorem taxes on such property. See discussion in Chapter 1.

CADASTRE (HISTORICAL) A detailed register, inventory, statement of public record, of lands, their extent, ownership, locations and value; executed by governments as a base of property tax systems. See Chapter 1.

CADASTRE (JURISPRUDENCE) An official statement of the quantity and value of real property in any district, made for the purpose of justly apportioning the taxes on such property. *Strothers v. Lucas*, 12 Pet. 410, 428 note 9 L. Ed. 1137. See Chapter 1.

CADASTRE, LEGAL The land title recording system; i.e. recorded deeds, mortgages, contracts, indexes, etc. See Chapter 1.

CADASTRE (MODERN) A comprehensive, modern land data system, composed of interrelated subsystems such as the assessment cadastre, legal cadastre, survey cadastre, demographic cadastre, etc. See Chapter 1.

CADASTRE, SURVEY The record of cadastral surveys (that is, of land boundary, or parcel boundary surveys).

CAMS The acronym for Computer Assisted Mapping System.

CARDINAL POINTS The four main points of the compass: north, south, east and west.

CARTOGRAPHER One who practices the science and art of cartography. A person who makes maps as a profession.

CARTOGRAPHY The science and art of making maps.

CARTOMETER A device consisting of a small wheel and a calibrated dial used to measure distances on a map by following the desired route.

CENTER The middle, or central point or portion of anything. Does not always mean the geographic or mathematical center.

CENTROID A variable, tied to a coordinate system, that represents the approximate center of a polygon.

CERTIFICATE OF FORECLOSURE A certificate stating that a particular mortgage has been foreclosed upon, the date of the foreclosure, and the number of the journal and page in which the deed is entered. ORS 97.720.

CERTIFICATE OF PROOF Oregon law requires that "every officer who takes the proof of any conveyance shall endorse a certificate thereof, signed by himself, on the conveyance. In the certificate he shall set forth those matters required by ORS 93.440 to 93.460 to be done, known or proved together with the names of witnesses examined before the officer, and their places of residence and the substance of the evidence given by them." ORS 93.470.

CHAIN A unit of measure 66 feet in length.

The chain unit was the invention of Edmund Gunter, a 17th century English astronomer. The "Gunter chain" was used because the ordinary foot chain was not suited to the acre unit of area measurement. The following shows the simple relationship which the Gunter chain bears to the mile and acre.

1 Gunter's chain = 4 rods = 66' = 100 links

1 mile = 80 chains

1 acre = 10 sq. chains

The term "chain" was derived from a chainlike measuring device that was divided into 100 links. Each link was made up of an assembly of short pieces of heavy iron (later steel) wire, which were bent at the ends to form rings. Three rings were

placed in between the pieces; each assembly made up one 7.92-inch link. In the early 1900s, steel ribbon tapes replaced chain devices; however, the tapes were still referred to as chains. Later, the "engineer chain" was developed. It is 100 feet long and divided into 100 links, each link being 1 foot long. When reference is made to the "chain" it must be considered to be 66 feet long unless "engineer chain" is specifically mentioned.

CHAIN-OF-TITLE In general, a chain-of-title is the successive conveyances commencing with the patent from the United States or from some other source and including the last instrument of conveyance to the one claiming title. In the context of this definition an unrecorded deed would be in the chain-of-title, except in, the case where a subsequent bona fide purchaser (from the same grantor of the unrecorded deed) records first: In most legal cases, chain-of-title includes only recorded deeds (however, recording itself does not mean the deed is in the chain). The fact that a deed is not recorded (therefore, not in the recorded chain-of-title) does not mean that title has not passed to the grantee of the deed. In absence of a subsequent purchaser (who has recorded), the grantee of an unrecorded deed has nearly as good a title as one who has recorded. Chain-of-title is a matter for title companies, attorneys and the courts; not the assessor.

CHANNEL The bed in which the main stream of the river flows. The channel can be, but is not always, the thread of a river (see "thread of a stream"). The terms "thread" and "channel" should not be used synonymously. The "main channel" is the bed of a body of water over which the principle volume of water flows the deepest and most navigable channel. See Chapter 10.

CHIP (MICROGRAPHICS) A piece of microfilms containing one or more microimages and coded identification. Chips are used in automatic retrieval systems and are usually 35mm wide and not more than 3 inches long.

CHOPPER (MICROGRAPHICS) The mechanical or photochemical process of separating prints in a roll of film.

CHORD A straight line drawn or extended from one end of an arc of a circle to the other end of the arc.

CIRCLE POSITION A prescribed setting (or reading) of the horizontal circle of a direction theodolite, to be used for the observation on the initial station of a series of stations that are to be observed.

CIRCULAR CURVE A simple curve having an arc of one radius.

CIRCUMFERENCE The perimeter of a circle. The external boundary or surface of a figure or object.

CLAIM OF OWNERSHIP Regarding adverse possession, a claim of land as one's own, irrespective of any semblance of color of title, right or title. Often used synonymously with "claim of right," "claim of title," or "right and title." A claim of ownership, or claim of right necessary for adverse possession depends upon intent of part in possession to hold property exclusively and can exist even though party is aware of outstanding interest in third party.

CLARKE SPHEROID The dimensions and shape of the earth's sphere (called a geoid) as determined in 1866 by an English geodesist, A. R. Clarke. See ORS 93.330, Clarke spheroid a requirement.

Equatorial radius = 3,963.3 Stat. mi.

Equal area rad. = 3,958.7 Stat. mi.

Polar semiaxes = 3,949.7 stat. mi.

Equatorial circumf. = 24,902 mi.

Surface area = 197,260,000 sq. mi.

CLEAR TITLE Title that is free from defects, doubts and litigious uncertainties; a title that would qualify as "marketable title."

CLERICAL ERROR An error on the assessment roll arising from an error in records of the assessor or which is a failure to correctly reflect the assessor's records, and which had the assessor discovered it prior to May 1 of the year of assessment would have been corrected as a matter of course. And where the information necessary to make the correction is contained in such records at the time the roll for the year is returned to the assessor from the Board of Equalization. Includes, but are not limited to arithmetic and copying errors, and omission or misstatement of a land, improvement or other property value on the roll. See ORS 311.205.

CLOCKWISE ANGLE A horizontal angle measured from left to right. See Chapter 4.

CLOSED TRAVERSE A traverse that starts and ends at the same point, or at points whose relative horizontal positions are known. A traverse that forms a continuous loop enclosing an area is known as a "loop traverse" (also being a closed traverse). Another kind of closed traverse is a "connecting traverse" that starts and ends at separate points whose relative positions have been determined by a survey of equal or higher-order accuracy. See Chapter 6.

CLOSING ERROR See "error of closure." See Chapter 6.

CLOSING THE HORIZON Measuring the last of a series of horizontal angles at a station; a surveying process required to make the series complete around the horizon. The sum of the horizontal angles between adjacent lines should equal 360° at any station. The amount by which the sum of the measured angles fails to equal 360° is the angular error of closure. This error is usually distributed as a correction among the measured angles to make their sum equal 360°. See Chapter 6.

CLOUD ON TITLE An apparent defect in a deed, mortgage, or other instrument; or, an outstanding claim or encumbrance which, if valid, would affect or impair the title of the owner of a particular estate; i.e., an incorrect description of the property lines, or a tax delinquency.

COASTAL AREA Land and sea area bordering the shoreline.

COASTAL BOUNDARY Boundary within the coastal zone, excluding one established by treaty or by the U.S. Congress A general term for a boundary defined as the line (or measured, from the line or points thereon) used to depict the intersection of the ocean surface and the land at an elevation of a particular datum.

COASTAL ZONE As defined in the Coastal Management Act of 1972 (amended) " the coastal waters (including the land therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes transitional and intertidal areas, salt marshes, wetlands and beaches. The zone extends seaward to the outer limits of the United States territorial sea, and inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters; excluding lands the use of which is by law subject solely to the discretion of, or which is held in trust by the Federal Government."

COASTLINE The configuration made by the meeting of the land and sea.

CODE The code number or code area. Also known as the levy code or tax-rate code.

CODE AREA A specific area of land within which there is a unique combination of taxing districts yielding a given composite tax rate. Each code area is assigned a code number.

CODE LINE A line that represents the boundary or boundaries of a taxing district or taxing districts. The code number, not the code line, identifies the combination of taxing districts.

CODE MAPS Maps that show all code areas, code lines, and code numbers in a county, or a part of a county. Code maps" should not be confused with "taxing district maps"; the code maps show the combination of taxing districts; the taxing district maps show and identify each taxing district.

CODE NUMBERS Numbers assigned each code area in the county to identify the various taxing districts that make up each code area.

COLOR OF TITLE That which in appearance is title, but which in reality is not title. Color of title implies that a valid deed has not passed. To be effective as color of title, a deed must describe the land with a degree of certainty essential to ascertain the land boundaries.

COLOR SEPARATION Process of preparing a separate drawing, engraving, or negative for each color required in the printing production of a (color) map.

COMMERCIAL PROPERTY (ORS 105.850) As used in ORS 105.850 to 105.870 (Action for Reduced Commercial Property Value Resulting From Street Use Restriction): "Commercial property means land and improvements used in a business operated thereon for the production of income, one of the principal aspects of which is the storing of motor vehicles or the providing of lodging to traveler using private conveyances." 1973 Or. Laws ch. 702 sec 1.

COMMON AREA See "general common elements."

COMMON ELEMENTS (UNIT OWNERSHIP) The general and limited common elements of a unit ownership as described by ORS 91.500(6), (12) and (14).

COMMON LAW As distinguished from statutory law created by legislative action, common law is that body of law based on custom and precedent, unwritten in statute or code. It is the body of law and juristic theory developed and formulated in England. It was adopted and further developed in the United States, adopted by the 1844 Legislative Committee of the Provisional Government of the Oregon Territory, and by the State of Oregon as provided in Article XVIII, Section 7 of the Oregon Constitution. In *Western Union Tel. Co. v. Call Pub. Co.*, 21 S. Ct. 561, 181 U.S. 92, 45 L. Ed 765, the court explained, "As distinguished from law created by the enactment of legislatures, the common law comprises the body of those principles and rules of action, relating to the government and security of persons and property, which derive their authority solely from usages and customs of immemorial antiquity, or from the judgements and decrees of the courts recognizing, affirming, and

enforcing such usages and customs, and, in this sense, particularly the ancient unwritten law of England. In 1842, Congress provided that the civil and criminal jurisdiction of the supreme courts and district courts of the Territory of Iowa would apply to the entire western United States. Oregon's common law is as it existed under English statutes antedating the American Revolution.

Common law rules can be classified as:

1. Rules of law.
2. Rules of construction.
3. Rules of intent

Rules of law rely upon "*express language*. ' They generally apply definite legal significance, sometimes contrary to the intent of the parties.

Rules of construction are used to give legal significance to ambiguous phraseology (commonly found in deeds).

Rules of intent operate only after all admissible collateral evidence has been considered, and the intent cannot be determined.

COMMON-LAW ABANDONMENT (public ways) A method of abandonment other than by statutory law. Some act or ordinance by a public agency could result in a cessation of use by the public for public travel, taking on all the characteristics of a common-law abandonment. However, such an abandonment cannot act to deprive the public of its easement over the way. In *Martin v. Klamath County*, 39 Or. App. 455, 592 P.2d 1037, the Court of Appeals noted that the fact that the legislature provides a method whereby a county (or a city) may abandon a road (street or alley) is positive inhibition. Against other methods of termination (such as common-law abandonment).

COMMON-LAW DEDICATION As distinguished from a statutory dedication, a dedication arising by operation of law from the acts of the owner. A common-law dedication, often termed an implied dedication, "may exist by an express grant and need not be evidenced by any writing, nor indeed by any form of words oral or written. It is not founded on a grant nor does it necessarily presuppose one, but is founded upon the doctrine of equitable estoppel. It is in the nature of an *estoppel in pais*, and is irrevocable. It may be established by evidence of conduct and in many ways. If the donor's acts are such as to indicate an intention to appropriate the land to the public use, then upon acceptance by the public the dedication becomes complete": *Portland Ry., L. & P. Co. v. Oregon City*, 85 Or. 574, 166 P. 932, cit' *Elliott on Roads and Streets*, 3d ed. 137.

It has been held in Oregon that the sale of a single lot, with reference to a plat showing streets and alleys open to the public (or implying the same), constitutes acceptance of the streets and alleys by the public. A common-law dedication has all the force and effect of a statutory dedication, except that neither a county nor a city is required to maintain, in repair, or improve a street, alley, or other public road established by a common-law dedication (unless, by formal, informal, express or implied acceptance has been made by a county or city). Synonymous with "implied dedication" and "parol dedication."

COMMON LAW OF OREGON The laws in force in the Oregon Territory were those laws prescribed by the 1844 Legislative Committee of the Provisional Government, *Le.* "the common law of England and the principles of equity not modified by the statutes of the Iowa Territory, or this government shall be the law of the land." In *Peery v. Fletcher*, 93 Or. 43, the Oregon Supreme Court concluded that the rules and principles of the common Law of England (as they existed prior to the American Revolution) are to be in full force (in Oregon); that is, so far as they are applicable and are of a general nature, and are not in conflict with the Constitution or special enactments of the legislature. The Territorial Laws became laws of this state via Art. XVIII, Sec. 7 of the Oregon Constitution, *i.e.* "All laws in force in the Territory of Oregon when this Constitution takes effect, and consistent therewith, shall continuos in force until altered, or repealed."

The established common law of Oregon today is that body of customary law, founded on English Common Law and the principles of equity not modified by the statutes of the Iowa Territory, or this government; based on judicial decision embodied in the reports of cases decided in the Oregon Supreme Court and Court of Appeals; made by applying custom, reason and established legal principles to general disputes; and made in consideration of the *lex situz*. Like statutory law, the common law can be altered by the legislature, but any alteration it subject to the strictest legal interpretation because: where a *common law principle exists, it very likely has the consequence of a property right protected by the United States Constitution and the Oregon Constitution.*

COMMON OWNERSHIP Shared among several; owned jointly by several.

COMMON SCHOOL GRAZING LANDS See ORS 273.805.

COMPASS An instrument used to determine direction by means of a magnetic needle, or needles that turn freely on a pivot and point to magnetic north.

COMPASS CARD An annular disk attached to the frame of a compass. The compass card is usually graduated in degrees; however, some compass cards are graduated in points, one quarter points, cardinal points and intercardinal points. See "points," "points, intercardinal," and "points, cardinal."

COMPASS DIRECTION Direction as indicated by a compass without any allowances for instrumental error.

COMPASS, DRAFTING A drafting tool used for constructing circles or arcs. See Chapter 11.

COMPASS, GYRO A complex instrument used for indicating true north with regard to magnetic conditions.

COMPASS ROSE A diagram, shown on some maps and charts, that consists of two or three concentric circles that graphically illustrate true and magnetic directions. The outer circle of a compass rose has its zero, true north; the inner circles, or circles, are oriented too magnetic north. The innermost circle on a three-circle rose (used mostly on nautical charts) is usually graduated into points. Each point equals 11.75 degrees. The outer circles are usually graduated by the sexagesimal system.

COMPILATION The preparation of a new or revised cadastral map, or portion thereof, from existing maps, aerial photographs, field surveys and other records.

COMPOUND CIRCULAR. CURVE A curve of changing radii made up of a series of adjoining curves, each with a different radius. The curves are usually tangent at the point where they join. See Chapter 8.

COMPUTER OUTPUT MICROFILMING (MICROGRAPHICS) The conversion of data from a computer into readable language on microfilm.

CONDEMNATION The legal proceedings to take property for public (never private) use, with just compensation being first made or secured in such manner as prescribed by law. A process by which the property of a private owner is taken, under right of eminent domain, for public use, without the owner's consent, but upon the award and payment of just compensation. Condemnation must be done under the restrictions of Amendments V and XIV of the U.S. Constitution, and Art. 1, Sec. 18, and Art H, Sec. 4 of the Oregon Constitution.

CONDITIONAL FEE A fee simple interest in property, limited or restrained by a condition, that upon a specific occurrence, may be terminated.

CONDITIONING (MICROGRAPHICS) The process of restoring microfilm after being stored. The process includes rehumidifying and cleaning. Conditioning also includes retaining microfilm a certain length of time at a specific temperature and humidity, before testing.

CONDOMINIUM A system of separate ownerships of individual units in a multi-unit building, or in a garden, or subdivision style development. In a typical condominium, the buyer purchases his or her own unit that may be attached to other units, may be in an apartment-style building, or may stand alone (like a house). However, the buyer is a joint owner in common with all other owners of the general common elements (such as the land, sidewalks, roadways, etc.), and may be a joint owner, with certain other owners, of limited common elements (such as a moorage slip). Some subdivisions have many of the characteristics of a condominium, such as common areas, but are not condominiums. Ad valorem tax laws and cadastral map standards for condominium, should not be applied to any development that is not expressly identified on the plat as a "condominium," "condominiums" or "a condominium" (as required by ORS 94.029(5)).

CONDOMINIUM ORS 91.599 (HB 2968, 1979) includes property, any part of which is residential in nature, submitted to the provisions of ORS 91.500 to 91.990. The term does not include any property, which is wholly commercial, industrial or commercial and industrial in nature, submitted to the provisions of ORS 91.500 to 91.671 and 91.990. As used in ORS 91.602 to 91.671 and 91.990, "condominium" also includes property located outside this state, any part which is residential in nature, which has been committed to the condominium form of ownership in accordance with the laws of the jurisdiction within which the property is located. See the new definition of "unit" or "condominium unit".

CONDOMINIUM, STATUTORY ORS 94.324 defines condominium as: "(I) As used in ORS 94.078(2), 94.084, 94.091, 94.221, 94.331 to 94.412, 94.424 to 94.480 and 94.991: (a) 'Condominium' includes property, any part of which is residential in nature, submitted to the provisions of ORS 94.004 to 94.480. (b) 'Condominium' does not include any property, which is wholly commercial, industrial or commercial and industrial in nature, submitted to the provisions of ORS 94.004 to 94.480 and 94.991. (c) 'Condominium' does not include any property operated

as a hotel as defined in ORS 699.005, the units of which are offered for sale as securities pursuant to ORS chapter 59 and are otherwise regulated by the provisions of ORS 94.004 to 94.480 and 94.991. (2) As used in ORS 94.331 to 94.412, 94.424 to 94.480 and 94.991, except as limited by paragraph (c) of subsection (1) of this section, 'condominium' also includes property located outside this state, any part of which is residential in nature, which has been committed to the condominium form of ownership in accordance with the laws of the jurisdiction within which the property is located." (Formerly ORS 91.599; 1985 ch. 760 sec 1.) There are subdivisions that have the characteristics of a condominium, but are not condominium, legal or otherwise. Some are what is known as a "planned unit community," provided for by ORS 94.550 to 94.783. To be a legal condominium in this State, the word "condominium" or "condominiums" or words "a condominium" must be part of the condominium name on the plat, the declaration, deeds, and anywhere else the condominium name appears (see ORS 94.029). The short title for ORS 94.004 to 94.480 and 94.991 is cited as the Oregon Condominium Act (by ORS 94.011).

CONFORMAL PROJECTION A map projection of which the shape of any small area of the earth is truly rendered. See Chapter 7.

CONIC PATTERN OF DEFORMATION A graphic illustration of the conic plane, effective zones, and zones of deformation.

CONIC PLANE The surface of a cone in a conic map projection. See Chapter 7.

CONIC PROJECTION A map projection developed by transforming a zone of the spherical surface of the earth to a conic plane. In the projection, a cone aligned with the earth axis is developed over a northern or southern part of the earth's sphere. The plane of, the cone is a secant plane cutting the earth's sphere at the standard parallels of the conic projection. See Chapter 7.

CONNECTING TRAVERSE A closed traverse that starts and ends at different stations, whose relative positions have been determined by other surveys; i.e., state highway traverses. See Chapter 6.

CONSIDERATION The inducement to a contract. Consideration includes the amount of cash paid for the conveyance of property, the amount of any lien, mortgage, contract, indebtedness, or other encumbrances existing against the property to which the property remains subject, or which the purchaser agrees to pay or assume. Considerations can also be other property given or promised, or may include services. See ORS 93.030. Note: In 1967, a

special session of the Oregon Legislature amended chapter 462 of the Oregon Revised Statutes to require that: "All instruments conveying or contracting to convey fee title to any estate shall state on the face of such instruments the true and actual consideration paid for such a transfer, stated in terms of dollars. If the actual consideration consists of or includes other property or other value given or promised, neither the monetary value nor a description of such other property or value need be stated so long as it is noted on the face of the instrument that other property or value was either part or the whole consideration." The statement, made by either the grantor or grantee, shall be on the face of the instrument before it can be recorded. Failure to make the statement does not invalidate the conveyance.

CONSOLIDATION (1) The merger of two or more contiguous parcels into a single parcel, (2) the merger of two or more taxing districts into a single taxing district, (3) an annexation.

CONSTRUCTION "The process, or the art of determining the sense, real meaning, or proper explanation of obscure or ambiguous terms or provisions in a statute, written instrument, or the application of such subject to the case in question, by reasoning in the light derived from extraneous connected circumstances or laws or writings bearing upon the same or a connected manner_or by seeking and applying the probable aim and purpose of the provision." *Black's Law Dictionary, rev. 4th ed.*, p. 386. There are statutory rules of construction in Oregon. For private writings, they are provided in ORS 42.210 to 42.300 (Interpretation of Writings), e.g. ORS 42.230 (Office of Judge in Construing Instruments). There are also common-law rules of construction as provided in *Minto v. Salem Water Etc. Co.*, 250 P. 722, 120 Or. 202: "It is the duty of the Court to declare the meaning of what is written in the instrument, not of what was intended to be written." The rules of construction are never to be applied when the wording is clear, unmistakable and unambiguous. As cited in *Minto*, and stated in 22 C-I. 1177: "Where the language used is clear and unambiguous, extrinsic evidence is not admissible on the ground of aiding the construction, for in such case the only thing which could be accomplished would be to show the meaning of the writing to be other than what its terms express." See: "Rules of Interpretation."

CONSTRUCTIVE NOTICE Where there exists actual notice of matter, to which equity has added constructive notice of facts, which an inquiry after such matter would have elicited; and, where there

has been a designed abstinence from inquiry for the very purpose of escaping notice.

CONTIGUOUS Touching or abutting. The courts have held that lands meeting at a common corner, no parts or sides being common do constitute contiguous bodies of land.

CONTOUR INTERVAL A difference in elevation at which contour lines are drawn; i.e., the contour interval for 1:24000 scale U.S.G.S. maps is 10 feet.

CONTOUR LINES Lines on a map that represent imaginary lines on the ground, all points of which are at the same elevation above or below a specified datum (generally, the datum is sea level).

CONTRACT An agreement, upon sufficient consideration, to do or not to do a particular thing, an obligation in, which there must be competent parties, subject matter, legal consideration, mutuality of agreement, mutuality of obligation, and the agreement must be ascertainable.

CONTRACT FOREST ROAD Under the "Forest Road Act," it is a forest road improved or maintained pursuant to a contract made under ORS 376.305 to 376.390. (ORS 376.310(2) as in effect Sept. 27, 1987.)

CONTRACT OF SALE An agreement to convey title. Property is not transferred with a contract of sale; it is not a deed.

CONTRAST (Photogrammetry) The rating of aerial photos corresponding to the relative-density-difference which it exhibits.

CONTROL See "basic control," "horizontal control," "vertical control," and "control survey." See also Chapter .12.

CONTROLLING SURVEY Same as "control, survey.

CONTROL MAP A map whereby the relative positions of points and lines have been carefully determined and plotted from reliable survey data. The lines on the control map control other smaller surveys, and they control property boundaries plotted from deeds.

CONTROL, NATIONAL (Survey Nets) Two control survey nets being extended over the United States by the National Geodetic Survey for the control of nautical charts and topographic maps; comprising:

1. The horizontal-control survey net consisting of areas of first and second-order traverse, a few of which have been run by the U.S. Geological Survey, the Corps of Engineers, and other organizations. The derived data in this survey are being coordinated and correlated on the North American Datum of 1927

2. The vertical-control survey net consisting of lines of first and second-order spirit leveling which determine the elevations of thousands of bench marks above a common datum, mean sea level. This net also includes lines run by the U.S. Geological Survey, the Corps of Engineers, and other organizations.

CONTROL STATION A point on the ground whose position (horizontal or vertical) is used as a base for a dependent survey.

CONTROL SURVEY A "Primary Survey." One that provides positions of points to which secondary surveys and deeds are plotted.

CONVERGENT PHOTOGRAPHY Aerial photography using an assembly of two cameras that take simultaneous photographs and are mounted so as to maintain a fixed angle between their optical axis. The effect is to increase the angular coverage in one direction, usually along the longitudinal axis of the aircraft.

CONVERSION CONDOMINIUM (1981) ORS 91.500 (HB 2968, 1979 laws). Property submitted to the provisions of ORS 91.500 to 91.671 and 91.990 on which there is a building, improvement or structure, which was occupied prior to any negotiation.

CONVERSION CONDOMINIUM A term used in the Oregon Condominium Act that means "... property submitted to the provision of ORS 94.004 to 94.480 and 94.991 on which there is a building, improvement or structure that was occupied prior to any negotiation and that is (a) residential in nature, at least in part, and (b) not wholly commercial or industrial, or commercial and industrial in nature."

CONVEY To transfer or deliver to another, to pass from one person to another. Is, in effect, equivalent to the word "grant."

CONVEYANCE OF LAND IN THE ADVERSE SESSION OF ANOTHER ORS 93.130. "No grant or conveyance of lands or interest therein is void for the reason that at the time of its execution the lands were in the actual possession of another claiming adversely."

CONVEYANCES, HOW MADE Conveyances of lands, or of any estate or interest therein, as provided in Oregon law, "may be made by deed, signed by the person of lawful age from whom the estate or interest is intended to pass, or by the lawful agent or attorney of the person, and acknowledged or proved, and recorded without any other act or ceremony. No seal of the grantor, corporate or otherwise, shall be required on the deed." (ORS 93.010). Note: The word "may," as used here, expresses the ability, competency, liberty, permission, possibility, probability or contingency, but does not mean

"shall" or "must." As explained in *Goodenough v. Warren*, 5 Sawy. 494, 498, F. Cas. 5, 534, "'The provision that a deed may be 'acknowledged or proved and recorded' was not intended to make either acknowledgement, proof or recording any part of the execution of an instrument."

CONVEYANCE (GENERAL) The term embraces every instrument in writing by which the title to any real estate may be effected.

CONVEYANCE (DEEDS) A deed which passes or conveys land from the grantor to the grantee. See ORS 93.010 (conveyances, how made).

COORDINATE (VERB) To place survey data on the same system of coordinates or datum. Two surveys over the same area are coordinated when they are computed on the same datum; i.e., grid north. See Chapter 12.

COORDINATES A pair of values which define a particular point in relation to a given reference frame. There are several types of coordinates: plane coordinates, local coordinates, polar coordinates, spherical coordinates, space coordinates, geodetic coordinates, state plane coordinates, and rectangular coordinates. The plane and state plane coordinates are "rectangular coordinates." See Chapter 7.

COORDINATES, ORIGIN OF The point in a system of coordinates which serves as the zero point in computing its elements or in prescribing its use.

COORDINATOGRAPH An instrument used in cartography and photogrammetry to plot in terms of plane coordinates, e.g. the computer-assisted mapping system (CAMS) is one kind of coordinatograph.

COORDINATE SYSTEM, PLANE A system of straight lines meeting at right angles to each other, the horizontal line designated as the "X" axis and the vertical line designated as the "Y" axis. See Chapter 7.

COORDINATE SYSTEM, STATE PLANE In Oregon, a plane coordinate system called "'The Oregon Coordinate System." See Chapter 7.

CORNER The intersection of two or more converging property or survey lines, whether internal or external. In surveying the terms "corner" and "monument" are used largely in the same sense; however, corner usually denotes a point determined by the survey, whereas "monument" is the physical structure erected to mark the corner on the earth's surface.

CORPOREAL A term descriptive of things of a material nature; as opposed to "incorporeal," things that

cannot be, touched. A barn would be corporeal; a water right would be incorporeal.

CORRELATE To remove discrepancies that might exist among survey data, so that all parts are interrelated without apparent error. The terms “coordinate” and “correlate” are usually applied to harmonizing surveys of adjacent areas or of different surveys over the same area. Two or more surveys are correlated when they are mutually adjusted.

COSECANT The trigonometric function that for an acute angle in a right triangle is the ratio between the hypotenuse and the side opposite the angle. Abbreviated cosec. See Chapter 9.

COSNE The trigonometric function that for an acute angle in a right triangle is the ratio between the side adjacent to the angle and the hypotenuse. Abbreviated cos. See Chapter 9.

COTANGENT The trigonometric function that for an acute angle in a right triangle is the ratio between the side adjacent to the angle and the side opposite. Abbreviated cot. See Chapter 9.

COUNTERCLOCKWISE ANGLE A horizontal angle measured in a counterclockwise direction. See Chapter 4.

COUNTY BOARD The County courts or board of county commissioners of a county.

COUNTY COURT The board of county commissioners. At one time county courts existed in all 36 counties. Only nine Oregon counties, all east of the Cascades, now have a formal; recognized “county court.” The term “board of county commissioners” is used in the other counties.

COUNTY ROAD (1981) A road lying wholly within a specific county, and which is distinguished from a city street, state highway, private road, B.L. M. road, public usage road, or forest service road. “In order for a road to become a county road, it must meet certain requirements as to width (ORS 368.415), and be presented to the county court by deed or plat. It must then be expressly accepted by the county court as a county road before county funds may be expended in its improvement or repair.” (Department of Justice opinion 150-25-048974; 7433)

COUNTY ROAD “A public road under jurisdiction of a county that has been designated as a county road under ORS 368.016.” (ORS 368.0(M definition.) Department of Justice opinion 30 Op. Atty. Gen. (60-62) at p. 311 cautions: “‘County road’ is a word of art and should not be indiscriminately used as a term of general description of roads or public ways situated within a county.” And in *Whitney*

v. Crittenden et al, 112 Or. 278, “A road may become an irrevocably dedicated public highway, by acceptance of a plat thereof by the county court, or by a common law dedication and acceptance, but in order to establish the road as a county road the court is required to accept it expressly as such by appropriate resolution entered in its journal.” Public roads under jurisdiction of a county, e.g. as in a dedicated street of a plat lying outside the limits of a city, not accepted expressly as county roads are legally designated “local access roads,” defined in ORS 368.001(3).

COURSE The direction of a line with reference to meridian.

COURSE OF RIVER An imaginary line, in a river, that runs parallel to the banks of the river. Does not mean direction of flow of a river.

COVENANT A formal agreement between two or more persons to do, permit the doing of, or not to do a particular act, usually by deed, in writing, or by a subdivision plat. All covenants are either real or personal. Those closely connected with realty are construed as real; all others are personal. ORS 93.140 provides, “No covenant shall be implied in any conveyance of real estate, whether it contains special covenants or not, except as provided by ORS 93.850 to 93.870 (amended by Or. Laws 1973 ch. 194 sec 6).” However, this section does not defeat such covenants as implied by a plat. In *Mutual Irr. Co. vs. Baker City*, 58 Or. 306, 110 P. 392, 113 P. 9, the court held, “A Conveyance of lots with reference to a plat, implies a covenant that the streets designated shall never be appropriated by the owner to an inconsistent use (ORS annotation).”

COVENANT OF GENERAL WARRANTY A covenant for “quiet possession.” It is a covenant that runs with the land.

COVENANT OF QUIET ENJOYMENT A covenant that there will be no disturbance in, or cessation of possession, by the, prosecution and operation of legal measures. It is one of the covenants for title in a conveyance. Used synonymously with covenant of warranty or covenant of general warranty.

COVENANT OF SEISIN A covenant of indemnity, which does not run with land. It is an assurance that the grantor has every estate, conveyed in quantity and quality that he purports to convey.

COVENANT OF SEISIN Synonymous with “covenant of seisin.”

CUL DE SAC French for “bottom of the sack” *Black’s*. A street that is open at one end only, and usually has a circular turn around at the closed end (but the circular turnaround is not a required). A through

street that is blockaded, unlawfully or otherwise, is a Cul de sac.

CULTURE The features of terrain constructed by man, i.e. dam, roads, etc.

CURSOR Part of a digitizer. It is the device used for manually activating and signaling the electronic digitizer to record the xy positions of points on a map or graph.

CURVE A line of which no part is straight. There are four basic types of curves in cadastral cartography: (1) circular curves (or simple curves); (2) compound circular curves; (3) spiral curves; and (4) compound spiral curves.

CUSTOMARY RIGHTS *Black's Law Dictionary* (rev. 4th ed.) defines customary rights as: "A usage or practice of the people, which by common adoption and acquiescence, and by long and varying habit, has become compulsory, and has acquired the force of law with respect to the place or subject matter to which it relates."

DANIEL BALL, THE A term used in reference to a legal dispute that led to a famous judicial opinion which established a criteria for the "test of navigability." (The Daniel Ball, 77 U.S. 557, 19 L.Ed. 999 (1870)).

DATA Facts from which conclusions are drawn; i.e., surveys, deeds, ordinances, probates, aerial photos, etc.

DATA BASE (CAMS) A set of data files organized in such a manner that retrieval and updating can be done on a selective basis and in an efficient manner.

DATA TABLET (CAMS) A flat tablet which will output the digital position of a cursor placed at any position on its surface.

DATUM A reference element, such as a line or plane to which the positions of other elements are determined, i.e., mean sea level is the datum for U.S.G.S. quadrangle map elevations

DATUM, MEAN SEA LEVEL See mean sea level datum.

DATUM, NATIONAL GEODETIC VERTICAL (NGVD) Fixed reference adopted as a standard geodetic datum for heights. The datum was derived for land surveys from a general adjustment of the first-order level nets of both the United States and Canada. In the adjustment 21 tide stations in the U.S. and 5 in Canada were held as fixed. The geodetic data now in use in the United States is the National Geodetic Vertical Datum of 1929. The year indicates the time of the last general adjustment. For this reason, the National Geodetic Vertical Datum should not be confused with mean sea level.

DATUM, NATIONAL GEODETIC VERTICAL OF 1929 (NGVD-1929; FORMERLY MEAN SEA LEVEL DATUM OF 1929) Datum to which all elevations in the National Geodetic Vertical Network are referred, as well as terrain elevations on maps of the National Topographic Map Series.

DATUM, NORTH AMERICAN OF 1927 See North American Datum of 1927.

DATUM PLANE A misnomer for a collection of datum used in mapping, charting and geodesy. This term should not be used.

DATUM, VERTICAL See vertical Datum.

DECCA An electronic distances measuring instrument used for medium-range navigation and surveying. The Decca range is approximately 300 miles.

DECLARANT (Oregon Condominium Act) "A person who files a declaration under ORS 94.023." ORS 94.004.

DECLARATION, CONDOMINIUM The instrument described in ORS 94.023 by which the property is submitted to the provisions of ORS 94.004 to 94.480 and 94.991. The law, spoiled out in ORS 94.029, requires the declaration to contain (in general): a description of the land; the name by which the condominium is to be known; a description of each unit and building (including the number of stories and basements of each); the number of units and principal materials of which they are constructed; the designation, location, boundaries and area of each unit; a description of the common elements; an allocation to each unit of an undivided interest in the common elements (in accordance with ORS 94.243) and the method used to establish the allocation; a description of the limited common elements, if any, stating to which units their use is reserved and the allocation of use of any limited common element, appertaining to more than one unit; the method of determining liability for common expenses and right to common profits (in accordance with ORS 94.260); voting rights allocated to each unit (as per ORS 94.255) or in the case of condominium units committed as property in a time-share plan (ORS 94.803), the voting rights allocated in the timeshare instrument; statements of building uses; name of persons to receive service of process; percentage of voting rights; statement as to whether or not the association pursuant to ORS 94.146(5) has authority to grant easements, rights of way, licenses and other similar interests affecting the general common elements of the condominium; restrictions, details and plans on annexations of additional property, etc. ORS 94.029(5) specifically requires the declaration

include the word “condominium” or “condominiums” or the words “a condominium.”

DECLINATION The angle between the magnetic meridian (magnetic north) and the true or geographic meridian. Sometimes referred to as magnetic declination. The declination, which is constantly changing, is designated as so many degrees east or west. Declination values may be found in the U.S. Coast and Geodetic isogonic charts.

DEDICATION A transfer of property by the owner to the public. Dedication must be intentional on the part of the owner or grantor, the intent must be to surrender the property to the public, and the public must accept the grant. See ORS 92.090 3a (Subdivisions). “An appropriation of land to a public use, made by the owner, and accepted for such use by or on behalf of the public. A dedication may be ‘express,’ as when the intention to dedicate is expressly manifested by a deed (or subdivision plat) or an explicit oral or written declaration of the owner, or some other explicit manifestation of his purpose to devote the land to public use. The dedication may be ‘implied’ by some act or course of conduct on the part of the owner from which a reasonable inference of his (or her) intent may be drawn or which is inconsistent with any other theory than he (or she) intended a dedication.” *Harris v. St. Helena*, 72 Or. 386. Dedications are of two kinds: statutory and common law; *Nodine v. Union*, 42 Or. 613, 616; *Elliott on Roads and Streets*, 3d ed. Both kinds of dedication have the same force to establish an irrevocable easement in the public.

DEDICATION, COMMON-LAW The appropriation of land, by the owner, for a public use; implied by some act or course of conduct, or in some cases by oral or written declaration by the owner that shows intent to commit the property to a public use. Common-law dedications, sometimes referred to as “parol dedications,” arise by operation of law from the acts of the owners, and may exist by express grant and need not be evidenced by any writing, nor by any form of words oral or written. “If the donor’s acts are such as to indicate an intention to appropriate the land to the public use, then upon acceptance by the public (such as the purchase of one lot with reference to a plan or plat indicating the streets, alleys, parks, squares or commons are public) the dedication becomes complete.” *Portland Ry. L. & P. Co. v. Oregon City*, 85 Or. 583. Common-law dedications are in the nature of “estoppel in pais” (defined in this glossary). The Oregon Supreme Court has held, “Where the owner of land lays out and establishes a town and makes and exhibits a map or plan thereof, and sells and conveys lots by reference to such a plan

or map, the streets and public places designated on that document are irrevocably dedicated to the public.” *Menstell et al v. Johnson et al*, 125 Or. 161, 162; *Steel v. City of Portland*, 23 Or. 176, 31 P. 479, *Bakke v. JohAson*, 102 Or. 501; *Nicholas v. Title & Trust Co.*, 79 Or. 226, 240; *Christian v. Eugene*, 49 Or. 170, 172, and all other Oregon Supreme Court and Court of Appeals cases dealing with this issue. “Recording” and “formal acceptance” are not requirements of a common-law dedication. An unsuccessful attempt to dedicate land under statutory law, if followed by sales made with reference to a plat, may result in a completed common-law dedication. *McCoy v. Thompson*, 84 Or. 148. A common-law dedication “is not a grant; it is a right created in favor of the public.” *Carter v. Portland*, 4 Or.

DEDICATION, STATUTORY A statutory dedication is the appropriation of land, by the owner, for a public use, made when the owner complies fully with the provisions of the Oregon Revised Statutes enacting that certain formalities, when observed, operate as a dedication of lands to the public. In *Menstell et al v. Johnson et al*, 125 Or., it was held that, “A valid statutory’ dedication cannot be created unless every provision of the laws are adhered to.” A statutory dedication is distinguished from a common-law dedication in that the former is the conveyance of an easement, while the latter operates by way of estoppel. However, neither form of dedication is a grant of the fee simple absolute in the land occupied by the public easement. An unsuccessful attempt to dedicate land under statutory law, if followed by sales made with reference to a plat, may result in a completed common-law dedication. *McCoy v. Thompson*, 84 Or. 148.

DEED An instrument in writing whereby an interest in realty is transferred from the grantor to the grantee. Deeds are used to declare uses, trusts, and to record limitations to estates transferred. “Deed” is ordinarily applied as synonymous with “act.” However, in a legal sense, the deed is a solemn document. The difference between a deed and a will is that a deed passes a present interest, and a will passes no interest until after the death of the testator. Title does not pass by the writing and signing of a deed alone. The deed must contain words of conveyance (grant, release, quitclaim or transfer), there must be delivery of the deed, and there must be acceptance of the deed. ORS 93.410 requires, “Deeds executed within this state, of lands or any interest in lands therein shall be signed by the grantors and may be acknowledged before any judge of the Supreme Court, circuit court, county judge, justice of the peace or notary public within the state. No seal of the grantor, corporate or otherwise, shall be required

on the deed.” Oregon law also provides, in ORS 93.480, “Every conveyance acknowledged, proved or certified in the manner prescribed by law by any of the authorized officers may be read in evidence without further proof thereof and is entitled (not required) to be recorded in the county where the land is situated.” Emphasis and clarification supplied.

DEED IN FEE A deed conveying the title to land in fee simple with the usual covenants. *Black’s Law Dictionary*, rev. 4th ed.503.

DEED OF... (MISCELLANEOUS,) Refer to *Black’s Law Dictionary* for information on “deed indented, or indenture,” “deed of covenant,” “deed of separation,” “deed of settlement.”

DEED OF GIFT A deed executed and delivered without consideration. Often, a bargain and sale deed is used.

DEED OF RELEASE “A deed that releases the property from the encumbrance of a mortgage or similar pledge upon payment or performance of the conditions ...” *Black’s*.

DEED OF TRUST A security device in use in Oregon as an alternative to a mortgage. It is an instrument involving three, rather than two, parties. Boyer, in his *Survey of the Law of Real Property* (3d ed., West Publishing Co.), says, “Deeds of trust usually contain a power of sale vested in the trustee authorizing him (or her) to sell the property if the grantor-mortgagor defaults on his obligation.”

DE FACTO In fact.

DEFAULT A failure to do that, which was supposed to have been done (and agreed to in writing).

DEFEASIBLE TITLE A title that becomes void but is not yet void.

DEFINITION (Photogrammetry) An optical term used to express the ability of an aerial camera lens to record fine detail.

DEFLECTION ANGLE A horizontal angle measured from the prolongation of the proceeding line, clockwise or counterclockwise if necessary, to the line that follows. See Chapter 4.

DEGREE (Sexagesimal) A unit of measure equal to 1/360th of the circumference of a circle. Surveying and cartography equipment and tools marked off in degrees are: surveyor’s transit, compass, theodolite, protractor, and drafting machine. A degree is also a position on the earth’s surface as measured by latitude or longitude. See Chapter 4.

DEGREE OF CURVE In highway and railroad engineering, the curvature of the right-of-ways is

designated by the “degree of curve.” In most railroad right-of-ways a chord of 100 feet subtends the angle at the center of the curve. In highway engineering, the degree of curve is determined by the amount of angle formed by the radius lines at the central angle by a distance of 100 feet along the arc of the curve.

DELETE To erase or eliminate.

DELIVERY (DEEDS AND OTHER INSTRUMENTS OF CONVEYANCE) The physical transfer of an instrument of conveyance from the seller to the buyer. In this, and in most states, title to real property does not transfer until there has been actual delivery and acceptance of the deed, to the buyer or grantee. The delivery may be in escrow, or it may be delivered directly to the buyer or grantee, and it must be in a manner that it cannot be recalled by the seller (or grantor). There must have been a conveyance of a present interest of land to constitute “delivery of a deed.”

DELIVERY OF A DEED The act, however evidenced by which the deed takes effect and title thereby passes. There must have been a conveyance of a present interest of land to constitute “delivery” of deed.

DEPARTURE A change in longitude. In a plane survey, the amount that one end of a line is east or west of the other end. The plane coordinates of a point are known as the easting of the two ends of the line, which may be either plus or minus. Symbolized by Δ .

DEPENDENT SURVEY A survey designed to accomplish restoration of the original conditions according to the records of the original U.S. public land survey. The dependent survey is based on existing corners of the original survey, and other recognized and acceptable points of control (such as bearing trees). Missing corners are restored by proportional measurement. Title, area, and description should remain absolutely unchanged in the typical dependent survey; however, the areas of unpatented lands may be corrected by the survey.

DERELICTION Land left dry by the shrinking back of water, imperceptibly, from one shore and encroaching on another. It is the opposite of alluvion. Land can be gained by dereliction.

DERIVATIVE TITLES All titles that are not the original title. Nearly all titles possessed by private owners are derivative titles.

DESCENDANTS All those who have issued from an individual; i.e., children, grandchildren, and their children to the remotest degree.

DESCENDANTS IN TITLE In correct use it would apply only to descendants of an individual. However, this term is often used in reference to anyone holding a derivative title in a specific parcel of land, or certain parcels of land (as descendants in title to abutting land of a dedicator, including grantees as well as descendants).

DESCENT Hereditary succession to an estate in realty. Usually applies to the devolution of real estate.

DESCRIBE To explain the boundaries of a parcel of land, estate, taxing district, subdivision, county, state, etc.

DESCRIBE To define, trace or traverse the outline of a parcel of land, estate, taxing district, subdivision, route of a public way, boundaries of a public way, city, county, state, and the like, orally or in writing and in either technical or general terms.

DESCRIPTION sufficiently definite and certain if possible for surveyor to ascertain, aided by extrinsic evidence, what property was intended to be conveyed *O'Hara v. Brace*, 258 Or. 416.

DESCRIPTION, DEED That part of a deed usually following the words of conveyance that defines the property to be conveyed. Primarily, a description of real property is in one or more of the three methods: by lot and block number (of a subdivision), by metes and bounds, or by government survey (in Oregon, the Rectangular Survey).

DESCRIPTION OF LAND, "assessment of property for taxation." Oregon law provides in ORS 308.240: "(1) Real property may be by giving the subdivision according to the United States survey when coincident with the boundaries thereof or by lots, blocks and addition names, or by giving the boundaries thereof by metes and bounds, or by reference to the book and page of any public record of the county where the description may be found, or by designation of tax lot number referring to a record kept by the assessor of descriptions of real property of the county, which record shall constitute a public record, or in such other manner as to cause the description to be capable of being made certain. Initial letters abbreviations, figures, fractions and exponents, to designate the township, range, section or part of a section, or the number of any lot or block or part thereof, or any distance, course, bearing or direction, may be employed in any such description of real property (3) Any description of real property which conforms substantially to the requirements of this section shall be sufficient description and designation in all proceedings of assessment for taxation, levy and collection of taxes, foreclosure and sale for delinquent taxes or assessments, and

in any other proceeding related to or connected with the taxation of such property." (2) Use of Oregon coordinate system (1981) ORS 93.360 "No coordinates based on the Oregon Coordinate System purporting to define the position of a point on a land boundary, shall be presented to be recorded in any public land records or deed records unless: (1) those coordinates were established with the standards and specifications adopted by the Federal Geodetic Control Committee for third-order geodetic surveying and are based upon horizontal control stations established in conformity with ORS 93.330(2); and (2) that point is within one mile of a horizontal control station established in conformity with ORS 93.330(2). However, an authorized state agency, city or county may modify the one-mile limitation to meet local conditions."

DETAIL Information shown on a map or survey, by lines, symbols, lettering, and patterns which, when considered together, furnishes the comprehensive representation of physical, technical, legal and cultural features.

DETERMINE To bring to a conclusion.

DEVELOPER (OREGON CONDOMINIUM ACT) "A declarant or any person who purchases an interest in a condominium from declarant, successor declarant (the transferee of any special declarant right) or subsequent developer for the primary purpose of resale." ORS 94.004(11).

DEVIATION OF A COMPASS Deflection of the compass needle caused by local magnetic attraction.

DEVISE (Probates) When used as a noun, means 'property disposed of by a will,' and includes "legacy" and "bequest." When used as a verb, means to dispose of a property by will, and includes bequeath."

DEVISEE (Probates) A person taking real property under a will. Devisee includes "legatee" and "beneficiary."

DEVISOR (Probates) A giver of realty by will.

DEVOLUTION The transfer of an estate, title, or a right, from one person to another.

DIAMETER The length of a straight line, through the center of a circle or sphere, that extends from one side of, the circle or sphere to the other side.

DIAPOSITIVE Photographic positive transparency on glass or film often used in photogrammetry.

DIGITAL MODEL A mathematical representation of a process, concept, or set of conditions.

DIGITIZER An electronic device for converting maps or any graphic format into digital form for com-

puter input. The digitizer converts the lines of the map in X and Y coordinates.

DIGITIZING The process of recording the XY values of points and lines on a map or graph with respect to the mathematical datum. Digitized values are entered on a computer tape via a magnetic disc. Anything that can be drawn, typed or marked on paper can be digitized. Digitizing of lines is accomplished by manually moving a handheld cursor to each point and line of a map. An alphanumeric keyboard is used to enter commands about the type of line or point (dash line, solid line, dotted line, circled point, etc.). The keyboard is also used to enter nongraphic information (map titles, bearings, dimensions, names, etc.).

DIGITIZING TABLET A large, flat-surfaced device with an imbedded electronic grid. Used in conjunction with a hand-held cursor, coordinate locations of features can be determined from maps or other two-dimensional graphic documents.

DIKE Bank of earth or stone used to form a barrier, frequently and confusingly interchanged with levee. A dike restrains water within an area that normally is flooded.

DIMENSIONAL STABILITY The ability of drafting media to withstand changes in humidity and temperature without expanding or shrinking. Mylar film, for example, has high dimensional stability.

DIRECT ACCESS Interactive graphic systems (i.e., CAMS) employ direct or random access in which the access time is not related to the location of the data in the computer memory; i.e., data does not have to be serially or sequentially searched.

DIRECTION The angle between a line and a meridian, between a line or plane and a chosen line or plane. Expressed as bearings, angles, azimuths, deflection angles, delta angles, etc. See Chapter 4.

DIRECTION THEODOLITE A specially designed non-repeating theodolite for precise surveying of the highest order of accuracy such as triangulation. Bearings, rather than angles, are read on the theodolite circle. The direction theodolite has no lower motion.

DIRECT MEASUREMENT The measurement of a line or angle by a surveying instrument or drafting instrument, such as transit measurement, tape or chain measurements, engineering scale measurements, etc. The term is used in contradistinction to "indirect measurement," which is the measurement of lines and angles by geometric and trigonometric computations.

DIRECT READING The reading of the horizontal or vertical circle of a theodolite or engineer transit with instrument direct. In field notes, a direct reading is usually indicated by the letter "D" preceding the observed value.

DIRECTION The angle between a line and a meridian, or between a line or plane and a chosen line or plane. Expressed as bearings, angles, azimuths, deflection angles, delta angles, etc.

DIRECTION THEODOLITE A specially designed non-repeating theodolite for precise surveying of the highest order of accuracy such as triangulation. Bearings, rather than angles, are read on the theodolite circle. The direction theodolite has no lower motion.

DISCLAIMER OF AN ESTATE The act of refusal by a party to accept an estate which has been conveyed to him.

DISCREPANCY (1) The difference between duplicate or comparable measures of a quantity, (2) the difference between computed values of a quantity obtained by different processes in the same survey.

DISPLACEMENT The horizontal shift of the plotted positions of a topographic feature from its true position, caused by required adherence to prescribed line weights and symbol sizes. In photogrammetry any shift in the position of an image on a photograph; that is, shift due to tilt of the photograph, scale changes in the photograph, and relief of the objects photographed.

DISTANCE The degree or amount of separation between two points, lines, surfaces, or objects measured along the shortest path adjoining them (or along a specified route or boundary measured linearly).

DISTRIBUTE (Probates) ORS 111.005 "Distributee means a person entitled to any property of a decedent under his will or intestate succession."

DISTRIBUTION (Probates) The division and apportionment, as directed by the court of the estate of an intestate, among those legally entitled to share in the estate.

DIURNAL VARIATION The daily variations 'in magnetic declination.

DIVIDE (1) To separate or segregate into two or more parcels, areas, or districts, (2) a dividing ridge between drainage basins, (3) a point or line of division, and (4) to subject to mathematical division.

DIVIDER A drafting instrument used for dividing lines into spaces; and for transferring distances.

DIVISION (1) A portion of a territorial unit marked off for administrative, judicial, or other purposes, and (2) the separation or segregation of one parcel into two or more parcels.

DOCUMENT RETRIEVAL SYSTEM (Micrographics) A system whereby a complete copy of a document is provided.

DOMAIN Complete and absolute ownership of land; land so owned; and territory over which domain is exercised.

DOMICILE (Probates) The place of abode of a person, where he intends to remain and to which, if absent, he intends to return. (See ORS 111.005.)

DOMINANT ESTATE An estate to which an easement is attached. The estate subject to an easement is called a servient estate.

DOMINANT TENANT The owner of an easement.

DOMINANT TENEMENT Land enjoying an easement.

DONATION LAND CLAIM The name of lands acquired under the Oregon Donation Land Law of 1850. Abbreviated D.L.C.

HISTORY OF D.L.C.s

The 1850 law granted half a section, or 320 acres, to every settler over 18 who was a citizen or declared his intention to become a citizen before December 1, 1851; and who occupied and cultivated his land before that date. If married before that date, his wife was also granted 320 acres.

Between December 1, 1851 and December 1, 1853, settlers had to be white males 21 years of age to receive 160 acres. Wives also received 160 acres.

The February 1853 amendment extended the expiration date of the act to 1855; permitted settlers to patent their land claims after two years of occupancy for \$1.25 an acre; and allowed widows title even though occupancy requirements had not been met.

An 1854 amendment granted orphans of settlers, who took lands under the land claim laws, 160 acres. There were approximately 2,567,285 acres granted through 7,329 patents.

DONATION LAW (OREGON) An 1850 act that granted half a section, or 320 acres, to a single man and 640 acres to a man and wife who were settlers in the Oregon Territory. The boundaries of these donation land Claim, (DLC's) were suppose to follow section subdivision lines whenever possible. Similar donations had been made to settlers in Florida in 1848 and 1849. Most of the DLC's were taken up in what is now the State of Oregon; fewer

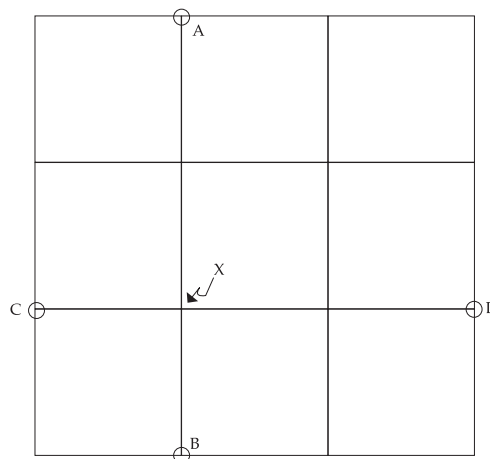
were taken in Washington. After the state boundary between Oregon and California were officially surveyed, one claim was found to be partly in California, but was honored anyway.

DOUBLE-ASSESS Assessing one parcel of land twice for the same purpose and in the same assessment year. Often the result of a mapping error.

DOUBLE MERIDIAN DISTANCE A distance equals to twice the meridian distance. Used in computing the area of a closed traverse by the double meridian distance method. Abbreviated D.M.D.

DOUBLE PROPORTIONATE MEASUREMENT A new measurement made between four known comers, two each of intersecting meridional and latitudinal lines, for the purpose of relating the intersection to both. The method of double proportionate measurement is generally applicable to the restoration of lost corners of four townships and of lost interior corners of four sections.

For example, the plan of double proportionate measurement is shown in figures A and B. In figure A, the comer of Point X is lost. Points A, B, C and D represent known comers.



Point E is located for departure by proportionate east and west measurement. Point XI in figure B, will be located at the intersection of the lines, east or west through point E, and north or south through point F.

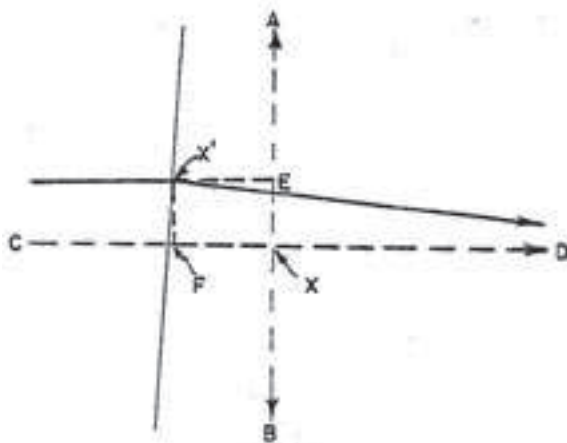


FIG. B
DOUBLE PROPORTIONATE MEASUREMENT

DOWER AND CURTESY A common law concept, dower is the right of a wife in the lands of her husband, and curtesy is the right of a husband in the land of his wife. Dower and curtesy was abolished in Oregon as per ORS 112.685 except for "any right to or estate or dower or curtesy of the surviving spouse of any person who died before July 1, 1970, shall continue and be governed by the law in effect immediately before that date." See ORS 112.695 for the statute of limitations for recovery of dower and curtesy.

DRAFTING MACHINE A precision instrument that combines the functions of a T-square, triangle, straightedge, and protractor. See Chapter 11.

DRAFTING MEDIA Special papers, vellums, cloths, and films designed to meet the drawing needs of the draftsman, engineer, architect, designer, and cartographer. See Chapter 11.

DRAFTSMAN (1) One who draws legal documents or other writings, (2) one who draws plans and sketches, and (3) an artist who excels in drawings. (From Webster's 7th New Collegiate Dictionary.)

DRAINAGE BASIN ORS 536.700. One of the 18 Oregon drainage basins identified by the Water Resources Department published by that Department.

DRIVE A private or public road.

DRIVEWAY A private road giving access from a public way to a building on abutting ground.

DROP-BOW COMPASS A drafting tool used for making very small circles. See Chapter 11.

DUE PROCESS OF LAW A course of legal proceeding according to rules and principles established in our systems of jurisprudence for the enforcement and protection of private rights. It implies the right of the person affected thereby to be present before the tribunal which pronounces judgment upon

the question of life, liberty, or property, in its most comprehensive sense; to be heard, by testimony or otherwise, and to have the right of controverting, by proof, every material fact which bears on the question of right in the matter involved. If any question of fact or liability be conclusively presumed against him or her, this is not due process of law. The essential elements of due process are notice and the opportunity to be heard and to defend in orderly proceeding adapted to nature of case, and the guarantee of due process requires that every man and woman have protection of day in court and benefit of general law. *Black's Law Dictionary*, rev. 4th ed., 590. As explained in *Frederick v. Douglas Co. et al*, 176 Or. 54, 155 P.2d 925, "Due process of the law is satisfied if notice given is sufficient to make it reasonably probable that the party proceeded against would be apprised of what is going on and he given the opportunity to defend."

DUO (Micrographics) An image-positioning technique used in rotary camera microfilming. Half of the film is masked for one series of images, and then the other half is masked for a different set of images

DUPLEX (Micrographics) A rotary camera technique whereby mirrors or prisms are used to photograph one-half of the film at the same time that the other side is being photographed on the other half of the film.

DUPLICATE (EVIDENCE) "A counterpart produced by the same impression as the original, or from the same matrix, or by means of photography, including enlargements and miniatures, by mechanical or electronic re-recording, by chemical reproduction or by other equivalent techniques which accurately reproduce the original." ORS 40.550 Rule 1001. See: "Evidence, admissibility of" and "Public records."

DWELLING UNIT ORS 91.500 (HB 2968, 1979 Laws relating to condominiums) "Dwelling Unit, Premises, Rental Agreement and Tenant mean those terms as defined in ORS 91.705"; that is, "a structure or the part of a structure that is used as a home, residence or sleeping place by one person who maintains a household or by two or more persons who maintain a common household". In the case of a person who rents space in a mobile home park, as defined in ORS 446.002, but does not rent the mobile home itself.

EASEMENT A nonpossessory interest held by one party, or the public, in the land of another party whereby the first party, or the public, is accorded partial use of such land for a specific purpose.

"An easement restricts but does not abridge the rights of the fee owner to the use and enjoyment of the easement holder's rights." Easements may be acquired in any one of a number of ways: by dedication (implied or express), grant, reservation, implied grant, prescription, road viewers method (statutory), eminent domain: necessity. All the authorities assert that the essential qualities of an easement are: (1) They are incorporeal, (2) they are imposed upon corporeal property and not upon the owner of it, (3) they confer no right to a participation in the profits arising from such property, (4) they are imposed for the benefit of corporeal property, and (5) there must be two distinct tenements, the dominant to which the right belongs and the servient upon which the obligation is imposed: *Monese v. Struve*, 155 Or. 68, 62 P.2d 822. Rights conferred by an easement attach to the estate and not to the person of the dominant tenement and they follow that estate into the hands of the assignee thereof. On the other hand, they are a charge upon the estate or property of the servient tenement and follow it into the hands of any person to whom such tenement or any part thereof is subsequently conveyed: *cit. Taylor v. Dyches*, 69 Ga. 455; *Morrison v. King*, 62 IJL 30. An easement in an interest in land, *Monese v. Struve*, supra, within statute of frauds, and therefore cannot be extinguished by parol agreement, *Tusi v. Jacobsen*, 134 Or. 505, but it is a nonpossessory interest. Easements may be extinguished (1) by vacation (a statutory abandonment), (2) when necessity no longer exists (in cases of easement by necessity), (3) express release (in any case except public easements, unless the express release is in the form of a vacation), (4) acquisition by the holder of the fee, (5) the union or merger of the dominant and servient estates by one party at the same time: *Dressler et al v. Isaac et al*, 217 Or. 586.

EASEMENT APPURTENANT An easement existing on parcel of land, serving or benefiting another parcel of land, e.g. an easement for a private way, across the land of another, to be used as access to an otherwise landlocked parcel of land. "An easement is appurtenant if so in fact, although not declared to be so in the deed, and that if the intention is not sufficiently expressed this question may be determined by the relation of the easement to the so-called dominant estate, or the absence of it, and in the light of all the circumstances under which the grant was made": *Tusi v. Jacobsen*, 134 Or. 505, 293 P. 587, 939. "When there is in the deed no declaration of the intention of parties in regard to the nature of the way, it will be determined by its relation to other estates of the grantor, or its want of such relation." (*Id.*) The burden on the servient estate,

effected by an easement appurtenant, will not be a greater extent than was intended at the time of the creation of the easement": *Fendall v. Miller*, 99 Or. 610, 196 P. 381. "The owner of the servient estate cannot make any alterations in his or her property by which the enjoyment of the easement appurtenant will be materially interfered with" *Id.* "As a general rule, the presumption is that an easement is appurtenant rather than in gross, where there is uncertainty as to the nature of the grant": *Houston v. Zahm*, 44 Or. 610, 76 P. 641. The rights associated with an easement appurtenant are annexed to, or are associated with the dominant estate; it does not exist separate and apart from the land to which it is annexed. See: "Easement in gross."

EASEMENT BY DEDICATION An easement acquired by the public when land is appropriated by the owner for the public's use. Such easements can be created by a common-law dedication (arising by operation of the law from the acts or conduct of the owners) or by statutory dedication (as provided in ORS Chapter 92). Refer to the text for details.

EASEMENT BY GRANT An easement that contains all the formalities of a deed, as distinguished from an easement by prescription, statutory dedication or common-law dedication. To create an easement by grant, an agreement is drawn between the parties, duly signed, acknowledged, delivered and accepted. Recording is advisable, but not a statutory requirement in this state. One problem associated with the use of an instrument to convey right, title or an interest for a way, is determining whether the provisions of the instrument operate to convey fee title in the land, or merely a right to the use of the land (an easement). In such cases intent is determined from the language of the entire instrument, giving effect to all recitals if possible: *Rall et al v. Purcell et al*, 131 Or. 19, 281 P. 832. It is not the intent of the grantor, or the grantee that shows the intent of the conveyance; it is the joint intent of the grantor and grantee that governs. "When there is no ambiguity, the words in the grant of an easement should receive their plain ordinary meaning, unless it appears by the context that they were used in a different sense or unless, when applied to the subject matter, they have a technical meaning": *Fendall v. Miller*, 99 Or. 610, 196 P. 381. And, "An easement created by express grant gives to the grantee all rights necessary to its full enjoyment, but does not convey rights not incidental to the easement itself: *Minto v. Salem Water Co.*, 120 Or. 202, 250 P. 722. Decisions of the court that advise "dedications are not grants," in saying that, subsequently, easements are not grants, are made in reference to "grants of fee simple title to the land." Consequently, although there are easements by

grant and dedications operate to grant easements, neither operate as a grant of fee (simple title to the land occupied by the easement); "dedications are not grants (of the fee in the land)."

EASEMENT BY IMPLICATION Technically called a "quasi-easement," this kind of easement is created where the easement is necessary and its prior use has been evident. Factors to be considered in determining whether an easement by implication will be recognized include (1) whether the claimant is conveyor or conveyee, (2) terms of conveyance, (3) consideration given for it, (4) whether claim was made against a simultaneous conveyee, (5) extent of necessity of the easement to the claimant, (6) whether reciprocal benefits result to conveyor and conveyee, (7) the manner in which land was used prior to its conveyance, and (8) the extent to which manner of prior use was, or might have been, known to the parties: *Thompson v. Schuh*, 286 Or. 201, 593 P.2d 1138. "The fact grantee paid consideration for land suggests that an implied easement over land was not contemplated in situation where claimant is the grantor." *Id.* "An easement by implication is to be distinguished from an easement by necessity. Cessation of necessity do not affect an easement by implication. Necessity element in an easement by implication is used as an indicator of intent of grantor and grantee at time of conveyance while in an easement by necessity it is primarily of the nature of an ongoing requirement." *Id.* And in *Dressler et al v. Isaacs et al*, 217 Or. 586, 343 P.2d 714: "Implied easements are not favored by the courts."

EASEMENT BY NECESSITY An easement which is necessary to the enjoyment of the dominant estate, e.g. *ingress and egress* to an otherwise land-locked parcel of land. There must be an actual necessity or an easement of this type cannot exist. However, the dominant estate need not depend on unreasonable means for access, e.g. *climbing over a mountain peak to reach the dominant estate*. Easement by prescription. An easement created by continued adverse user for 10 years, under a claim of right, exclusive, uninterrupted, and with the knowledge and acquiescence of the owner of the estate out of which the easement is claimed. "Where the use is merely permissive, and not adverse, there is no basis on which an easement by prescription may rest": Elliott, 2d, *supra*; *Parrott v Stewart*, *supra*. "...the possession taken must be open, hostile and continuous; he must unfurl his flag on the land, and keep it flying, so that the owner may see, if he will, that an enemy has invaded his domain and planted the standard of conquest": *Curtis v. La Grande Water Co.*, 20 Or. 34, 23 P. 808, 10 L.R.A. 484. "Permissive use can never ripen into a prescriptive

easement": *Minto v. Salem Water Etc. Co.*, 120 Or. 202, 250 P. 722. "An offer to purchase negates the idea of adverse user, and, even when made after prescriptive period, tends to show that enjoyment was not adverse." *Id.* "Mere silence or passive acquiescence will not of itself constitute 'estoppel' to deny alleged prescriptive rights." *Id.* "Easements by prescription are not favored by the law": *Shumate v. Robinson*, 52 Or. App. 199, 627 P.2d 1295. Consequently, "If a person desires to assert a claim not favored by the law, at a minimum he should be required to give notice in his pleadings, that he is specifically asserting such a claim. "Ineffective protests do not succeed in interrupting a prescriptive period, but if a servient owner does some act that would be legally actionable if an easement did in fact exist, the prescriptive period may perhaps be broken ": *Thompson v. Schuh*, 286 Or. 201, 593 P.2d 1138. "While slight or intermittent use may satisfy continuity requirements because of the nature of use of property, there is still a requirement that such use be open and notorious." *Id.*

EASEMENT BY PRESCRIPTION An easement created by the continued use of property for the statutory period of adverse possession.

EASEMENT BY RESERVATION Generally, an easement reserved by the grantor in a deed. "The reservation in a deed creates a new right in the thing granted, which was not in existence at the time of the making of the grant, and was originated by it; whereas the office of an 'exception' is to take something out of the thing granted that would otherwise pass by deed": *Rall et ux v. Purcell et ux*, 131 Or. 19, 281 P. 832. "Although a reservation in a deed may be construed as exception to effect obvious intention of parties, or vice versa, in determining whether a deed created an easement, the tendency is to disregard the technical distinction between reservations and exceptions": *Beck v. Lane County*, 141 Or. 580, 18 P.2d 594. "Where there is an exception or reservation of one thing, it is presumed that no other exceptions or reservations are intended": *Fendall v. Miller* 99 Or. 610, 196 P. 381. "A reservation contained in a deed of conveyance, which is doubtful or ambiguous, is to be construed most strongly against the grantor and in favor of the grantee": *Oliver v. Johnson*, 166 Or. 475, 113 P.2d 430. "A reservation or covenant in a deed may create an easement in gross or appurtenant; to be determined by instrument and intent of parties": *Beck v. Lane County*, *supra*.

EASEMENT IN GROSS The rights given to a party to use the land of another and are not annexed to, or restricted by other property, e.g. *an easement for*

a telephone line. See: "Easement appurtenant" (easement annexed to the dominant estate).

EASEMENT, INTENT "Land should not be burdened with an easement unless the intent to create it is clearly manifested or the circumstances are such as to clearly show that had the grantor considered the matter he would have intended an easement to burden the land": *Dressler et al v. Isaacs et al*, 217 Or. 586, 343 P.2d 714. "The courts will not attempt to discover and give effect to the conjectural intent of parties to create an easement" *Id.* "Rules of construction are not to be invoked to contradict the plain meaning and purport of language of a grant": *Minto v. Salem Water Etc. Co.*, 120 Or. 202, 250 P. 722. "Where language of express grant of easement is clear and unambiguous, it is decisive of the limits of the easement." *Id.* And, "Presumption is that intention of parties is expressed by the language of the deed itself; and the deed must be construed as a whole": *Rall et ux v. Purcell et ur.*, 131 Or. 19, 281 P. 832.

EASEMENT OF ACCESS The right of ingress and egress to and from one's property to a public mad. "An abutting owner, however, is not necessarily entitled as against the public to access to his land at all points, and it is held that it is sufficient if he has free and convenient access to his land and improvements thereon, even though not at all points where it abuts upon the highway": *Morris v. City of Salem*, 179 Or. 666. "Where property fronts on more than one street, access may be denied, under particular circumstances, at one of the streets, if adequate means of access remain to the owner at the other street or streets": *Oregon Investment Co. et al v. Schrunck et al* 242 Or. 63. "A landowner is not entitled to compensation under eminent domain for the circuitry of a route resulting from the construction of a limited access highway": *Highway Com. v. Central Paving Co.*, 240 Or. 71, 74.

EAST One of the four cardinal points of the compass. When not controlled by definite courses, monuments, or descriptions, means "due east."

EASTERLY From the east or towards the east. When not controlled by definite courses, monuments, or descriptions, means due east. The term must always yield to monuments and other definite calls.

EASTERLY COURSE Generally, an eastward course; not due east. See Chapter 4.

EASTERN MOST Farthest to the east; most eastern.

EASTING One of the two values indicating the position of a point on a coordinate grid system. The easting coordinates are abbreviated "E".

EAST-NORTHEAST The fourth part of the northeast quadrant; 22° 30' north of east; N 67° 30' E. Abbreviated E.N.E.

EAST-SOUTHEAST The fourth part of the southeast quadrant; 22° 30' south of east; S 67° 30' E. Abbreviated E.S.E.

EASTWARD (or eastwardly). Having a direction toward the east.

EBB CURRENT Movement of a tidal current away from the shore or down a tidal stream.

EGRESS The act or right of going to, or coming from, one's property.

ELECTRONIC DISTANCE MEASURING (EDM) DEVICES Instruments that measure the phase difference between transmitted and reflected or retransmitted electromagnetic waves of known frequency; or that measure the roundtrip transit time of a pulsed signal, from which distance is computed.

ELEVATION The vertical distances of a point above or below a reference surface or level datum; usually elevations above or below sea level. Abbreviated ELEV.

EMBLEMENTS A right in growing crops that one possesses when his estate in land is of uncertain duration. The owner of land, for example, may not harvest the crops of a tenant with these rights.

EMINENT DOMAIN One of the oldest rights. It is the right of government to take private property within its jurisdiction, for public (never private) use, without the owner's consent, upon paying due compensation. "The power of eminent domain is inherent in the state; the Oregon and U.S. Constitutions are not grants, but limitations of the power. "Statutes authorizing the condemnation of private property for a public use are wholly in invitum, and since they are in derogation of vested rights, must be strictly construed": *Huddleston v. Eugene, supra*.

ENCROACH To enter, by gradual steps or stealth into the property rights of another.

ENCROACHING WALL A wall that illegally intrudes into the land of another. It is not a party wall, established by agreement.

ENCROACHMENT Infringement upon the property of an abutting owner. An encroachment could render title to the property unmarketable. An encroachment could result in the creation of an easement by implication if maintained for the statutory period. Encroachments may be best thought of as an overlapping.

ENCUMBRANCE A burden or charge upon property. A claim or lien upon an estate which may diminish its value. A paramount right which is capable of defeating a grantee's title. Anything that impairs the use or transfer of property, e.g. an easement encroachment, unrecorded deed or mortgage, unpaid taxes, etc. Encumbrance, at law, is every right to, or interest in, land granted to the diminution of value of land, but consistent with passing of fee simple absolute.

ENGINEER'S CHAIN A 100 foot chain (actually a tape with each chain equaling 1 foot) See "chain."

ENGINEER'S LEVEL See "level, engineer's."

ENJOIN To require. To require a person or party by writ of injunction from a court of equity to perform, or to abstain or desist *from, some act.* *Black's Law Dictionary, rev. 4th ed.*

ENJOYMENT See "Covenant for Quiet Enjoyment."

ENTIRETY Whole, in contrast to part. That which the law considers as incapable of being divided.

ENTITLE To give a title or legal right.

EPOCH As used in tidal datum determinations, the 19-year Metonic cycle over which tidal height observations are meaned in, order to establish the various datum. As there are periodic and apparent secular trends in sea level, a specific 19-year cycle called the National Tidal Datum Epoch (NTDE) is selected so that all tidal datum determinations throughout the United States and its possessions will have a common reference. The NTDE officially adopted by the National Ocean Survey in 1941-59. The NTDE will be reviewed for possible revisions at 25-year intervals.

EQUALATERAL TRIANGLE A triangle which has three equal sides.

EQUITABLE TITLE The right in a party, to whom equitable title belongs, to have the legal title transferred to him. The right to acquire absolute ownership of property to which another has title by law. The purchaser in a land contract has equitable title; legal title remains in the vendor and is held as security for payment of the purchase price.

EROSION The gradual removal of soil by currents, tides, wind, or glacial ice. Real property boundaries can change as a result of erosion.

ERRONEOUS Containing or characterized by error.

ERROR (GENERAL) The difference between an observed or calculated value and a true value. See Chapter 6.

ERROR (ACCIDENTAL) In cartography, any small error accidentally incurred in the measurement of a distance or angle. Not governed by fixed laws, the occurrence of these errors is the basis for the theory of probability. See Chapter 6.

ERROR (INSTRUMENTAL) Errors that arise from imperfections in an instrument. See Chapter 6.

ERROR (NATURAL) Arising from the variations in temperature, humidity, wind, gravity, refraction, and magnetic declination. A drafting vellum with low dimensional stability can cause natural errors in mapping. See Chapter 6.

ERROR (PERSONAL) Arising from the limitations of the human senses; principally sight, touch and hearing. See Chapter 6.

ERROR (RESIDUAL) The difference between the value of a quantity obtained by a single measurement and the mean value of that quantity obtained by a number of measurements. The value that most nearly approximates the resultant error. See Chapter 6.

ERROR (RESULTANT) The difference between a measured value and the true value for a quantity. See Chapter 6.

ERROR (SYSTEMATIC) Synonymous with "cumulative error." The compounding of several errors, types of errors, or variety of errors. See Chapter 6 (surveying) and Chapter 11 (for systematic errors produced by incorrect measurement procedures).

ERROR OF CLOSURE The amount by which the value of a quantity obtained by surveying operations fails to agree with another value of the same quantity held fixed from earlier determinations, or with a theoretical value of quantity. See limits of closure.

ESCHEAT The reversion of real property to the state when the owner of the realty dies intestate and without heirs. ORS 112.055 "if no person takes under ORS 112.025 to 112.045, the net, intestate estate shall escheat to the State of Oregon."

ESCROW AGENT Any person engaged in the business of receiving escrows for deposit or delivery for compensation. (ORS 696.505 subsection 3.)

ESCROW (GENERAL) A deed, bond, money, or piece of property delivered by a grantor, promisor, or obligor, to a third person to be held by the latter until fulfillment of a prescribed condition, or happening of a specified event.

ESCROW, REAL ESTATE "An escrow where the escrow fee is paid in whole or in part by a seller of real property and wherein the unpaid purchase price

is delivered to an escrow agent for dispersal at the seller's direction simultaneously on the transfer by the seller of specified title to real property." (ORS 696.505 subsection 4.)

ESCROW (STATUTORY) ORS 696.505 "Any transaction wherein any written instrument, money, evidence of title to real or personal property or other thing of value is delivered to a person not otherwise having any right, title, or interest therein for the purpose of effecting the sale, transfer, encumbrance or lease of real or personal property, to be held by that person until the happening of a specified event or performance of a prescribed condition, when it is then to be delivered by such person to a grantee, grantor, promisee, promisor, obligee, obligor, bailee, bailor, or any agent or employee of them."

ESCROW AGENT Any person engaged in the business of receiving escrows for deposit or delivery for compensation. ORS 696.505, subsection 3.

ESTATE (GENERAL) Every species of property; the condition or circumstances in which an owner stands with reference to his property. The degree, quality, nature and extent of one's interest in, or ownership of, property, real, personal, and mixed. "Estate" describes property, particularly real property, of which one is possessed.

ESTATE (PROBATES) ORS 111.005 "Estate means the real and personal property of a decedent, as from the time changed in form by sale, reinvestment or otherwise, and augmented by any accretions or additions thereto and substitutions thereof or diminished by any decreases and distributions there from."

ESTATE BY THE ENTIRETY A common law estate based on the doctrine that husband and wife are one, and that conveyance of real property to husband and wife creates but one estate, each taking the whole estate. See ORS 108.090 (Conveyances, transfers and liens between spouses; creation and dissolution of estates by entireties; validation of prior dissolutions). "When property is owned by either husband or wife, the other has no interest therein which can be the subject of contract between them, or such interest as will make the same liable for the contracts or liabilities of either the husband or wife who is not the owner of the property, except as provided in ORS 108.040 (Liability for expenses of family or education of children., liability after divorce or separation)." ORS 108.060. "The property and pecuniary rights of every married woman at the time of her marriage or afterwards acquired including real or personal property acquired by her own labor during cover-

ture, shall not be subject to the debts or contracts of her husband." ORS 108.050.

ESTATE FOR LIFE An estate that one may receive either for the duration of her or his life or the life of another (the latter estate known technically as a life estate *pur autre vie*). The recipient of the estate for life may receive it either by deed or by will. The grantee of a life estate is generally referred to as the life tenant. As life tenant, he or she may do with the estate almost as much as could be done with a fee simple estate, except. (1) The life tenant may sell, but the grantee of the life tenant's estate will receive an estate that will terminate upon the death of the life tenant, (2) The life tenant has a right to receive any rents or profits from the land, but he or she cannot injure the land to such an extent as to commit waste upon the land, (3) the life tenant is entitled to what is technically known as "*estovers*," which is the right to take a reasonable amount of wood from the land for fuel and for repairs to any buildings on the land, (4) In absence of any agreement to the contrary, the life tenant is bound to make reasonable, but is not required to make any improvements, (5) A life tenant may mortgage a life estate, but the mortgage terminates with his death, but upon the death of the tenant, the mortgage would no longer constitute a lien upon the property. ORS 91.030 provides: "A tenancy by entirety and a tenancy for life shall be such as now fixed and defined by the laws of the State of Oregon." See ORS 93.150 (Conveyance by tenant of greater estate than that possessed); ORS 93.160 (Conveyance by reversioners and remaindermen to life tenant vesta fee); ORS 105.310 (Setting of estate for life or years in part not sold; re: court partitioning); ORS 105.315 (Disposition of life estate or leasehold; re: court partitioning); ORS 108.540 (Removal of community property status by death of either spouse).

ESTATE IN FEE SIMPLE ABSOLUTE An absolute estate; the largest estate and most prevalent interest in land; the entire property in land; the complete ownership of land. At one time it was said of the fee-simple-absolute estate, that the owner, during his or her lifetime, could do anything he or she wished with the land, except using the land as a nuisance. Today the fee-simple-absolute title provides the maximum ownership, but does so subject to the restrictions enacted in both U.S. and state law (e.g. environmental laws, subdivision laws, partitioning laws, etc.). Having the complete ownership of land, the owner may dispose of it entirely by sale or gift during her or his lifetime. At the death of the owner, she or he may dispose of the property by a will, and if no will is left, it will pass to the owners issue, if any exists, or to

the owner's collateral relatives in the event she or he has no heirs of her or his body.

ESTATE OF INHERITANCE An estate that can be inherited, such as, a fee estate.

ESTATE ON CONDITION One by which the terms of the instrument in which it is created is subject to a contingency not forming a part of the limitation of the estate. If the estate is to begin on the happening of a contingency, it is called an "estate on condition precedent." If it is to terminate on the happening of a contingency, it is called an "estate on condition subsequent." Oregon has abolished the estate on condition precedent.

ESTOP In law, to impede or bar one's own act. According to Blackstone: "A man shall always be estoppel by his own deed, or not permitted to aver or prove anything in contradiction to what he has solemnly allowed."

ESTOPPEL A stop; a plea in bar, grounded on a man's own act or deed, which estops or precluded him from averring anything to the contrary. "Thus a party is estopped from disputing a record title when, by his own negligence, he has held title out to the world by means of a public record as being good." *Reasoner v. Fisikelli*, 114 Fla. 102, 153 So. 98.) An estoppel must be clearly proved. It conveys no title; its purpose is to preserve right already acquired.

ESTOPPEL BY DEED A technical estoppel, it is a bar precluding a party from denying the truth of his deed. Ordinarily, it applies to the grantor and not the grantee.

ESTOPPEL BY LACHES A failure to do something which should be done or to claim or enforce a right at a proper time. A neglect to do something one should do, or to seek to enforce a right at a proper time. *Black's Law Dictionary*, rev. 4th ed. p. 1017.

ESTOPPEL IN PALS (PRONOUNCED "IN PAYS") Estoppels by conduct, as distinguished from estoppels by deed, written declaration, or by other written record. *Black's Law Dictionary*, rev. 4th ed. p. 1264. Common-law dedications are in the nature of estoppel in pals.

ESTUARY A body of water, semi-enclosed by land, connected with the ocean, and within which salt water is usually diluted by fresh water derived from the land. The estuary includes: (a) estuarine water, (b) tidelands; (c) tidal marshes; and (d) submerged lands. Estuaries extend up-stream to the head of tidewater, except for the Columbia River Estuary, which by definition is considered, to the Western edge of Puget Island. (LCDC definition).

ESTUARY, NATURAL Estuaries lacking maintained jetties or channels, and which are usually little developed for residential, commercial or industrial uses. They may have altered shorelines provided that these altered shorelines are not adjacent to an urban area. Shorelands around natural estuaries are generally used for agriculture, forest, recreation and other rural uses (LCDC definition); e.g. Sand Lake.

ESTUARY (CONSERVATION) Estuaries, lacking maintained jetties or channels, but which are within or adjacent to urban areas which have altered shorelines adjacent to the estuary. (LCDC definition).

ESTUARY (SHALLOW-DRAFT DEVELOPMENT) Estuaries with maintained jetties and a main channel (other than entrance channel) maintained by dredging at 22 feet or less, e.g. Coquille River.

ESTUARY (DEEP-DRAFT DEVELOPMENT) Estuaries with maintained jetties and a main channel maintained by dredging at deeper than. 22 feet, e.g., Coos Bay. (LCDC definition).

ET AL Latin for "and others" or "and another."

ET ALIUS Latin for "and another."

ET CON Latin for "and husband." Et vir is the popular term for "and husband."

ET UX Latin for "and wife."

ET VIR Latin for "and husband."

EVIDENCE (WRITING, RECORDING, PHOTOGRAPH, DUPLICATES AND OTHER EVIDENCE) To prove the content of a writing, recording or photograph, the original writing, recording or photograph, except as otherwise provided in ORS 40.550 to 40.585 or other law. ORS 40.555, Rule 1002. A duplicate is admissible to the same extent as an original unless (1) a genuine question is raised as to the authenticity of the original, or (2) in the circumstances it would be unfair to admit the duplicate in lieu of the original. ORS 40.560, Rule 1003. The original is not required, and other evidence of the contents of a writing, recording or photograph is admissible when (1) all originals are lost or have been destroyed, unless the proponent lost or destroyed them in bad faith, (2) an original cannot be obtained by any available judicial process or procedure, (3) at a time when an original was under control of the party against whom offered, that party was put on notice, by the pleadings or otherwise, that the contents would be subject of proof at the hearing, and the party does not produce the original at the hearing, or (4) the writing, recording or photograph is not closely related to a controlling issue. ORS 40.565. Rule 1004.

EVIDENCE CODE, OREGON The rules provided in ORS Chapter 40 to secure fairness in administration, elimination of unjustifiable expense and delay, and promotion of growth and development of the law of evidence to the end that the truth may be ascertained and proceedings justly determined. ORS 40.020, Rule 102. ORS Chapter 41 speaks to evidence “generally.”

EXCEPT To take out, or leave out from a part or a whole; not including.

EXCEPTION IN A DEED A clause in a deed which withdraws from its operation; some part of a thing granted which would otherwise have passed to the grantee under the general description. , The word exception, in a deed, is used synonymously with the word reserving; however, a reservation in a deed creates some new right in the grantor issuing out of the thing granted.

EXCESS The state of surpassing or going beyond the limits; the fact of being in a measure beyond sufficiency; or that which exceeds what is usual, proper, proportionate or specified. For example, a subdivision block is found, by a survey, to be longer than shown by the distance on the recorded plat. The difference between the specified length and the actual length is known as excess. There are definite rules for the distribution of excess and deficiency.

EXCLUSIVE OWNERSHIP An ownership of real property that is free from any legal or equitable interest that another might have in that property.

EXECUTE To complete, as a legal instrument. To perform what is required to give validity to, as by showing consideration, signing, acknowledging and delivering, as to execute a deed, will, etc. See ORS 93.010 and 93.030.

EXECUTED DEED A deed that is signed acknowledged and delivered.

EXECUTION AND ACKNOWLEDGEMENT Customarily, a deed is executed or signed by the grantor or grantors. It is only when the grantee is assuming a mortgage that both the grantor and grantee sign a deed. In order for a deed to be recordable, it must be acknowledged. This has been defined as the act by which a party, who has executed an instrument of conveyance as grantor, goes before a competent officer and declares or acknowledges the same as his or her genuine and voluntary act or deed. The officer is usually a notary public. The reason for this is to prevent forged instruments. The notary will require identification of those who sign, and furthermore, he will require that the instruments be executed in his or her presence.

EXECUTION OF INSTRUMENT When used in connection with instruments conveying realty and particularly deeds connotes all acts necessary to operation of instruments, such as writing, showing the consideration, signing, acknowledging, and delivering. See ORS 93.530.

EXECUTOR (GENERAL) The person appointed by a testator to execute his will, or see it carried into effect.

EXECUTOR (PROBATES) As regards taxable property, deductions, and rates; ORS 118.005 defines executor as meaning “the executor, administrator, personal representative, fiduciary, or custodian of property of the decedent, or if there is no executor, administrator, fiduciary or custodian appointed, qualified and acting, then any person who is in the actual or constructive possession of any property inculcable in the estate of the decedent for inheritance tax purposes whether or not such estate is subject to administration.” See also ORS 118.855(3) regarding disputes over domicile of decedent.

EXECUTRIX A female executor, a woman appointed by a testator to execute his will.

EXISTENT CORNER A corner that its position can be identified by verifying the evidence of the monument, or its accessories, by reference to the description that is contained in the field notes; or where the point can be located by an acceptable supplemental survey record, some physical evidence, or testimony.

EXPRESS DEDICATION A clear, definite, explicit, unmistakable dedication. A dedication that is not dubious or ambiguous. An express dedication is declared in specific language, usually in writing, and on a subdivision plat. However, an express dedication can be manifested by a deed or an explicit oral declaration of the owner to devote the land to the public use. The term is usually applied in contrast to an “implied dedication” made by some act or course of conduct of the owner, from which a reasonable inference of intent may be drawn, or which is inconsistent with any other theory than that he intended a dedication. See: *Black’s Law Dictionary, rev. 4th ed. p. 501.*

EXPRESSWAY Expressway means a divided arterial highway with four or more lanes available for through traffic with full or partial control of access and with or without grade separation at intersections.

EXTREME LOW TIDE Tides which are lower than lower low, and therefore lower than mean lower low, which occur at certain seasons. State vs. Edwards, 62 P2d, 1095, 188 Wash. 467). See Chapter 10.

FALLING The distance by which a survey line falls to the right or left of a corner on which the random line was intended to close.

FATHOM A unit of length, for measuring the depth of water, equal to six feet. See Chapter 10.

FEATURE SEPARATION Process of separating a separate drawing, engraving, or negative for selected types of data in the preparation of a map or chart.

FEDERAL-AID HIGHWAY State highways described by Section 103b of Title 23. United States Code, as selected and designated by the Oregon State Highway Commission.

FEE In feudal law, a right to use another's land in return for services rendered or to be performed; also, the land so used; a "fief"; hence, in common law, a loan of land or estate in trust, granted by an owner or holder to a grantee, to be held on some condition, as of personal service, and which reverts to the grantor if the grantee fails to comply with the conditions; *Webster's New Twentieth Century Dictionary*, Standard Reference Works Publishing Co., Inc., New York, N.Y. In English law, a freehold estate of inheritance, with or without the adjunct "simple," denoting an absolute inheritance descendable to heirs at the pleasure of the proprietor, who is absolute owner of the soil. In the United States, an estate held by a person in his or her own right, and descendible to the heirs in general, without conditions.

FEE, BASE (ESTATES) A determinable or qualified fee; in the nature of a fee, but not a fee simple absolute. It is an interest, which may continue forever, but the estate is liable to be determined without aid of a conveyance by some act circumscribing its continuance or extent.

FEE SIMPLE Synonymous with fee simple absolute."

FEE SIMPLE ABSOLUTE The "fee simple" or the "fee simple absolute," as it is sometimes called, is an absolute estate; the highest estate which the law recognizes; a full and absolute estate in all that can be granted; the largest estate and most prevalent interest in land; it is the complete ownership in land; one that confers an unlimited power of alienation (as unlimited, that is, as allowed by statutory law). During the owner's lifetime, the fee simple absolute title allows that owner to do anything she or he wishes with the land, provided it is in conformance with the law, e.g. not a nuisance, building code followed, statutory partitioning laws are adhered to, and the like. Thus, having complete, absolute ownership of the land, the owner may dispose of it entirely by sale or by gift during her or his lifetime. At the owner's death, she or he may

dispose of the property by will. If the owner leaves no will, the real property will pass to her or his issue, if any, or to collateral relatives in the event there are no heirs of the owner's body. As stated, the fee simple absolute estate constitutes the absolute ownership of real property. This being so, it follows that all other estates in real property must be held in terms of quantity of ownership or time of holding that are less than a fee simple.

FEE SIMPLE CONDITIONAL At common law, an estate created by a conveyance (by a donor) to a donee and the heirs of the donee's body. It has been defined as "an estate restrained to some particular heirs, exclusive of others, as to the heirs of a man's or woman's body, by which only his or her lineal descendants were admitted in exclusion of collateral; or to the heirs male of his body, in exclusion of heirs female, whether lineal or collateral." *Willis v. Mutual Loan & Trust Co.*, 183 N.C. 267. It is called a conditional fee by reason of the condition expressed or implied in the donation of it that if the donee died without such particular heirs, the land should revert to the donor.

In Oregon this was a fee simple conditioned on an issue being born to the donee until Sept. 9, 1971. If the donee did not have issue upon death, the estate was to revert to the donor. 1971 Or. Laws, ch. 382, subsection converted this into a fee simple absolute, ie. ORS 93.250. "Every conveyance or devise of lands, or interest therein, made subsequent to Sept. 9, 1971, using language appropriate to create a fee simple conditional or fee tail estate shall create an estate in fee simple absolute in the grantees or devisees of such conveyances or devises. Any future interest limited upon such an interest is a limitation upon the fee simple absolute and its validity is determined accordingly."

FEE SIMPLE DETERMINABLE A freehold estate with limitation annexed that upon the happening of some future event, the estate will automatically terminate; but this estate is less than a freehold estate of inheritance. Sometimes called a "base fee" or "qualified fee," the fee simple determinable is an estate in fee; consequently, it may endure forever. Therefore, it is necessary that the event creating the fee simple determinable be not certain but only a contingency. Note: ORS 105.770 provides: "(1) A special limitation or a condition subsequent, which restricts a fee simple estate in land, and the possibility of reverter or right of entry for condition broken thereby created, shall, if the specified contingency does not occur within 30 years after the possibility of reverter or right of entry was created, be extinguished and cease to be valid. "(2) This section shall apply only to *inter vi-*

vos instruments taking effect after January 1, 1978, to wills where the testator dies after such date, and to appointments made after such date, including appointments by *inter vivos* instruments or wills under power created before such date.” See: ORS 105.772 regarding possibilities of reverter or rights of entry limited on fees simple existing on January 1, 1978. Exclusions are covered in ORS 105.774.

FEE SIMPLE ESTATE One entitling the owner to the entire property, with unconditional powers of disposition during his life (unconditional in theory), and descending to his heirs and legal representative on his death intestate, and includes both legal title and equitable title.

FEE TAIL A freehold estate in which there is a fixed line of inheritable succession limited to issue of the body of the grantee or devise, and in which regular and general succession of heirs at law is cut off. In Oregon the fee tail estate has been converted into a fee simple absolute by ORS 93.250 (1971 Or. Laws ch. 382 sec 1), *i.e.*: ORS 93.250. “Every conveyance or devise of lands, or interest therein, made subsequent to Sept. 9, 1971, using language appropriate to create a fee simple conditional or fee tail estate shall create an estate in fee simple absolute in the grantees or devisees of such conveyances or devises. Any future interest limited upon such an interest is a limitation upon the fee simple absolute and its validity is determined accordingly.”

FEE TAIL ESTATE See Fee Tail.

FEOFFEE The grantee, or beneficiary, of a feoffment; one vested with a fee, or corporeal hereditaments.

FEOFFMENT Originally, the grant of a feud or fee. It is: (a) a gift of any corporeal hereditaments to another, (b) or, the instrument or deed by which corporeal hereditaments are conveyed. The words *enfeoff* or *grants* are sufficient words in a deed to create a feoffment.

FEOFFOR (OR FEOFFER) The grantor of a feoffment, in contradistinction to the feoffee (grantee) who received the feoffment.

FIELD NOTES The written record of a survey. They identify lines previously established from which the survey has been extended, with suitable calls referring to the alignment and measurements, description of topography along the lines surveyed, and monumentation of the work. Field notes are usually transcribed from the field tablets. Survey plats, subdivision plats and route strip maps are constructed from the field notes, which in turn are developed from rough field tablets. Consequently, the plats and maps are products of two transcribing steps, often the reason they contain erroneous

information. If you suspect the plat or map to be incorrect, it is a good idea to review the field tablets as well as the field notes (if they are obtainable) to see if the field survey measurements have been transcribed correctly.

FIELD TABLETS The field survey notes containing all survey measurements and other information critical to the survey; the original survey notes. The field tablets are the rough draft; the field notes are the neater, finished notes for filing. Some surveyors take such care in making the field tablets that they suffice as field notes. Fill, ORS 41.805(5). The total of deposits by artificial means equal to or exceeding 50 cubic yards or more of material at one location in any waters of this state.

FILL ORS .541.605(5) The total of deposits by artificial means equal to or exceeding 50 cubic yards or more, of material at one location in any waters of this state.

FILIAD LANDS Submerged and submersible lands reclaimed artificially through raising such lands above the highest probable elevation, of the tides to form dry lands, by placement of a fill or deposit of earth, rock, sand or other solid imperishable material. ORS 274.705(1).

FIRE DISTRICT See “rural fire protection district” and “forest protection district.”

FISCAL YEAR The period beginning on July 1 of any given year and ending on June 30 of the next year.

FIXED POSITION An adjusted value of the position of a point on the earth.

FIXTURE (General) A thing that was originally personal property that has been annexed to the land in a more or less permanent manner and is now considered real property.

FLYSHEET Record of names of the owners of each parcel of real property on each cadastral map. Usually filed opposite the cadastral map in the map book-binder. The flysheets are not a mandatory part of the state cadastral map system; however, they are highly recommended.

FLOOD PLAIN A belt of low flat ground bordering a stream channel that is flooded when runoff exceeds the capacity of the stream channel.

FOCAL LENGTH Distance between the center, vertex, or rear node of a lens (or the vertex of a mirror), and the point where the image of an infinitely distant object comes into focus.

FORECLOSURE A legal proceeding by which the county acquires legal title to a property when taxes are not paid by a certain time.

FORESIGHT The reading on a leveling rod being held at a point whose elevation is to be determined. Also called a minus sight. See Chapter 6.

FOREST PATROL ASSESSMENT The cost levied and assessed under ORS 477.270.

FOREST PROTECTION DISTRICT ORS 477.001(8) "Means an association, group or agency composed of owners of forest lands, organized for the purpose of protecting such forest lands from fire."

FORFEITURE In the United States, the property of an individual may be surrendered to the state by virtue of "forfeiture" for one of two reasons: failure to pay taxes or treason.

FORTRAN (CAMS) An acronym for FORMula TRANslation; a procedure oriented computer programming language.

FORWARD AZMUTH See azimuth and back azimuth. See Chapter 4.

FOUND CORNER See existent corner.

FOUR CORNERS (OF A DEED) Used in reference to everything on the face of a deed. All wording contained in a deed, without any aid from the knowledge of the circumstances under which it was made, is said to be within its four corners, because every deed is still supposed to be written on one entire skin, and so to have but four corners. See: *Black's Law Dictionary*, rev. 4th ed., p. 785. Four corners rule. "The construction of a deed is made on the entire deed, and not merely on a particular part, and having thus taken the instrument by the four corners, you can endeavor to ascertain its true intent (which is the essence of every agreement)." *Swan E. Sanborn v. City of Minneapolis et al* (35 Minn. 314, 29 N.W. 126). Note: In arriving at a property construction of the effect of a deed, the four corners rule is always applied. But when necessary, regard must also be given to the situation of the property and the state of the title. Keep in mind that a construction which would make a deed legal is preferred to one having the opposite effect. *Keedy v. United Rys*, 57 Or. 325, 100 P. 658, 108 P. 197. And, "The presumption is that the intention of the parties is expressed by the language of the deed itself." *Rall et ux v. Purcell et ux*, 131 Or. 19, 281 P. 832.

FRACTIONAL The use of fractional in a deed means there is less land than is usually contained in a lot, block, section or township. "Fractional" is not synonymous with "part."

FRACTIONAL LOTS (Surveys of the public lands). Irregular 1/16 subdivisions of fractional sections as designated on the official plats of the public sur-

vey. Fractional lots are usually less than 40 acres. One or more of the following creates the deficiency of fractional lots

1. Meandered bodies of water.
2. State boundaries.
3. Reservation boundaries.
4. National parks.
5. Overlapping government surveys
6. Donation Land Claims.
7. Patented mining claims.
8. Excess or deficiency of exterior sections of a township.
9. Resurvey of the public lands,

Fractional Lot is synonymous with government lot; however, not all government lots are fractional lots. See Chapter 5. (Note: Fractional is used to designate excess as well as deficiency.) See Chapter 5.

FRACTIONAL LOTS (Subdivisions and townsite) A fractional lot of a subdivision or townsite is usually a lot irregular in size or shape as compared to the majority of uniform lots of the subdivision or townsite. The term is meaningless because it describes all of the lot. The term is used to describe excess as well as deficiency.

FRACTIONAL SECTION A section that is not whole or regular (one containing more or less than 640 acres). The word fractional, as used in describing a section of land partly within and partly without a meander line, refers simply to the circumstance that the section does not contain 640 acres of dry land (or contains more than 640 acres). See Chapter 5.

FRACTIONAL TOWNSHIP A township where the outer boundary lines cannot be carried out in full because of a water course or some other external interference. Excess or deficiency carried into external lots of external sections does not create, in itself, a fractional township. See Chapter 5.

FREE ACCESS Unobstructed, open, clear, unhampered, unrestricted, and unimpeded access.

FREE BOUNDARY A boundary not limited by definite bearings and dimensions.

FREEHOLD An estate in real property for life or in fee. A right of title to land. It is an estate of inheritance.

FREEHOLD ESTATE (1981)

FREEHOLD ESTATE (1) Any interest in real property which is or may become possessory. It is an interest greater than leasehold; the duration of which is not fixed by a specified or certain period of time, but may last during the lifetime of some person. It is an estate of inheritance, or for life in heredita-

ments existing in or arising out of real property of free tenure (1981). (2) Estates according to their quantity or duration are divided into “freehold estates” and “estates of less than freehold.” The endurance of an estate of freehold is of an indeterminate length, which is or may become possessory. It is an interest greater than a leasehold, the duration of which is not fixed by a specific or certain period of time, but may last the lifetime of some person. It is an estate of inheritance, or for life in hereditament existing in or arising out of real property of free tenure. It is distinguished from the “estate of less than freehold,” because the length of the latter is capable of accurate determination. The estates of freehold are generally treated in the legal sense as real property. The estates of less than freehold are generally treated as personal property in the nature of leasehold interests.

FREEHOLD INTEREST An interest in real property, the duration of which is not fixed by a specified or certain period of time, but must, or at least may last during the lifetime of some person.

FREEWAY In Oregon, a “throughway.” However, the term “freeway” is a more explicit term for a throughway that is a divided arterial with four or more lanes available for through traffic with full control of access and grade separation at intersections. Sometimes referred to as an “expressway” or “superhighway.” See: “Throughway.”

FRONTAGE “A piece of land that fronts; the land between the front of a building and a street.” *Webster’s New Collegiate Dictionary*.

FRONTAGE ROAD A local street or road that generally parallels a freeway or throughway, and that provides access to property isolated from the limited access freeway or throughway. When designed specifically for the latter purpose, the term “service road” is often used.

FRONTING The words “fronting” and “adjoining” are synonymous, and reference to lots fronting upon a street means that the lots touch the boundary line of the street.

FRONTING AND ABUTTING Synonymous with fronting, but must be interpreted in context with the other wording where it is used. The term is usually used in reference to land that abuts a public way, but is also used to describe the boundary of riparian land that abuts the water. The term “fronting and abutting” will not deprive the owner of the land from his or her lawful rights to the fee in the bed of a public way or highway.

FURLONG A unit of linear measure that equals 1/8 of a mile (or 660 feet).

GENERAL COMMON ELEMENTS In general, the elements common to all owners. For, a specific description of general common elements see ORS 91.500.

GENERAL COMMON ELEMENTS (CONDOMINIUM LAW) ORS 94.004. “General common elements,” unless otherwise provided in a declaration or by consent of all the unit owners, means:

GENERAL COMMON ELEMENTS (GENERAL USAGE) The elements of a subdivision, condominium, planned community, etc., that are common to all owners of land, unite, or of land and improvements in the development. See: “General common elements (condominium law).”

- “(a) The land, whether leased or in fee simple, on which a building is located, except any portion thereof included in a unit or made a limited common element by the declaration;
- “(b) The foundations, columns, girders, beams supports, main walls, roofs, halls, corridors, lobbies, stairs, fire escapes, entrances and exits of a building;
- “(c) The basements, yards, gardens, parking areas and outside storage areas;
- “(d) Installations of central services such as power, light, gas, hot and cold water, heating, refrigeration, air conditioning, waste disposal and incinerating;
- “(e) The elevators, tanks, pumps, motors, fans, compressors, ducts and in general all apparatus and installations existing for common use;
- “(f) The premises for the lodging of janitors or caretakers of the property; and
- “(g) All other elements of a building necessary or convenient to its existence, maintenance and safety, or normally in common use.” See: “Limited common elements.”

Note: ORS 94.066 provides: “Subject to the provisions of the declaration, a declarant has an easement through the common elements as may be reasonably necessary for the purpose of discharging any obligation of the declarant or exercising any special declarant right, whether arising under the provisions of ORS 94.004 to 94.480 and 94.991 or reserved in the declaration or by laws.” (See also, ORS 94.250--Easements held by units and common elements, and ORS 94.285--Taxation of units, common elements, appraisal and assessment). (Laws as of Sept. 27, 1987.)

GENERAL DEVISE (PROBATE LAW) ORS 111.005. "General devise" means a devise chargeable generally on the estate of a testator and not distinguishable from other parts thereof or not so given as to amount to a specific devise. Note: A "devise," when used as a noun, means property disposed of by a will and includes "legacy" and "bequest." ORS 111.005(11). See: "Specific devise."

GENERAL LAND OFFICE (abbreviated G.L.O.) (1989) A United States bureau created by the act of April 25, 1812, 2 Stat. 716, in the Treasury Department. The chief officer was called the Commissioner of the General Land Office "to superintend, execute, and perform all such acts and things, touching or respecting the public lands of the United States . . . ' A chief clerk was to be appointed who would take the place of the commissioner in case that position became vacant. The commissioner was to countersign patents and had a multitude of other administrative duties. One flaw in this act was that it did not give clear authority to the commissioner over the surveyor general. Because of that omission, the surveyor general continued to operate in a semi-autonomous fashion for the next 25 years or more. They made their own rules for the execution of the public land surveys, often only at the insistence of the commissioner. But whatever it lacked, the act established a bureau responsible for the land surveys and sales, which Alexander Hamilton had suggested 22 years earlier. It also got the War Department and the State Department out of the land business. The act of July 4, 1836, 5 Stat. 107, reorganized the G.L.O. It said in part: 'That from and after the passage of this Act, the executive duties., appertaining to the surveying and sale of the public lands., shall be subject to the supervision and control of the Commissioner of the General Land Office ... ' Section 2 of the act authorized appointment of a "Principal Clerk of the Public Lands" and a "Principal Clerk of Private Land Claims." Section 3 provided for a "Principal Clerk of Surveys, and Sections 4 and 5"--a recorder of the G.L.O. On March 3, 1849, 9 Stat. 395, Congress established the Department of the Interior which brought together, under the Secretary of the Interior, the Patent Office, G.L.O., Indian Affairs, Public Buildings and several other functions of government. The act of September 27, 1850, 9 Stat. 496, created the office of Surveyor General in Oregon, and extended the rectangular survey system to that territory. It allowed the "geodetic method" for executing the surveys; and provided the Donation Law for the territory. On July 16, 1946, the Bureau of Land Management was established in the Department of Interior, assuming the

responsibilities of the G.L.O. plate and abolishing the General Land Office.

GEOCODING The combining of geographic based data into a special geographic number. It is a system designed for the computer manipulation of geographic data and non-map data converted to geographic terms, for operational and analytical application. The state standard tax lot number is a simple example of a geocode.

GEODESY That part of practical geometry which has for its object, the determination of the magnitude and figure either of the whole earth or of any given portion of its surface, especially of a large portion.

GEODETTIC COORDINATES The system of spherical coordinates of the earth described with reference to latitude and longitude.

GEODETTIC NORTH True North.

GEODETTIC POSITION The term is used interchangeably with "geographic position," and refers to a position on the spheroid representing the earth.

GEODETTIC SURVEYING Surveying in which the curvature of the earth must be considered. The term "geodetic survey" is often used in reference to the N.O.A. surveys (formerly. U.S.C. and G.S. surveys).

GEODOMETER A geodetic distance meter used to electronically measure distances.

GEOGRAPHICAL Relating to geographic location; to geography.

GEOGRAPHIC COORDINATES Geodetic coordinates, state plane coordinates, rectangular survey coordinates, local coordinates. Any coordinates that relate to a specific geographical network of coordinates. Usually means geodetic coordinates.

GEOGRAPHIC LAND INFORMATION SYSTEM (G.I.S.) Any system of geographic referenced land information or data, associated with a specific place on or relatively near the earth's surface, designed to provide rapid, or at least efficient, entry and retrieval of land and land related information and data (such as location, size and shape of land parcels; parcel ownership; public easements; demographic data; soil types; land classifications and uses; minerals; riparian interests; bodies of water;; transportation routes; urban growth; property values; environmental data; and the like).

GEOGRAPHIC POSITION Synonymous with "geodetic position" when used in relation to geodetic surveys. Usually by latitude and longitude; however, any location with reference to a geographic datum could be called a geographic position.

GEOGRAPHY A systematized knowledge regarding the earth's surface as it exists, its physical features and phenomena, the living creatures (especially mankind) and the political divisions of mankind. From applied mathematics, as geodesy, topography, and cartography, it derives a systematic declination of the surface (mathematical geography).

GEOID The precise mathematical shape of the earth.

GEOLOGY ORS 516.010(4) "Geology" means the study of the earth and in particular the study of the origin, history and topographic form of rocks, ores and minerals, either under the ground or upon the surface, and their alteration by surface agencies, such as wind, water, ice and their agencies, and the economics of their use.

GEOMETRIC LINE The edge of any surface; the boundary of a polygon; a line that separates one figure from another. A geometric line has no thickness or width.

GEOTHERMAL AREA ORS 522.010(5) Geothermal area means any parcel, of land that is or reasonably appears to be, underlaid by geothermal resources.

GEOTHERMAL RESOURCES See resources geothermal.

GEOTHERMIC Relating to the internal heat of the earth.

GIFT OF PROPERTY A voluntary conveyance of property, both real and personal, without consideration.

G.L.O. The General Land Office of the U.S. An agency created in 1812 to take charge of all such acts and things touching or respecting the public lands of the U.S., which included the surveying of the public lands. On July 16, 1946, the B.L.M. was established in the Department of Interior. Under that plan, the G.L.O. was abolished and its functions were transferred to the B.L.M. The office of the U.S. Supervisor of Surveys, together with the field surveying service known as the Cadastral Engineering Service, was abolished and the functions were transferred to the Secretary of the Interior. In July of 1946, the Secretary of the Interior ordered that the functions and powers of the G.L.O., and the U.S. Supervisor of Surveys, together with the Field Surveying Service, be exercised by the Director of the B.L.M. subject to the direction and control of the Secretary.

G.L.O. PLATS The official plats of the U.S. Government Land Office. The term is often used in reference to B.L.M. plats executed after July 1946.

GOOD AND MARKETABLE TITLE One that is free from reasonable doubt; not necessarily free from pos-

sible suspicion. It is a title reasonably free from litigation.

GOOD AND MERCHANTABLE TITLE Title in fee simple, free from litigation, palpable defects and grave doubts, which will enable the owner to not only hold land in peace, but to sell or mortgage it to a person of reasonable prudence and caution. It is a title free from reasonable objections.

GOOD AND SUFFICIENT DEED A marketable deed, which will pass a good title to the land it purports to convey.

GOOD TITLE Generally, a title free from substantial restrictions or limitations; however, not necessarily one perfect of record. The term is synonymous with clear title, good and marketable title, and good and merchantable title.

GOVERNMENTAL AGENCY Any agency which can constitutionally be created by a congressional or legislative body, that performs duties of public character, is a governmental agency, i.e., federal government, state government, county government, city government, taxing district, etc.

GOVERNMENT LOTS Lots established, measured, and computed by the U.S. Government's survey of the public lands. The term is often used synonymously with "fractional lots" or "lots" (1/4 1/4 sections irregularly shaped and more, or less than 40 acres). Some government lots are regular in shape and are 40 acres in area.

GOVERNMENT SURVEY Generally, the term is used in reference to the U.S. Bureau of Land Management surveys of the Public Lands of the U.S. (prior to 1946, Government Land Office surveys). The term, however, might be used in reference to surveys executed by other U.S. agencies, i.e., the U.S. Forest Service, the U.S. Geological Survey, the National Oceanic Survey. Technically, any survey executed by a governmental agency whether U.S., State, County or City.

GOVERNMENTAL AGENCY Any agency, such as the Oregon Department of Revenue, that can constitutionally be created by a congressional or legislative body, that performs duties of a public character. The organization, machinery, or agency through which a political unit exercises authority and performs functions of a public nature, and which is usually classified according to the distribution of power within it, e.g. "the Department of Transportation." Synonymous with "public agency." See: "Governmental body" and "Quasi-public."

GOVERNMENTAL BODY The body of persons and agencies that constitutes the governing authority of a political unit or organization. Synonymous

with “political body,” as used in this publication. The United States government, Oregon State government, a city government or county government. See: “Governmental agency” and “Quasi-public.”

GRANT (a) To convey, (b) a conveyance. Means to bestow; to confer; to agree or assent to. The word is generally used to denote private conveyances. It is applicable to all transfers of real property and incorporeal rights; comprehending everything that is passed from one to another and is applied to every species of property. Grant is synonymous with the word conveyance.

GRANT BARGAIN & SELL Operative words of conveyance that imply a general warranty. Grant bargain & sell should be sufficient to carry all legal or equitable interest the grantor has in the land.

GRANTEE A grantee is one to whom some valuable interest or right in land is conveyed by the deed; the person to whom a grant is made.

GRANTOR (General) One who conveys land.

GRANTOR (TRUST DEEDS) ORS 86.705. “Grantor” means the person conveying an interest in real property by a trust deed as security for the performance of an obligation. ORS 86.715 explains (in part), “... For the purpose of applying the mortgage laws, the grantor in a trust deed is deemed the mortgagor and the beneficiary is deemed the mortgage.” 1959 Or. Laws ch. 625 subsec 7; 1961 ch. 616 subsec 4; 1965 ch. 457 subsec 4; 1983 ch. 719 subsec 5; 1985 ch. 817 subsec 3. See note under ORS 86.705.

GRID A network composed of two sets of equidistant parallel lines, intersecting at right angles.

GRID AMMUTH An azimuth measured from grid north. See Chapter 7.

GRID BEARINGS Bearings oriented to, or based on the grid north datum of the grid being used. See Chapter 7.

GRID COORDINATES The points on a Euclidean coordinate system, described by perpendicular distances from a coordinate datum, usually on an x and y axis. See Chapter 7.

GRID DECLINATION The angular difference in direction between grid north and geodetic north. See Chapter 7.

GRID DISTANCE The straight line distance between two points on a grid; obtained by computations from the grid coordinates. See Chapter 7.

GRID GAUGE (Micrographics). A gauge that is used to check the position of images on microfiche.

GRID MERIDIAN The meridian, based upon a coordinate system that is used as a reference meridian. See Chapter 7.

GRID NORTH The direction of y-axis of a cartesian coordinate system. See Chapter 7.

GROSS ACREAGE The acreage before or without diminution or deductions.

GROUND CONTROL (Photogrammetry) Control obtained from ground surveys as distinguished from that obtained by photogrammetric methods.

GROUND WATER ORS 537.515(3) Any water, except capillary moisture, beneath the land surface or beneath the bed of any stream, lake, reservoir or other body of surface water within the boundaries of this state, whatever may be the geological formation or structure in which such water stands, flows, percolates or otherwise moves.

GROUND WATER RESERVOIR ORS 537.515(4) A designated body of standing or moving ground water having exterior boundaries which may be ascertained or reasonably inferred.

GUARD STAKE (Surveying) A stake driven near a hub to protect and identify a hub.

GUARDIAN (General) One who is chosen or appointed to take charge of an estate and education of an orphan who is a minor, or of any person who is not of sufficient discretion to manage his own affairs.

GUARDIAN (GUARDIANSHIP, AND CONSERVATORSHIPS, ORS Chapter 126). ORS 126.003 Means a person appointed as guardian of a minor or incapacitated person under ORS 126.060 to 126.143. Note: Generally, a guardian is a person who is chosen or appointed to take charge of an estate and education of an orphan who is a minor, or of any person who has insufficient discretion to manage his or her own affairs.

GUARDIAN (Statutory) ORS 126.003 Guardian means any person appointed under ORS 126.003 to 126.413 as guardian of the person, guardian of the estate, or both, for any other person.

GUIDE MERIDIAN (System of Rectangular Surveys) Correction lines extended north from the base line, or standard parallels, at intervals of 24 miles east and west from the principal meridian. The guide meridians are terminated at the points of their intersections with standard parallels; the guide meridian being projected on the true meridian and the fractional measurement being placed in the last half mile.

GUNTER’S CHAIN See chain.

HABENDUM The statement in a deed that usually follows the premises: 'To have and to hold the premises herein granted unto the party of the second part ...' (the wording here limits and defines the estate to be taken by the grantee. Any reservation or declaration of trust is made at this point in the deed). One rule of construction is that when the habendum conflicts with the premises, the premises are construed to indicate the intent of the deed. However, in Oregon the "four corners rule" demands that the intent of the parties be derived from all wording contained within the four corners of the deed when such a construction is possible. Consequently, the habendum can indicate intent of the parties if, by applying the four corners rule, the language of the entire deed, except the conflicting or ambiguous wording, supports such an interpretation.

HACHURES Short lines on topographic maps or nautical charts to indicate the slope of the ground or submarine bottom. They usually follow the direction of the slope. Also, inward pointing short lines or "ticks" around the circumference of a closed contour indicating a depression or a minimum. In the cadastral map program hachures are used to define subdivision boundaries.

HALF (General) The word half has no technical meaning other than its ordinary meaning as a quantitative term. When a deed calls for half of a tract of land and there is nothing to suggest the contrary, half should be construed as meaning half in quantity.

HALF (U.S. Public Land Surveys) When reference is being made to 1/4 or 1/4 1/4 sections, the terms east-half and west-half, or north-half and south-half are to be interpreted as meaning half as divided by a line equidistant from the boundary lines of the subdivision of section. A deed of the east-half of a parcel of land "according to the U.S. survey" is definite, and excludes the principle of equal quantities, and fixes the dividing line equidistant from the boundary lines of the parcel thus subdivided. This rule will possibly create conflicts when government lots are a part of the 1/4 section being divided in half. In this case the intent is usually to convey a parcel of land divided by the government lot lines; however, this is not always the case. It is, therefore, important to try to determine the intent of the conveyance. See half section. See Chapter 5.

HALF SECTION The south half; north half, east half or west half of a section would be that half according to the government survey. The general and proper acceptance of the terms section and half section as well as their construction by the B.L.M., denotes

the land in the sections and subdivision lines, and not the exact quantity which a perfect measurement of an unobstructed surface would declare. See Chapter 5.

HALF-TIDE, LEVEL (Mean tide level) Hypothetical surface midway between high water and mean low water.

HALFTONE Photomechanical printing surface or the impression therefrom, in which detail and tone values are represented by a series of evenly spaced dots of varying size and shape, varying in direct proportion to the intensity of the tones they represent.

HARBOR LINE The line beyond which wharves and other structures cannot usually be extended. It marks the boundary of a certain part of public waters being reserved for a harbor. See Chapter 10.

HARD-SURFACED HIGHWAYS (state highways, ORS Chapter 366). ORS 366.015 "As used in all highway Acts, 'hard surfaced highways' means any state road or highway constructed and surfaced or to be constructed and surfaced with such materials or combinations of materials as to produce what is commonly known or styled 'pavement,' and not such construction or surfacing as is commonly known as 'macadan'.

HARMONIC PLANE The zero adopted by the National Oceanic Administration, upon which its tidal tables, charts, and maps are based.

HEAD OF STREAM The uppermost point on the stream, which furnishes a continuous stream of water. See Chapter 10.

HECTARE A metric unit of square measure equal to 2.47 acres or 10,000 square meters. See tables in the appendix.

HEIR (Probates) ORS 111005. Heir means any person, including the surviving spouse, who is entitled under intestate succession to the property of a decedent who died wholly or partially intestate.

HEIRS AND ASSIGNS Words of limitation and not of purchase. In common law, this wording was essential to conveyance of fee simple.

HEIRS OF THE BODY Words of limitation describing a fee tail estate.

HEREDITAMENTS Anything which can be inherited.

HIGH WATER (HW) The maximum height reached by a rising tide. The height may be due solely to the periodic tidal forces or it may have superimposed upon it the effects of prevailing meteorological conditions. The U.S. DEPT. of Commerce, NOAA,

discourages use of the term “high tide”. See Chapter 10.

HIGH WATER LINE Intersection of the land with the water surfaces at an elevation of high water. When used in deeds, the term must be interpreted as “mean high water line”. See Chapter 10.

HIGH WATER MARK The line or mark upon tidal flats, beach, or along shore objects indicating the elevation of the intrusion of high water. See Chapter 10.

HIGH WATER MARK (Rivers) The point to which a river usually rises in an ordinary season of high water. It is the point where the water stands sufficiently long enough to destroy vegetation; impressing upon the soil as the line of dominion. It does not mean the height reached by unusual floodwaters. See Chapter 10.

HIGHWAY (GENERAL) Every public way, thoroughfare, road, street or stretch of land used or intended for the use of the general public for travel from place to place. The term includes bridges, tunnels, viaducts and other structures intended for travel, by the public, by vehicle, foot, horse, boat, bicycle, motorcycle, etc., from place to place.

HIGHWAY Synonymous with the general definition (above) except excludes highways under jurisdiction of the Department of Transportation (noted as “state highways”).

HIGHWAY DIVISION (STATE HIGHWAY LAW) ORS 366.005 (1981) “The Highway Division of the Department of Transportation.” See ORS 366.105 to 366.165 for provisions of the law on “Organization of Highway Division.” The Oregon Transportation Commission, as provided for in ORS 366.215, may “select, establish, adopt, lay out, locate, alter, relocate, change and realign primary and secondary state highways.”

HIGHWAY, STATE ORS 366.005 “Any road or highway designated as such by law or by the Oregon Transportation Commission pursuant to law and includes both primary and secondary state highways.”

HOMESTEAD (ORS 310.630 HARP) The taxable principle dwelling located in Oregon, either real or personal property, whether owned or rented by the taxpayer, and the taxable land area of the tax lot upon which it is built.

HOMESTEAD (Tax Reduction Program on owner occupied principle residences). Section 1, Chapter 241, Oregon Laws 1979 provides:

Sec 1. As used in sections I to 8 of this Act, unless the context otherwise requires:

(1) “Homestead” means the principal residence owned and occupied by the taxpayer and located in Oregon. It includes the land area of the tax lot or tax lots on which the residence is located, but does not include land area in excess of one acre, or the minimum by zoning, whichever is greater. If the residence is located on a tax lot or lots that include land area that is classified or designated or is otherwise specially assessed as farm or forest land under ORS 308.345 to 308.403, 321.257 to 321.372, 321.705 to 321.765 or 321.805 to 321.825, or as open space land under ORS 308.740 to 308.790, that portion of the land area so specially assessed shall not be included as part of the homestead property. If the residence is located in a multiunit building, the residence is the portion of the building actually used as the principal place of abode and its percentage of the value of the common elements and of the value of the tax lot upon which it is built. The percentage is the value of the unit in the building consisting of the residence compared to the total value of the building exclusive of the common elements, if any. If the residence is a part of a group of associated single family units on one tax lot, the residence is the single unit and the portion of the common tax lot allocated to it on the basis of the relative value of each unit.

HOMESTEAD ENTRY An entry under U.S. land laws for the purpose of acquiring title to a portion of the public domain under the homestead laws.

HORIZONTAL ANGLE An angle measured in a horizontal plane. All angles shown on cadastral maps are horizontal angles.

HORIZONTAL CONTROL Control stations whose grid coordinates have been computed; plane surveys whose known points can be converted to coordinate values. See Chapters 6 and 12.

HORIZONTAL DATUM In plane surveying, the grid system of reference used for the horizontal control of geographical area; defined by the easting and northing of one station in the area, and the azimuth from this selected station to an adjacent station. See Chapter 6.

HORIZONTAL DIRECTION Direction in a horizontal plane. See Chapter 4.

HORIZONTAL DISTANCE Distance measured in a horizontal plane, as distinguished from distance measured on a slope.

HORIZONTAL LINE A line that is perpendicular to vertical lines.

HORIZONTAL PLANE The plane that is perpendicular to the direction of gravity.

HORIZONTAL POSITION The grid position of a horizontal control point.

HUB A wooden, stake, iron pipe or rod, set in the ground, with a tack or marker to indicate the exact position of a measured point.

HYDROGRAPHIC SURVEY Surveys of bodies of natural and artificial bodies of water.

HYPOTENUSE In a right triangle, the side opposite the right angle. (Also spelled hypotenuse.) See Chapter 9.

HYPOMETRIC MAP A map that shows relief by contours, shading, tinting or hachures.

ID Something previously mentioned.

IDEOGRAPH (or ideogram) A graphic character which suggests the idea of a subject; a pictorial representation of thought.

IMAGERY Visible representation of objects and (or) phenomena as sensed or detected by cameras, infrared and multispectral scanners, radar and photometers. Recording may be on a photographic emulsion (directly as in a camera or indirectly after being first recorded on magnetic tape for subsequent conversion and display on a cathode-ray tube).

IMPLIED DEDICATION An implied dedication is one arising by operation of the law from the acts of the owner. It may exist by an express grant and need not be evidenced by any writing, nor by any form of words oral or written. It is not founded on a grant, nor does it necessarily presuppose one, but is founded upon the doctrine of equitable estoppel. It is in the nature of an estoppel *in pais*, and is irrevocable. It may be established by evidence of conduct, and by many ways. If the donor's acts are such as to indicate an intention to appropriate the land to the public use, then upon acceptance by the public the dedication becomes complete. *Portland Ry., L. & P. Co. v. Oregon City*, 65 Or. 574, 166 P. 932, *cit'* *Elliott on Roads, Streets & Highways*, 3d ed., subsec 137.

IMPLIED EASEMENT An easement based on the presumed intent of the parties based on surrounding circumstances rather than on the language of the deed. *La Plant v. Schuman*, 196 N.W. 280. For example, the owner of a 40-acre tract of land makes the "beck 20 acres" dependent on the 20 acres abutting a public way for a means of access, and creates a private way over the 20 acres fronting and abutting the public way, and then sells the "back 20 acres" that is dependent on the private way. The private way is an easement that had been created that passes by implication to the

grantee, even though not expressly described or mentioned in the deed. Thompson, *Commentaries on the Modern Law of Real Property*, 1961 Replacement, sec 351, cites several cases that explain, "It is a general rule of law that where one conveys a part of his estate, he (or she) impliedly grants all those apparent or visible easements upon the part retained which were, at the time, used by the grantor for the benefit of the part conveyed, and which are reasonably necessary for the use of that part. Implied easements fall into two categories (1) those necessary for the enjoyment of some other right granted (or necessary for the enjoyment of the land purchased by a grantee), and (2) where the easement is necessary to give effect to the common intent of parties to a grant of real property with reference to the manner or purposes in and for the land granted or the land retained. The most important consideration for the courts in determining whether an implied easement has passed, or was retained, is the intent of the parties "as disclosed by the extent and character of the truer, the nature of the property, and the relation of the separated parcels of land to each other. Thompson, *supra*, citing *Philadelphia Steel Abrasive Co. v. Louis J. Gedicke Sons*, 343 Pa. 524, 23 A.2d 490, 138 A.L.R. 776; *Rogers v. Cation*, 9 Wash.2d series 369, 115 P.2d 702. "Implied easements rest on the intent of the parties, not necessity alone," *Perodeau v. O'Connor*, 336 Mass. 472, 146 N.E.2d 512; *Wiesel v. Smira*, 49 R.I. 246, 142 A. 148, 58 A.L.R. 818. In the Oregon case of *Dressler et al v. Isaacs et al*, 217 Or. 586, 343 P.2d 714, the court said, "It is generally agreed that implied easements are not favored by the courts. It would seem enough to say that a man's land should not be burdened with an easement unless the intent to create it is clearly manifested or the circumstances are such as to clearly show that had the grantor considered the matter he (or she) would have intended an easement to burdened his (or her) land"; *id.*, *cit. Jack v. Hunt*, 200 Or. 263, 264 P.2d 461, as in the examples supplied here.

IMPROVEMENT A structure, appurtenance or other addition, modification or alteration constructed, placed or made on or to the land. The term includes any building, street, sidewalk, wharf, bridge, ditch, flume, reservoir, well, tunnel, fence, tower and all other structures and superstructures.

INCHOATE Imperfect; partial; unfinished; begun, but not completed; or in process of becoming. An inchoate interest in real estate is not a present interest, but may ripen into a vested estate, if not barred, extinguished or divested.

INCHOATE DOWER Not an estate, but nevertheless a right or interest in the land, of which a wife may not be deprived except by proceeding. See dower.

INCORPOREAL Not of a material nature.

INCROACHMENT See encroachment.

INCUMBRANCE A burden or charge upon property. A claim or lien upon an estate, which may diminish its value. It is a paramount right, which might defeat title of the grantee. Incumbrance is anything that impairs the use or transfer of property; an easement; encroachment; unrecorded deeds or mortgages; unpaid taxes, etc. Incumbrance, at law, is every right to or interest in land granted to the diminution of value of land, but consistent with passing of fee.

INDEFEASIBLE TITLE A title that cannot be defeated, set aside, or made void.

INDENTURE Historically, a conveyance of real estate. In law, a deed or written agreement between two or more parties.

INDEPENDENT RESURVEY An official running and marking of new township and section boundary lines without regard for the location of the record lines and corner monuments, or other marks of the prior survey which the independent resurvey is designed to supersede. This type of survey is only effective with respect to the public lands; the tract segregations do not modify the private titles. This type of survey is designed to give official recognition and respect to all such rights when required for the identification of the remaining public lands. See Chapter 5.

INDEXING FILM (Micrographics) A system that uses targets, flash cards, lines or bars to quickly find specific data on a reel or microfilm without the need to examine each image in sequence.

INDEX MAP A map, in the standard cadastral map system, used to identify and locate maps in a township, section or 1/4 section. The term “& Index,” when shown at the upper and lower right-hand corners of the cadastral map, is used to show that the map not only shows property ownership and parcel numbers, but also identifies and locates certain parts of a township, section, or 1/4 section that has been mapped at a larger scale. See Chapter 2.

INDIRECT MEASUREMENT See direct measurement. See Chapter 9.

INFRARED SCANNER A thermal mapping device. An instrument that detects infrared radiation and converts the detected energy to an electrical signal

for recording on photographic film or magnetic tape.

INGRESS To go into, or to enter. Used to denote a right to go upon or enter one's own property, or a right of others to go upon or enter the property, *i.e.* a “right of ingress.” The root of the word is in the old English law *ingressus*, meaning ingress or entry, and the ancient writ of entry *ingressu*.

INHERITANCE An estate in things, real, personal, corporeal or incorporeal.

INITIAL POINT Starting point of a traverse.

INITIAL STATION Target of initial pointing.

INK ADHERANCE The ability of a tracing surface to hold on to ink.

INLAND WATERS ORS 308.515(3) “Inland water or inland waters shall mean all water or waters within the State of Oregon, all interstate rivers touching Oregon and all tidewaters extending to the ocean bars.” See Chapter 10.

INNAVIGABLE Synonymous with “not navigable” and unnavigable.” Not capable or suitable for navigation. See Chapter 10.

INSHORE In beach terminology, the zone of variable width between the shore-face and the seaward limit of the breaker zone.

INSHORE LIMITS OF WETLAND Junction of wetland and stable ground.

INSTRUMENT OF CONVEYANCE A written document by which property is transferred. A deed, contract, etc. To be effective in this state, an instrument of conveyance must have a grantor, some person or party capable of taking title to the real property (a grantee); right, title or interest to be conveyed, consideration stated as required by law, words of grant, signatures, and acknowledged or proved, delivered and accepted Recording suffices to transfer property, but is not actually required by law. See ORS 93.010, “Conveyances, how made.”

Oregon law provides in ORS 93.020, “(1) No estate or interest in real property, other than a lease for term not exceeding one year, nor any trust or power concerning such property, can be created, transferred or declared otherwise than by operation of law or by a conveyance or other instrument in writing, subscribed by the party creating, transferring or declaring it, or by the lawful agent of the party under written authority, and executed with such formalities as are required by law. (2) This section does not affect the power of a testator in the disposition of real property by a last will and testament, not to prevent a trust from arising

or being extinguished by implication or operation of law, nor to affect the power of a court to compel the specific performance of an agreement in relation to such property." Scs: ORS 93.030, requiring the consideration be stated on instruments of conveyance and related memoranda; ORS 93.040, requiring warning to be stated in instruments of conveyances, as well as contracts to convey, relating to approved uses of the land; ORS 93.110, removing the ancient requirement that words of inheritance are necessary to convey fee (the conveyances are now deemed to convey grantors entire estate); and other statutes in ORS chapter 93 that relate to conveyances and instruments of conveyance.

INSTRUMENT DIRECT (Surveying) The theodolite or engineer transit in its normal position. Signified by the letter "D" in field notes.

INSTRUMENT REVERSED (SURVEYING) The theodolite or engineer transit when the telescope is plunged from the instrument direct position. In field notes, the letter "R" signifies a reading with the instrument reversed, called a "reverse reading." Instruments of conveyance, statutory. Warranty deeds (ORS 93.850, form and effect); special warranty deeds (ORS 93.855, form and effect); bargain, and sale deeds (ORS 93.860, form and effect); quitclaim deeds (ORS 93.865, form and effect).

Note: ORS 93.870 provides: "The form of deeds set forth in ORS 93.850 to 93.865 are permissive and not mandatory. Other forms of deeds may be used for the conveyance of real property."

Also note.- ORS 93.110 states: "A deed of quitclaim and release, of the form in common use, is sufficient to pass all the estate which the grantor could lawfully convey by a deed of bargain and sale." See also ORS 93.860(3).

INTENT The purpose, aim, or design A mental attitude of a dedicator, or parties to a deed, made known by certain conduct or acts. An operation of the mind that must be proven as a fact, and is rarely to be inferred as an actual matter of law. It can usually only be evidenced by words or conduct of persons claimed to have entertained it. In *Parrott v. Stewart*, 65 Or. 254, the court said, "In determining as to dedication, the intention of the owner is the controlling factor, but the law does not seek for his undisclosed intention. It acts upon his intention as evidenced by his acts and the circumstances which he permits or encourages. True intent is the essence of every instrument of conveyance. *Swan E. Sanborn v. City of Minneapolis et al*, 35 Minn. 314. The presumption is that the intention of the parties is expressed by the language of the writ-

ten instrument itself. *Rall et ux v. Purcell et ux*, 131 Or. 19, 281 P. 832. The cardinal rule of construction (of a deed) is that the construction be made on the entire deed, and not merely upon a particular part, and having thus taken the instrument by the four corners, you can endeavor to ascertain its true intent. Sanborn. The courts are unanimous in their support of the rule that it is the joint intent of the grantor and the grantee that governs the intent of a conveyance of real property. A court's duty is to assume the position of the parties and to consider the circumstances of the execution of the conveyance, and therefrom, if possible, gain the intent of the parties to a conveyance. *Dexlin v. Powell* 67 Cal. App. 165, 170, 227 P. 231. The conveyance in its entirety and each part thereof is to be considered to give effect to the true intent of the grantor and grantee. *Las PaSas W. Co. v. Ventura*, 97 Cal. App. 296.

INTERACTIVE DIGITAL PLOTTING SYSTEM (CAMS) A technical term for CAMS; a Computer Assisted Mapping System consisting of a CPU (Central Processing Unit), a digitizer, CRT (Cathode Ray Tube), a decwriter, a controller mini computer and a plotter. Used for converting map data into digital data, and when needed, digital data into map data.

INTERCARDINAL POINTS The points on the compass that mark northeast, southeast, northwest and southwest. The cardinal points are North, South, East and West.

INTEREST (Oregon Subdivision and Series Partition Control Law) ORS 92.305 "Interest" includes a lot or parcel, and a share, undivided interest or membership which includes the right to occupy the land overnight. "Interest" also includes the lessee's interest in land for more than three years, or less than three years if the interest may be renewed under the terms of the lease for a total period of more than three years. "Interest" does not include any interest in a condominium (that term is defined in ORS 94.004) or any security interest under a land sales contract, trust deed or mortgage. "Interest" does not include divisions of land created by lien foreclosures or foreclosures of recorded contracts for the sale of real property.

INTEREST (Subdivision Laws) See ORS 92.305(4).

INTEREST IN LAND The legal concern of a person in a thing or property, or in the right to some of the benefits or uses from which the property is inseparable.

INTERFACE (CAMS) The junction between components of a data process system. The interface is that important element that allows different types of hardware and software to function as one total

system. A plotter, for example, must be interfaced to the computer and controller so that it understands the commands of those units and so that it will accept the commands and signals of the computers.

INTERMEDIATE (Micrographics) Microfilm used to make copies for distribution.

INTERMITTENT STREAM ORS 541.605 Any stream which flows during a portion of every year and which provides spawning, rearing or food producing areas for food and game fish. See Chapter 10.

INTERPOLATION The operation of finding terms between any two consecutive terms of a series (usually in math tables) that must conform to the law of that series. See Chapter 9.

INTERPOLATED WATER ELEVATION (IWE) Water elevation interpolated from established datum at two adjacent tide stations.

INTERSECTION (SURVEYING) A method of locating the horizontal position of a point by observations from two or more points of known position, thus measuring directions that intersect at the station being located.

INTERSTATE Between two or more states. "Intrastate" means entirely within the state.

INTERSTATE HIGHWAY Every state highway that is part of the National System of Interstate and Defense highways established pursuant to section 103(d), title 23, United States Code.

INTERSTATE SYSTEM Same as interstate highway.

INTESTATE One who dies without leaving a valid will, or the circumstances of dying without leaving a valid will that would effectively dispose of his estate.

INTESTATE SUCCESSION Succession to property of a decedent who dies intestate or partially intestate.

INTRASTATE Entirely within the state.

INVOLUNTARY ENCUMBRANCE Any encumbrance upon property other than a voluntary encumbrance.

ISOGONIC CHART A chart showing the magnetic declinations of the earth's surface by isogonic lines.

ISOGONIC LINES Lines passing through points of equal magnetic declination.

ISOPLETH A line of constant value of a given quantity with respect to either space or time, e.g., contours, isobars.

ISOSCELES TRAPEZOID A trapezoid whose nonparallel sides is equal.

ISOSCELES TRIANGLE A triangle which has two equal sides.

ISSUE OF NAVIGABILITY ORS 274.029(2) For the purpose of the Division of State Lands performance of its lawful functions, whether a stream was navigable in fact on February 14, 1859. A stream was navigable in fact on that date if it was susceptible of being used in its ordinary condition as a highway for commerce, trade and travel in the customary modes of trade and travel on water. See Daniel Ball and see discussion in Chapter 10.

JOINT ESTATE An estate which as a plurality of tenants having the same interest, in the estate, occurring under the same conveyance, commencing at the same time, and held under the same undivided possession.

JOINT TENANCY An estate arising by purchase or grant to a plurality of persons who have the same interest, under the same conveyance, commencing at the same date, and under the same undivided possession.

JOINT TENANTS A plurality of persons who, by grant or purchase, have one and the same interest in lands or tenements, by one and the same instrument of conveyance or will. They can hold the lands or tenements in fee-simple, for life or for years, or at will.

JUS COMMUNE The Latin "jus" means "law"; "commune" means "common." Jus commune means the "common law."

JUST TITLE Regarding acquisition of property by prescription, a title received from any person honestly believed to be the real owner, providing the title were such as to transfer the ownership of the property.

JUXTAPOSITION Near, contiguous, side-by-side.

KELPSHORE Submersible land. The land between the line of ordinary high water and the line of ordinary low water.

KILOMETER A metric unit of measure equal to 0.62137 mile; 3,280.83 feet. One mile equals 1.609 kilometers.

LAKE A lake is an island body of water of considerable size lying in a natural basin or depression below ordinary drainage level. Whether water is a lake, marsh, swamp or bay depends on the depth of the water, its permanence according to season, and its main source of supply. (See *Keener v. Sharp*, Mo. App, 95 S.W. 2d 648.)

LAMBERT, J. H. A Swiss surveyor and mathematician who developed, among other concepts, the conic conformal projection that provided the plane used for state plane coordinate grids, and the azimuthal equal area projection. He developed the conic conformal projection in 1772; 87 years prior to Oregon statehood. ORS 93.330 defines the Oregon Coordinate System as "...a Lambert conformal projection..." (not a Lambert grid).

LAMBERT GRID Used to denote the grid of the Oregon Coordinate System. Technically, the term is incorrect because Lambert did not develop the Oregon Coordinate grid (Oregon was not even a state in 1772 when Lambert developed his conic conformal projection), he only developed the plane upon which the grid is developed. It was Dr. O. S. Adams, senior mathematician for the U.S.C. & G.S. who developed the mathematics of the Oregon Coordinate grid.

LAMBERT PROJECTION This term can be used to denote either J. H. Lambert's conic conformal projection or his azimuthal equal-area projection. However, in Oregon it is generally used in reference to the conic conformal projection required by ORS 93.330 as the plane of the Oregon Coordinate System. (See Chapter 7 for an explanation.)

LAND Technically, the surface of the earth and all its natural resources. However, the term has no single, strict meaning, and its definition must be in context with the law in which it is applied. As used in assessment and taxation, it is that part of real property that is either the raw, undeveloped land, or improved to the extent to a site (a "site" existing when land has been improved to the point that it is, or is ready to be, used for the purpose intended). Site developments are improvements to the land that become so intertwined with the land as to become inseparable (fill, grading and leveling, utility facilities such as sewer and water, and any other improvements to the land necessary to improve it to become a site). The term is sometimes used synonymously with real property, real estate, and property (including structures, buildings, equipment, fixtures etc.), but such use is inappropriate when applied to assessment and taxation.

LAND CERTIFICATE The obligation of the United States government entitling the owner to secure the designated quantity of lands by following the requirements of the law.

LAND DESCRIPTION The description of the boundary of a parcel area or unit of land; of a lot, block, tract or other unit of a subdivision, condominium or planned community; or of a section or subdivision

of a section of a township. The description may be by metes and bounds, by parcel identifier, or by reference to a subdivision, condominium, planned community or the rectangular survey system.

LAND DEVELOPMENT (General) The division of lands into lots, parcels, units, memberships or interests for the purpose of disposition.

LAND GRANT The donation of public lands to a subordinate government, a corporation, or individual.

LANDMARK A monument or material mark or fixed object used to designate a land boundary on the ground.

LAND PARCEL (1) The basic land unit of the Oregon Standard Cadastral Map System. A contiguous area of land capable of being described in a single description, by a closed traverse; or as one of a number of lots, blocks, sections, or tracts in a subdivision or township, separately owned and capable of being separately conveyed. (2) This term has no strict meaning in the law, and its definition must be in context with the law in which it is used, or the principle, doctrine or concept where it has been applied. But its generally accepted meaning, in the statewide cadastral map system. Any tract of land, lot or contiguous lots, block or contiguous blocks, section or contiguous sections of a subdivision or township, owned by one party, at one time, for which there is a unique and complete bundle of rights; that can be enclosed by one, unbroken boundary line. Land on each side of a public way is contiguous if the owner of land abutting the public way has the underlying fee in the way (which is the case in most situations). The public easement does not divide the servient estate. Although the intent of the cadastral map standards is to confine to contiguous fee simple interests in one owner, the standards recognize that some noncontiguous segments of land have all the characteristics of a "land parcel." The standards allow such lands to be mapped, appraised and assessed as one parcel of land. For example, farmland on each side of an interstate highway, with access under the highway. Because an easement is a non-possessory interest in land, it must not be referred to as a "land parcel," but rather an "interest in land." If it becomes necessary to identify such interests in the assessment cadastre by reference to a parcel identifier, it must be identified by a "special interest number."

LAND PATENT A document or instrument issued by the United States conveying a part of the public domain. Forms being recorded in counties, titled "Land Patent," in which an individual claims to be the true owner of the land under a patent from the federal government, and makes certain assertions

as to its effect, are not conveyances in the usual sense. They are merely declarations by the record owner (usually) that he or she is the lawful owner of the property and challenges anyone to prove otherwise. The Oregon Department of Justice (150-303-4-00913; 83-261, "Allodium" Deeds) has identified these documents as attempts to place the land beyond the reach of the tax collector and government regulations. The department says, "They are ineffective and may be ignored by the assessor." See: "Allodium deeds."

LANDS, PUBLIC See public lands.

LAND SURVEYOR A person who has knowledge of the principles of mathematics, physical and applied sciences, the techniques of measurement necessary to the various surveying branches and the relevant requirements of law for adequate evidence, which are all requisite to surveying of real property. (ORS 672.002.) The practice of land surveying without registration as an Oregon Land Surveyor is prohibited as per ORS 672.025. See ORS 672.007 for acts that constitute the practice of land surveying.

LAND SURVEYS Generally, surveys executed to establish property boundaries and corners.

LANDED ESTATE Denotes real property; an interest in and pertaining to land.

LAND SURVEYS Generally, surveys executed to establish property boundaries and corners.

LAND USE CLASSIFICATION SYSTEM The coding of categories and subcategories designed to designate land or water use.

LAPLACE STATION A station of triangulation or traverse at which both astronomic azimuth and astronomic longitude have been determined. (A Laplace or true geodetic azimuth is an observed astronomic azimuth corrected for the prime vertical component of the deflection of the vertical.) The Laplace equation, used for computing true geodetic azimuth from astronomic azimuth is:

$$aG = aQ + ("A" "G) \sin "G$$

Where aG is the geodetic azimuth, aQ the astronomic azimuth, A the astronomic longitude, G the geodetic longitude and (G the geodetic latitude).

LAPPAGE A situation whereas one party claims land, under a deed, while another claims (in large part) the same land. The words lap, overlap, interference, conflict and interlock are synonymous with lappage.

LATENT AMBIGUITY Occurs when the deed appears certain, but the ambiguity arises not from the

document itself, but from extrinsic causes. See patent ambiguity.

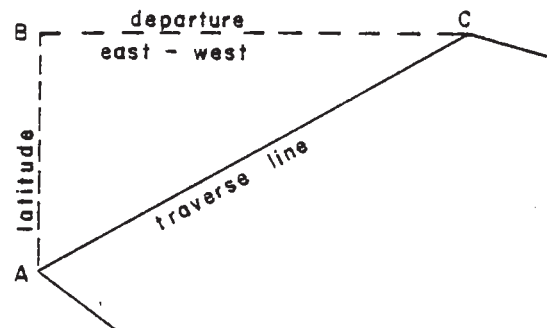
LATENT DEFECT A hidden defect in a deed which is not discoverable by general inspection made with ordinary care.

LATERAL RAILROAD A branch of a railroad that connects to the main trunk.

LATITUDE (Geodetic use) The angular distance north or south of the equator. The horizontal element of the geodetic coordinate system.

LATITUDE (In plane surveying) The amount that one end of a line is north or south of the other end; as the plane coordinates of, a point are known as the "easting and northing" of a point, the latitude is the difference between the northing of the two ends of the line. See latitude and departure.

LATITUDE AND DEPARTURE The x and y components used to mathematically check the closure of a polygon. The latitude of any line is the north-south difference between the two ends of a traverse line (distance A B in the following illustration).



The departure of the line is the east-west difference between the two ends of a traverse line (distance B C of the preceding illustration). The formula for computing the latitude and departure of a line is:

$$\text{Lat.} = \text{Dist. of AC} \times \cos \text{AC}$$

$$\text{Dep.} = \text{Dist. of AC} \times \sin \text{AC}$$

LATITUDINAL CURVES An easterly and westerly line properly adjusted to the same mean bearing from each monument to the next one in regular order; as distinguished from the long chord or great circle that would connect the initial and terminal points.

LATITUDINAL LINES (U.S. Survey of the Public Lands) The north and south exterior lines of a township.

LAW, KINDS OF ORS 40.990, Rule 202 of the Evidence Code identifies law that is judicially noticed in Oregon as:

1. The decisional, constitutional and public statutory law of Oregon, the United States and any state, territory or other jurisdiction of the United States.
2. Public and private official acts of the legislative, executive and judicial departments of this state, the United States, and any other state, territory or other jurisdiction of the United States.
3. Rules of professional conduct for members of the Oregon State Bar.
4. Regulations, ordinances and similar legislative enactments issued by or under the authority of the United States or any state, territory or possession of the United States.
5. Rules of court of any court of this state or any court of record of the United States or of any state, territory or other jurisdiction of the United States.
6. The law of an organization of nations and of foreign nations and public entities in foreign nations.
7. An ordinance, comprehensive plan or enactment of any county or incorporated city in this state, or a right derived therefrom. As used in this subsection, 'comprehensive plan' has the meaning given that term by ORS 197.015."

Note: Taking "notice" does not mean all of the foregoing sources are legally applicable in this state; are constitutional; are recorded as law in Oregon (although it is obvious the list includes acts, rules, ordinances, statutes, principles based on decisions, plans, regulations and legislative acts that are applicable in Oregon, or are a part of Oregon civil or common law). It means the courts will instruct the jury to accept as conclusive evidence any fact of law judicially noticed (in any civil action or proceeding). See ORS 40.085, Rule 201 (g) of the Oregon evidence code (ORS 40.010 to 40.585).

LAYOUT (or, Layout Map) A preliminary cadastral map or work map used for plotting secondary surveys and parcel boundaries; for computing acreages; for taxlotting maps; for plotting lines from aerial photos. The manuscript map.

LEAGUE 2.4 to 4.6 statute miles. The square league is 4,428 acres more or less.

LEASE A transfer of the rights of use and occupancy of land and/or structures by the owner (the lessor) to another person or persons or entity (the lessee) for a specified period of time.

LEASEHOLD ORS 91.500(13) "The interest of a person, firm or corporation who is the lessee under a lease from the owner in fee."

LEAST COUNT The smallest reading that can be obtained from a vernier, without interpolating. The least count is given by the expression

$$d/n$$

Where d = the smallest division on the vernier scale,

Where n = the number of divisions on the vernier.

LEDGE (Mining Claims) Synonymous with the word lode.

LEFT BANK (River or stream) The bank to the left when facing downstream.

LEGAL CADASTRE See cadastre, legal.

LEGAL DESCRIPTION This term has no technical, precise meaning. Rather, it is used in reference to descriptions that either derive their authority from the law, are founded on the law, or have a formal status derived from the law (often without a basis in actual fact). The term is usually applied in reference to the description on an instrument of conveyance, a document describing a taxing district boundary or boundary change, the surveyor's certificate on a subdivision plat, a road viewer's report, the "Record of Descriptions of Real Properties," etc.

LEGAL TITLE "One cognizable or enforceable in a court of law; or one which is complete and perfect so far as regards the apparent right of ownership and possession, but which carries no beneficial interest in the property, another person being equitably entitled thereto." *Black's Law Dictionary*, rev. 4th ed., *supra*.

LENGTH OF THE TIDE The vertical distances from a reference datum to the water surface at any stage of the tide.

LESSEE The one to whom a lease is made; the person holding the estate by right of lease.

LESSOR The one granting a lease.

LETTING Synonymous with leasing.

LEVEE An artificial bank confining a stream channel or limiting adjacent areas subject to flooding; an embankment bordering a submarine canyon or channel, usually occurring along the outer edge of the curve of a stream. The word is sometimes used to denote a place on a river for lading and unloading goods and for the reception and discharging of passengers to and from boats, ships, barges, etc.

LEVEL (1) pertaining to a level surface, (2) to make horizontal at the point of observation; and (3) an instrument used for leveling. See Chapter 6.

LEVEL DATUM A level surface to which elevations is referred. (Generally, used to denote mean sea level.)

LEVEL, ENGINEER'S A surveying instrument employed in determining the exact elevation, of definite points, above a datum. See Chapter 6.

LEVELING The surveying process of determining the difference in elevation between two or more points by measuring the vertical distance between the points; the determination of elevation, of points, above a datum. See Chapter 6.

LEVELING RODS Rods marked in feet and decimals of a foot, or in meters and decimals used with leveling instruments to determine distances in elevation.

LEVEL SURFACE A horizontal plane.

LEX In Roman law, "lex" means "law" or "the law."

LEX COMMUNIS The common law.

LEX SITUS *Black's Law Dictionary* defines this modern law term as Latin for "the law of the place where property is situated." See: *Black's Law Dictionary*, 4th ed., p. 1058, *supra*,

LICENSEE Authority to do a particular act, or series of acts, upon another's land, without possessing any estate therein. 1A Thompson on *Real Property*, *supra* sec 215, p. 188. It is a mere permit to do something that would otherwise be unlawful (*Gosliner v. Brionee*, 187 Cal. 557), or authorize the performance of acts (*Brush v. Lehigh Valley Coal Co.*, 290 Pa. 322), which would otherwise constitute trespass, *i.e.* the right of entry for the purpose of removing gravel. A license is not a property right protected by the constitution and confers no vested right in the licensee. Under common law, a license, being a mere privilege, may be revoked at the will of the licensor. The death of the licensor or sale of the property revokes the license. See: 1A Thompson, *supra* for a complete explanation of the concept of license, sec 215 to sec 216, pp. 187 to 248. In the Oregon case of *Smith v. Gardner*, 12 Or. 226, 6 P. 771, 53 A.L.R. 342, "A mere permissive use of a way by certain portions of the community constitute a license; and is something that may be revoked." In *City of Clatskanie v. McDonald*, 85 Or. 670, 167 P. 560, the court said, "Where the use is merely permissive, and not adverse, there is no basis on which a right of way by prescription may rest." That is, license cannot ripen into an easement by prescription.

LIEN A legal term generally used to signify an incumbrance on property; and is usually employed in connection with privileges, and not mortgages; however, mortgages are liens. Can be created by statute or contract; and they must arise from usages of trade or commerce. It denotes a legal claim or charge on real or personal property. Liens are founded upon the right to retain possession of the property of another until the debt or duty it secures is paid or discharged.

LIFE ESTATE An estate limited to the life of the person holding it, or some other person. It presupposes a fee existing elsewhere than in the life tenant, though the later may be empowered to convey the fee. A life estate may be created by a deed, lease, or devise, with or without stipulation for rent. A life estate is a freehold estate though not one of inheritance.

LIFE TENANT The holder of a life estate; the duration of the estate being the life of the life tenant or that of another particular person.

LIGHT PEN (CAMS) A device the size of a ballpoint pen which is used for pointing to a location on a CRT screen. It is one of several types of interactive positioning devices. ("Computer Mapping/Geographical Information Needs Survey" by Kristina Brooks; Geography Department, OSU.)

LIMITED-ACCESS HIGHWAY In Oregon, a throughway. A highway especially designed for through traffic, enhanced by limiting and controlling access thereto. Owners of land abutting such a highway do not have rights of access to and from the highway from the abutting land, as possessed by the owners of land abutting a public way that is not a limited-access highway. See: "Throughway" and throughway, county."

LIMITED-ACCESS THROUGHWAY A throughway,, a limited-access highway. Actually, throughway means a limited-access highway; consequently, the term "limited-access throughway" means a "limited-access highway."

LIMITED COMMON ELEMENTS ORS 91.500(14). Those common elements designated in the declaration or by Agreement of all the unit owners, as reserved for the use of a certain unit or number of units, to the exclusion of the other units.

LINE A narrow elongated mark drawn or projected as: (a) a circle of latitude or longitude on a map; (b) a mark designating a boundary, division or contour. A straight line is the shortest line that can be drawn between two points. A curved line is a line of which no part is straight. A broken line is composed of two or more straight lines.

LINE DRAWING Map copy suitable for reproduction without the use of a screen; a drawing composed of lines as distinguished from continuous tone copy. A cadastral map meeting the standards defined in the Manual of Cadastral Map Standards, Concepts and Cartographic Procedures would be a line drawing.

LINE FENCE A fence that marks the boundaries of a parcel of land or serves to mark such a boundary.

LINE OF ORDINARY HIGH WATER The line on the bank or shore to which the high waters ordinarily rises annually in season. See Chapter 10 and ORS 274.005.

LINE OF ORDINARY LOW WATER The line on the bank or shore to which the low water ordinarily recedes annually in season. See Chapter 10 and ORS 274.005.

LINE PRINTER An output device for computers, which prints one line at a time. It can be used as a high-speed listing or, by spacing symbols, as a map plotting device. The resultant graphic product, however, is of a quality much lower than a flatbed incremental plotter.

LINK One-hundredth of a chain; 7.92 inches. See chain.

LIS PENDENS A pending suit.

LITHOGRAPHY Planographic printing method based on the chemical repulsion between grease and water to separate the printing from nonprinting areas.

LITTORAL Characterizes upland bordering oceans, seas or lakes. Littoral could be called a "specific kind of riparian right."

LIVERY OF SEISIN Investiture or delivery of possession of and/or tenement.

LOCAL ASSESSMENT Assessment by the county or other local entity.

LOCATE Discovery by survey methods.

LOCATION (American Land Laws) The designation of the boundaries of a particular piece of land; either upon record or on the land itself.

LOCATION (Mining Laws) The act or series of acts whereby the boundaries of a mining claim are marked, however, in the absence of discovery it confers no right.

LOCATION MONUMENT Location monuments are established in districts where corners of the public survey, and other monuments within 2 miles, do not exist. Sites of the monuments are usually at some prominent point, giving good visibility from

every direction. The monuments are of stone, and marked "USLM" followed by the number of the survey. The exact reference point is marked by a cross (X) chiseled on the top of the monument.

LODE A vein containing ore. A fissure between well-defined boundaries containing ore, even though the ore is found at considerable intervals and in small quantities. Any body of mineral rock lying within clearly defined boundaries separating it from non-mineral rock; usually lying so close together as to be capable of being mined as a unit. Placer deposits are not lodes. Lode is synonymous with ledge.

LODE CLAIM A deposit of ore-bearing rock veins, known as mineral lodes, that has been staked out to specified dimensions by the prospector who made the legal discovery. If desired, a prospector may protect his rights by applying for a mineral survey and obtain a patent. All other forms of mineral, claims are known as placer claims.

LONG CHORD A straight line between the ends of a curve or segment of a curve. See Chapter 8.

LOST CORNER A point of a survey whose position cannot be determined, beyond reasonable doubt, either from traces of the original marks or from acceptable evidence or testimony that bears upon the original position, and whose location can be restored only by reference to one or more independent corners.

LOT, GOVERNMENT See government lots.

LOT, SUBDIVISION A unit of land that is created by the subdivision of land.

LOWER HIGH WATER (LHW) The lower of the two high waters of any tidal day.

LOWER LOW WATER (LLW) The lower of the two low waters of any tidal day. The single low water occurring daily during periods when the tide is diurnal is considered to be a lower low water.

LOWER LOW WATER DATUM (LLWD) Approximation to the hypothetical surface of mean lower low water that has been adopted as a standard reference for a limited area, and is retained for an indefinite period regardless of the fact that it may differ slightly from a better determination of mean lower low water from a subsequent series of observations. used primarily for river and harbor engineering purposes. The Columbia River lower low water datum is an example.

LOW WATER (LW) (Estuaries and Ocean Shore) Minimum height reached by a falling tide. The weight may be due solely to the periodic tidal forces or it

may have superimposed upon it the effects of meteorological conditions.

LOW WATER DATUM (LVTD) An approximation of mean low water that has been adopted as a standard reference for a limited area and is retained for an indefinite period regardless of the fact that it may differ slightly from a better determination of mean low water from a subsequent series of observations. Used primarily for river and harbor engineering purposes.

LOW WATER LINE The intersection of the land with the water surface at an elevation of low water. Not to be confused with the mean low water line.

LOW WATERMARK The point to which a river or other body of water recedes, under ordinary conditions, at its lowest stage.

LOWER HIGH WATER (LHW) The lower of the two high waters of any tidal day.

LOWER LOW WATER (LLW) The lower of the two low waters of any tidal day. The single low water occurring daily during periods when the tide is diurnal is considered to be a lower low water.

LOWER LOW-WATER DATUM (LLWD) Approximation to the hypothetical surface of mean lower low water that has been adopted as a standard reference for a limited area. It is retained for an indefinite period even though it may differ slightly from a better determination of mean lower low water from a subsequent series of observations. Used primarily for river and harbor engineering purposes. The Columbia River lower low water datum is an example.

LUNE That part of a spherical surface bounded by two great circles (i.e., formed by longitude lines or latitude lines).

MACRO (Interactive Graphics) A sequence of instructions which may be invoked by a single command. Macros are used to eliminate the need to enter a set of instructions into a computer, which are used repeatedly.

MAGNETIC AZIMUTH An azimuth measured with reference to the direction indicated by a magnetic compass needle. Measured from magnetic north, which is east or west of true north as shown by magnetic declination. (In Oregon the needle points east of true north.) See Chapter 4.

MAGNETIC BEARING The direction of a line within a quadrant, with respect to the magnetic meridian. See Chapter 4.

MAGNETIC DECLINATION The angle between the magnetic meridian and the geodetic meridian

(true) often referred to as simply "the declination." Magnetic declination is designated by degrees east or west of true north. (In Oregon the declination ranges from 19° to 22° east, depending on the specific year the survey was made and the exact location of the survey.)

MAGNETIC DISK (CAMS) A computer memory medium on which data is available by random access.

MAGNETIC TAPE (Or Mag. tape) (CAMS) A computer memory or storage device which will store a large amount of data; however, this data is only available by sequential search.

MAGNETIC VARIATION Regular or irregular changes in the magnetic declination. See annual variation and Chapter 4.

MAIN CHANNEL The bed of a river over which the main volume of water ordinarily flows. The main volume is not that which are attained under unusual flood conditions. Note: County and State boundary lines following channels do not change with a sudden and perceptible change in the main channel. See Chapter 10.

MAIN TRAVELLED WAY ORS 377.710 The through traffic lanes, exclusive of frontage roads, auxiliary lanes and ramps.

MAJOR BOUNDARY CHANGE The formation, merger, consolidation or dissolution of a city or district. See ORS 199.415(12).

MAJOR PARTITION A partition, which includes the creation of a road or street. ORS 92.010.

MAJORITY Majority of unit owners (Oregon Condominium Act). More than 50 percent of the voting rights allocated to the units by the declaration. ORS 94.004.

MANIFEST Clear to the mind, obvious, evident, conclusive, and unmistakable.

MANOR A house, dwelling or residence.

MANUSCRIPT, MAP The original drawing of a map Syn. "layout map," "working drawing."

MAP (GENERAL) A graphic representation of a planet's surface or part of that planet's surface; or a graphic representation of part of the known universe. The purpose of a map is to communicate the location or spatial relationship of physical, cultural or scientific features.

MAP (SUBDIVISION LAW) ORS 92.010. A final diagram, drawing or other writing concerning a major partition.

MAP, BASE A map on which information may be placed for purposes of comparison or geographi-

cal correlation. The term “base map” was at one time applied to a class of maps known as “outline maps.”

MAP, BATHYMETRIC A map delineating the form of the bottom of a body of water, or a portion thereof, by the use of depth contours (isobaths).

MAP, CADASTRAL See cadastral map.

MAP, CHOROPLETH A map showing statistical data by means of shading, dotting, hatching, coloring, or otherwise identifying a range of distribution within an area determined by political boundaries.

MAP, COASTAL ZONE A map depicting natural and cultural features in a section of the coastal zone. An orthophoto base is sometimes used for the area immediately inshore.

MAP DIGITIZATION Conversion of map data from graphic to digital form.

MAP, ENGINEERING A map showing information that is essential for planning an engineering project or development and for estimating cost. It is usually a large-scale map of a small area or route. It may be entirely the product of an engineering survey, or reliable information may be collected from various sources for the purpose, and assembled on a base map. Cadastral maps are often used, as a base for engineering maps.

MAP, FLOOD CONTROL A map designed for studying and planning control projects in areas subject to flooding.

MAP, FORESTRY A map prepared principally to show the size, density, kind, and value of trees in a designated area. Syn. “timber map”.

MAP LIFE The effective life of any map. In cadastral cartography it is that period of time when a map accurately represents the latest surveys, aerial photos and deeds. It is measured from the time that the original map is completed to that point in time when the cadastral map no longer accommodates new property surveys, segregations, new photogrammetric detail or, new parcel numbers. It also terminates when map specifications and graphic standards are no longer adhered to.

MAP MODEL (CAMS) A mathematical representation of the spatial relationships and geographic characteristics of a map.

MAP MODEL BUILDING (CAMS) Synonymous with “digital model building.” The process of converting cadastral map data to the mathematical datum of an interactive computer mapping system; and

writing polygon records comprising the map model in computer storage.

MAP PROJECTION Orderly system of lines on a plane representing a corresponding system of imaginary lines on an adopted terrestrial or celestial datum surface. Also the mathematical concept of such a system, e.g. “The Lambert Conic Conformal Map Projections”.

MAP, THEMATIC A map designed to provide information on a single topic, such as geology, soils, rainfall, population.

MAP, TOPOGRAPHIC A map that presents the horizontal and vertical positions of the features represented; distinguished from a planimetric map by the addition of relief in measurable form.

MAP TRIANGULATION A system of joined or overlapping triangles in which the length of the angles and sides are either established from existing surveys, or are computed from existing survey data. See Chapter 12, figure, 12-4.

MARINE MILE A linear measure of the sea equals to 6,086.7 feet or 60 geographical or sea miles to a degree.

MARKETABLE TITLE Title free from encumbrances, judicial doubt, or uncertainty; one in which the poesesalon can be acquired and retained without litigation or judicial decision. A title acceptable to a reasonable and prudent purchaser. Title that would insure to the owner the peaceable enjoyment and control of the land against all otherL But it does not mean a “flawless” title. Synonymous with merchantable title.

MARKET ROADS Main traveled roads of a county, exclusive of state highways and secondary state highways that connect with the market places of commercial community centers of a county and with county roads in adjoining counties. ORS 369.020, enacted in 1973, provided for the county courts or city councils to designate former county market roads as “ways of public easement.” If no such designation was made (on or before Jan. 1, 1974), the roads became a part of the respective county or city road systems as of that date (1973 Or. Laws ch. 240, sec 2).

ORS 369.025 provides, “Not-with-standing ORS 369.020 or any action pursuant thereto, a road within a city that was a designated county market road prior to Jan. 1, 1974, shall be on the county road system until the county surrenders jurisdiction over the road within a city and the city accepts the county order and offer of surrender in the manner prescribed in ORS 373.270.” (1975 Or. Laws ch. 362, sec 1)

MATHEMATICAL DATUM The central, most used coordinate datum of the state, the Oregon Coordinate System. See Chapter 2.

MAVERICK SURVEY A survey that is not in harmony with abutting surveys. Does not mean that the survey is necessarily in error. See Chapter 12.

MEAN That which is intermediate or has a value intermediate between two extremes. The middle rate, degree or point in place.

MEANDER To follow a winding or flexuous course of a stream. A line (usually the center) that follows the sinuosities of a stream. "Meander" is not synonymous with "meander line." If a deed runs "to a stream; thence with the meanders of said stream," etc., it usually means that line which follows the sinuosities of that stream, and the stream is the boundary, so the deed would be running to the center of the stream (but only if the stream is not navigable); not merely to the banks or the surveyed meander line. See chapter 10.

The word "meander" is derived from a winding river in Phrygia called the Mederiz River (known in classic history as the Meander River).

MEANDER CORNER Corner monuments established according to the U.S. Public Land Surveys at the intersection of section lines with the meander lines of all meanderable bodies of water. See Chapter 10.

MEANDERED LAKE ORS 274.425. "As used in OPUS 274.430 to 274.520, meandered lake means a lake wholly or partly within this state that has been meandered by the United States Surveys." ORS 274.430 provides that all meandered lakes are declared navigable; however, it does not exclude non-meandered lakes from being declared navigable. See Chapter 10.

MEANDER LINES The traverse of the margin of a permanent natural body of water. "In original surveys, meander lines were not run as boundary lines, but for the purpose of defining the sinuosities of the bank or shore line, and for ascertaining the quantity of land remaining after segregation of the water area." (From the "Manual of Surveying Instructions," U.S. B.L.M., Dept. of Interior)

MEAN HIGH TIDE A mean of all the high tides. The average to be used should be, if possible, the average of all the high tides over a period of 18.6 years. See Chapter 10.

MEAN HIGH WATER The average height of all high waters over a given location during a span of 18.6 years. According to the "B.L.M. Manual of Surveying Instructions," it is the margin of the area oc-

cupied by the water for the greater portion of each average year. See Chapter 10.

MEAN HIGH WATER LINE (MHWL) Intersection of the land with the water surface at the elevation of mean high water. See "shoreline."

MEAN HIGHER HIGH WATER (MHHW) Tidal datum that is the arithmetic mean of the higher high waters of a mixed tide observed over a specific 19-year Metonic cycle (the National Tidal Datum Epoch). Only the higher high water of each pair of high waters of a tidal day is included in the mean. For stations with a shorter series, simultaneous observations are made with a primary control tide station to derive the equivalent of a 19-year value.

MEAN LOWER LOW TIDE The average of lower low tides for 18.6 years. See Chapter 10.

MEAN LOWER LOW WATER The average of all lower waters over a period of 18.6 years.

MEAN LOW TIDE Average of all low tides, both low and lower low, over a fixed period of 18.6 years. See Chapter 10.

MEAN LOW WATER (MLW) Tidal datum that is the arithmetic mean of the low water heights observed over a specific 19-year Metonic cycle (the National Tidal Datum Epoch). For stations with shorter series, simultaneous observations are made with a primary control tide station in order to derive the equivalent of a 19-year value. For a semidiurnal or mixed tide, the two low waters of each tidal day are included in the mean. When any higher low water is indistinct, it is determined by record examination. For a diurnal tide, the first low water of each tidal day is used in the mean. In the event a second low water occurs, only the diurnal low water is included.

MEAN LOW WATER LINE (NLWL) The intersection of the land with the water surface at the elevation of mean low water.

MEAN LOWER LOW WATER (MLLW) Tidal datum that is the arithmetic mean of the lower low water heights of a mixed tide observed over a specific 19-year Metonic cycle (the National Tidal Datum Epoch). Only the lower low water of each pair of low waters of a tidal day is included in the mean. For stations with shorter series, simultaneous observations are made with a primary control tide station to derive the equivalent of a 19-year value.

MEAN LOWER LOW WATER LINE (MLLWL) The intersection of the land with the water surface at the elevation of mean lower low water.

MEAN RANGE OF TIDE The difference in height between mean high water and mean low water.

MEAN RIVER LEVEL Tidal datum that is the average height of the surface of a tidal river at any point for all stages of the tide observed over a 19-year Metonic cycle (the National Tidal Datum Epoch), usually determined from hourly height readings. In rivers subject to occasional freshets the river level may undergo wide variations, and for practical purposes certain months of the year may be excluded in the determination of tidal datum. For charting purposes, tidal datum for rivers are usually based on observations during selected periods when the river is at or near low water stage.

MEAN SEA LEVEL The average height of the sea for all stages of the tide over a period of 18.6 years (as determined from hourly readings). Mean sea level is usually the datum for elevations; the level datum.

MEAN SEA LEVEL OF 1929 (MSL 1929) Determination of mean sea level (last adjusted in 1929). that has been adopted as a standard datum for heights.

MEAN TIDE LEVEL (MTL) The mean surface elevation as determined by averaging the height of water at equal intervals of time, usually at hourly intervals. MWL is used in lieu of MHW in inland tidal waters when the nontidal changes in water level are greater than, or on the same order of magnitude as, the range of tide.

MEAN WATER LEVEL LINE (MWLL) The line formed by the intersection of the land with the water surface, at an elevation of mean water level.

MEASURE (V.T.) To compute or ascertain the extent, quantity, dimensions, or capacity of, by a certain standard. (V.I.) to take a measurement or measurements.

MEDIAN LINE (OF BODY OF WATER) A continuous line, formed by a series of intersecting straight line segments or a combination of straight line and curved line segments, every point of which is equidistant from the nearest point on the opposite shores. Synonymous with thalweg.

MEMORANDUM An instrument that contains the date of the instrument being memorialized, the names of the parties, a legal description of the property involved, and the nature of the interest created, which is signed by the person from whom the interest is intended to pass, and acknowledged or proved in the manner provided for the acknowledgement or proof of deeds. ORS 93.640.

MENU A rectangular area of the digitizing surfaces which is divided into an array of squares for the assignment of commands or macros. The menu allows execution of the commands or macros by merely touching the appropriate square with the stylus or cursor.

MERCATOR PROJECTION A map projection commonly employed when constructing maps of the world. In the Mercator projection the distortion created by an east-west expansion of the projection is balanced by mathematically computing the positions for the parallels of latitude to produce north-south expansion that increases at the same rate as the east-west expansions; the result being a conformal projection. The Mercator projection is an appropriate projection for areas with longer north south than east west dimensions (i.e. California). The Lambert conic conformal projection is ideal for areas with wider east-west dimensions than north south dimensions (i.e. Oregon and Washington). See Chapter 7.

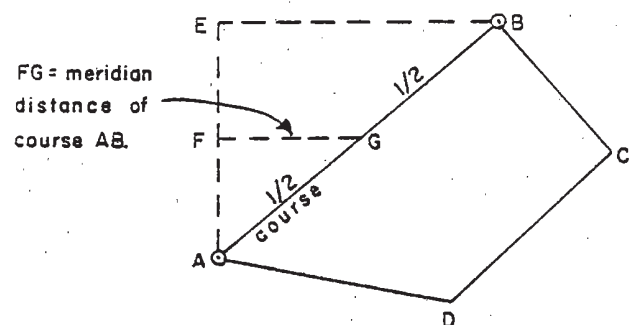
MERCHANTABLE TITLE Synonymous with marketable title.

MERE RIGHT The mere right of property in land as distinguished from possession or even the right of possession in land.

MERGER (ESTATES) The absorption of a lesser estate into a greater estate in the same owner and one and the same right without any intermediate estate. Where the owner of a life estate acquires the remainder therein, there is a merger of the two estates. A merger is dependent on intent.

MERIDIAN A north-south line from which longitudes or departures, and azimuths are reckoned. See Chapter 4.

MERIDIAN DISTANCE The right angle distances from the center point of a course to the reference meridian. In the following illustration FG is the meridian distance of course AB.



MERIDIONAL LINES Range lines; the east and west exterior lines of a township.

METE To measure; a measure; to exactly define.

METER A unit of length in the metric system that equals approximately 39.37 inches.

METES The exact length of each line and the exact quantity of land in square feet, rods or acres; however, when used in the term metes and bounds

it does not necessarily mean that the length of a boundary is given. A parcel of land bounded in the deed description by the lands of named persons, rather than by bearings and dimensions would qualify as land described by metes and bounds. (Amer. Jur.)

METES AND BOUNDS By metes and bounds, in strictness, may be understood to be the lines of land with their terminal points and angles. . In general, metes and bounds means the boundary line or limit of a tract, which boundary may be described by rivers and objects, either natural or artificial (which are permanent in character and erection) and so situated with reference to the tract to be described that they may be conveniently used for the purpose of indicating its extent. A description locating a center line traverse and naming the width of the tract in relation to that centerline would qualify as a metes and bounds description. See also mete, and metes.

METONIC CYCLE A period of 235 lunations or about 19 years. Devised by Meton, an Athenian astronomer (5th century B.C.) for the purpose of obtaining a period at the end of which the phases of the moon recur in the same order and on the same days as in the preceding cycle.

METRIC SYSTEM An International system of weights and measures, the units of which are derived from the meter. The meter is the unit of linear measure; the liter, the unit of capacity; the are, the unit of land area; the square meter, the unit of small surface area; the ster, the unit of cubic measure; and the gram, the unit of mass and weight. (The meter was originally based on one-ten-millionth of the distance from the North Pole to the Equator.)

MICROFICHE (MICROGRAPHICS) A sheet of microfilm made up of multiple microimages in a grid.

MICROGRAPHICS A generic term covering all techniques that reduce documents to microimages, i.e. microfilming.

MIDPOINT (RECTANGULAR SURVEY) Halfway between two section corners; halfway between a 1/4 corner and a section corner; etc.,

MIDPOINT (CURVES) That point on the arc of a circular curve that is the same distance from both ends of the arc. See Chapter 8.

MILE, NAUTICAL 6,080 feet. Mile, statute. N= STATUTE. 5,280 feet; 1,760 yards; 80 chains; or 8 furlongs.

MINE An excavation in earth made for the purpose of removing metals ores, coal, or precious stones.

MINERAL ORS 273.775. "Mineral includes oil, gas, sulfur, coal, gold, silver, copper, lead, cinnabar, iron manganese and other metallic ore, and any other solid, liquid or gaseous material or substance excavated or otherwise developed for commercial, industrial or construction use from natural deposits situated within or upon state lands, including mineral waters of all kinds."

MINERAL DEED A realty conveyance involving a severance, from the fee, of a present title to minerals in place; either affecting such severance of title in the first instance, or conveys a part of such mineral ownership previously carved from the fee.

MINERAL DISTRICT A term of no precise meaning that generally designates areas where valuable minerals are found, or where the business of mining is chiefly carried on.

MINERAL ENTRY See mineral land entry.

MINERAL ESTATE An estate in fee simple in and to minerals, and conveyance or reservation thereof gives title to minerals in place; an entire bundle of rights a landowner has in the minerals in his land.

MINERAL INTEREST An estate in fee simple in and to minerals, and conveyance or reservation thereof gives title to minerals in place. It means a mineral interest in all minerals, beneath the surface, including oil and gas in place, and constitutes a present ownership of an interest in real property.

MINERAL LAND Used in reference to metaliferous lands and all other land chiefly valuable for deposits of mineral character. Mineral lands would include those with valuable deposits of gypsum, granite, coal, iron, oil, uranium, metal bearing ores, and deposits of a mineral character which are useful in arts (such as clay, marble and agate) or valuable for purpose of manufacture (sulfur, bauxite, etc.). The term mineral lands include land, which is worth more for mining than for agriculture. Minerals must be in sufficient quantities to justify expenditure for its extraction.

MINERAL LAND ENTRY The act of filing a claim to hold or purchase mineral lands belonging to the public domain The term implies discovery of precious metals in paying quantities in the lands to be entered, and the doing of work upon the claims necessary to develop and successfully operate mines.

MINERAL LEASE A contract permitting the lessee to explore for minerals on the land of the lessor in consideration of the payment of a rental and/or bonuses. It is an incorporeal right.

MINERAL LODGE A mineral bed of rock with definite boundaries, and any zone or belt of mineralized rock lying within boundaries clearly separating it from neighboring rock. Synonymous with lode.

MINERAL RIGHTS An interest in minerals, including oil and gas, in exclusion of the rights to the land and improvements. It is an interest in the nature of servitude granting an owner of the rights to explore for, and extract minerals from land subject to the rights.

MINERAL SERVITUDE A right to go upon the land and produce the minerals.

MINERAL SURVEY Surveys made to mark the legal boundaries, of mineral deposits or ore bearing formations on the public domain, where the boundaries are to be determined by lines other than the normal subdivision of the public lands. Placers usually do not require a mineral survey, unless they are located on unsurveyed land or the configuration of the mineral deposit is such as to make conformation to the public survey impractical. Millsites embracing land occupied for ore milling purposes or used in any manner incidental to mining operations may be located, surveyed and patented in a manner similar to lode claims.

MINING CLAIM A portion of the public mineral lands which the prospector, for mining purposes, takes up and holds in accordance with the United States mining laws. Oregon tax laws treat mining claims in two ways. Patented mining claims are taxable. Unpatented mining claims are exempt from taxation as provided for in ORS 307.080. ORS 307.080. Except for the improvements, machinery and buildings thereon, mining claims are exempt from taxation prior to obtaining a patent therefore from the United States. NOTE: "Mining claim" is not synonymous with "mineral rights."

MINING DISTRICT A section of country with deposits of gold, silver, copper, etc. designated by name and described or understood as being confined within certain natural boundaries, and which is worked under the rules and regulations prescribed by the miners therein, e.g., the Bohemia Mining District east of Cottage Grove, in Lane and Douglas Counties.

MINOR BOUNDARY CHANGE An annexation, withdrawal or transfer of territory to or from a city or district. See ORS 199.415.

MINOR PARTITION A partition that is subject to approval by a city or county under a regulation or ordinance adopted pursuant to ORS 92.046 and that does not include the creation of a road or street. See ORS 92.010(4).

MINUTES Angular measures equal to 1/60th of a degree. There are 60 seconds in a minute and 60 minutes in a degree. See Chapter 4.

MISTAKE An error in action. An act or omission arising from ignorance or misconception. See Chapter 6.

MIXED TIDE Tide with a large unequally in either the high or low water heights, with two high waters and two low waters usually occurring each tidal day.

MONUMENT (BOUNDARIES) Permanent landmarks established for the purpose of indicating boundaries. Monuments described in deeds can be either natural or artificial, e.g. stream, roads, fences, stakes, posts, trees, bottles, buildings, etc.

MONUMENT (SURVEYING) A physical structure erected for the purpose of making points on the earth's surface. The monuments of land surveys range from the deposit of some durable material, a marked wooden stake or post, a marked stone, an iron post having an inscribed cap, a marked tablet set in solid rock or concrete block, a marked tree, a rock in place marked with a cross (X) at the exact point of the corner, and other special types of markers.

MORE OR LESS Words of safety and precaution meaning reasonably certain, about, or approximately. More or less should NOT be construed to mean that the distance, or quantity can be ignored; that it is subject to small errors; or to admit an unlimited variation in measurement or quantity. If a deed described property by metes and bounds, being so many acres "more or less," it should be construed to mean "all of the described land in gross," not all of the land by acreage; however, where the land was described as "the west 15 acres more or less of the NW1/4 NW1/4," the courts have held that the acreage controlled and the deed was construed to mean in gross of 15 acres.

MORTGAGE A security for payment of debt. A conveyance of property as security for a debt, and it becomes void upon payment of the debt. The debtor makes a mortgage to his creditor or to someone in trust for him.

MORTGAGEE The person to whom property is mortgaged. ORS 87.005(6) defines mortgagee as: a person who has a valid subsisting mortgage of record or trust deed of record securing a loan upon land or an improvement.

MORTGAGOR The person granting property as security for a debt.

MOSAIC, AERIAL Assembly of aerial photographs whose edges usually have been cut selectively and matched to the imagery on adjoining photographs to form a continuous representation of a portion of the Earth's surface.

MOUTH OF RIVER The mouth of any river emptying into the Pacific Ocean, including the bay or tidal area formed by such a river, is the seaward end of the jetty or jetties of the river. If no jetties exist, the extension of the Pacific Ocean shoreline high watermark across the river, bay or tidal area is the mouth of such river. See ORS 511.011. In inland waters it is the point where the river empties into another body of water at mean low water or mean low tide.

MUNICIPAL Cities, towns or other local government units. The word is derived from the Roman word *municipium*, meaning a town.

MUNICIPAL CORPORATIONS Voluntary associations created and built upon, voluntary assent of a community and its citizens. A local division of the state, vested with certain rights of self-government, in regard to its local and internal affairs, as are conferred upon it by the legislature. A city is a municipal corporation; a county is a municipal or a quasi municipal corporation invested with legislative powers to be exercised for local purposes, subject to the control of the state, but is not, in a strict sense, a municipal corporation.

MUNICIPALITY A city, county or other unit of local government otherwise authorized by law to enact codes.

NADIR (Photogrammetry) The point on the ground vertically beneath the lens of the aerial camera, at the instant of exposure. Synonymous with ground plumb point. See figure 951 of Chapter 9.

NATIONAL GEODETIC VERTICAL DATUM (NGVD) A fixed reference adopted as a standard geodetic datum for heights. The datum was derived for land surveys from a general adjustment of the first-order level nets of both the United States and Canada. In the adjustment 21 tide stations in the U.S. and 5 in Geodetic were held as fixed. The geodetic datum now in use in the U.S. is the National Geodetic Vertical Datum of 1929. The geodetic datum is fixed and does not take into account the changing stands of sea level. Because there are many variables affecting sea level, and because the geodetic datum represents a best fit over a broad area the relationship between the geodetic datum and local mean sea level is not consistent from one location to another in either time or space. For this reason, NGVD must not be confused with mean sea level.

NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929; formerly the Mean Sea Level of 1929). Datum to which all elevations in the NGV network are referred as well as terrain elevations on maps of the National Topographic Map Series.

NATIONAL MAP ACCURACY STANDARDS Specifications promulgated by the U.S. Office of Management and Budget to govern the accuracy of topographic and other maps produced by Federal agencies.

NATIONAL TIDAL DATUM EPOCH Specific 19 year cycle adopted by N.O.S. as the official time segment over which tide observations are taken and reduced to obtain mean values for tidal datum. It is necessary for standardization because of apparent periodic and apparent secular trends in sea level. The present National Tidal Datum Epoch is 1941–1959. It will be reviewed for possible revision every 25 years.

NATURAL BOUNDARY Any existing boundary that can readily be identified and located and that is the result of natural causes rather than artificial boundaries created or erected by man. A river is a "natural boundary," an irrigation ditch an "artificial boundary." This term is often used to denote a feature that is an "ideal" boundary. When used this way, it is meant to include artificial boundaries as well as boundaries created by nature. For example, a public way is an ideal boundary, and is, therefore, "a natural" feature for limiting the extent of a parcel of land; consequently, it is a "natural boundary." In the rule that courses and distances give way to a call for a "natural boundary" (because it is fixed, unchangeable, and more likely to be true than courses and distances), the latter use (meaning an "ideal" or typical boundary, natural as well as artificial) applies.

NATURAL MONUMENTS Objects permanent in character, which are found on land as they were placed by nature, e.g., lakes, streams, bluffs, etc.; in contradistinction to artificial monuments which are landmarks or signs erected by the hand of man.

NATURAL OBJECTS Any permanent features on the landscape, either natural or artificial.

NAUTICAL MILE 6,080 feet.

NAVIGABILITY, ISSUE OF See issue of navigability.

NAVIGABILITY, THE TEST OF A test to determine, legally, whether or not a stream is navigable in fact. The test is actually a federal question; e.g., regardless of what Oregon Courts have said about streams or other bodies of water being navigable or nonnavigable, for the purpose of ownership of the bed of the stream, the Federal test governs. In

the Daniel Ball case (77 U.S.S. 557, 19 L. ed. 999 1870) Justice Field laid down the rule of navigability, which remains unchanged today: A different test must, therefore, be applied to determine the navigability, of our rivers, and that is found in their navigable capacity. Those rivers must be regarded as public navigable rivers in law, which are navigable in fact. And they are navigable in fact when they are used, or are susceptible to being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water. And they constitute navigable waters of the United States within the meaning of the Acts of Congress, in contradistinction from the navigable waters of the States, when they form in their ordinary condition by themselves, or by uniting with other waters, a continued highway over which commerce is or may be carried on with other states or foreign countries in the customary modes in which such commerce is conducted by water." See Chapter 10.

NAVIGABLE Capable of being navigated. See navigability, the test of and Chapter 10.

NAVIGABLE BODY OF WATER All tidewater streams, and other important permanent bodies of water whose natural and normal condition at the date of admission of the State into the Union was such as to classify the same as navigable water. All meandered lakes of this state are navigable (including any nonmeandered lake that is navigable in fact). See navigability, the test of and Chapter 10.

NAVIGABLE IN FACT See "navigability, test of." In *Guilliams v Beaver Lake* (90 Or. 13 1918) the court said that commerce included a vessel carrying a load of passengers to a picnic.

NAVIGABLE RIVER In general, rivers that are susceptible to any public use such as floatation of logs. This definition, however, is inadequate in determining the ownership of lands underneath the streams, which are not navigable under the Federal test of navigability. The opinion of the Supreme Court of the U.S. establishes the guiding principle spelled out in the definition of navigability, the test of. See also *U.S. v Holt State Bank* 270 U.S. 49, 56 1926; also Chapter 10.

NAVIGABLE WATERS Waters that were navigable in fact under the test in the Daniel Ball case, at the time Oregon was admitted to the Union as a State. See navigability, the test of and Chapter 10.

NAVIGABLE WATERS OF THE U.S. In general, "waters that form in their ordinary condition by themselves, or by uniting with other waters, a continued highway over which commerce is or may be

carried on with other states or foreign countries in the customary mode in which such commerce is conducted by water." (U.S.C.A. Const. Article 1, Subsection, 8, cl. 3.) See Chapter 10.

NEAP TIDES When the moon is in its first and third quarters, the tides do not rise as high or fall as low, as on the average; at such times the tides are known as "neap" tides. ,

NEEDLE, COMPASS A needle, in a compass, that turns freely on a pivot and points to magnetic north See Chapters 4 and 6.

NET ESTATE ORS 111.005(23) The real and personal property of a decedent, except property used for the support of his surviving spouse and children and for the payment of expenses of administration, funeral expenses, claims and taxes.

NET INTESTATE ESTATE ORS 111.005(24) Any part of the net estate of a decedent not effectively disposed of by his will.

NEW LANDS ORS 274.905 Those lands protruding above the line of ordinary high water, whether or not connected with the adjoining or opposite upland or riparian lands on the same side of the body of water, which have been created upon submersible or submerged lands by artificial fill or deposit. New land does not include bridges, wharves and similar structures constructed upon submersible or submerged lands by other than artificial fill or deposit. ORS 274.905 to 274.940 apply to new lands created before, on or after May 28, 1963. See Chapter 10.

NON GRAPHIC DATA (Interactive Graphic Term) A term describing alphanumeric information (e.g. courses, notes, distance, eng. stations, section numbers, etc.) associated with map lines.

NON ORTHOGONAL COORDINATE SYSTEM A coordinate system where both the x and y axes are skewed; neither axis being vertical or horizontal, and the axes are not perpendicular.

NON RECTANGULAR COORDINATE SYSTEM A coordinate system where either the x or y axes are skewed (not at right angles to the other). The rectilinear axis is either a true horizontal axis or true vertical axis.

NOOK OF LAND 12.5 acres of land.

NORTH One of the cardinal points of the compass. That point of intersection of the horizon and meridian which is nearest the north pole. Termination of the north end of longitudinal lines. When used in a deed description, and not controlled by any other words, means due north or geodetic north; the meaning is dependent upon the context of the deed.

NORTHEAST (NE) The northeast quadrant of a section (NE of section or NEIA of section); or NE corner of a one quarter section. The quadrant of the compass between north and east. Where the term is employed to designate a boundary, or line, in the description of a deed, it should be construed as equivalent to a call to run due northeast (N 45°00'00"E) as the case may be, in the absence of a call for visible monuments, or any other description of a line which locates it with reasonable certainty.

NORTHERLY From south towards north. When .not controlled by definite courses, monuments, or other definite descriptions, usually means due north. This term must always yield to monuments and other definite calls.

NORTHERLY COURSE Generally, a course having a direction toward the north; not due north.

NORTHERNMOST The farthest to the north; most northern.

NORTHING One of two values indicating the position of a point on a grid system. The northing coordinate is abbreviated N or Y.

NORTH-NORTHEAST 22°30' east of north.

NORTH-NORTHWEST 22°30' west of north.

NORTHWEST The northwest quadrant of a section (NW of section, or NWI/4 of section); or NW corner of a one-quarter section corner (NWI/4 NWI/4 of section, or NW NW of section). The quadrant of the compass between north and west. Where the term is employed to designate a boundary, or line, in a description of a deed, it should be construed as equivalent to a call to nm due northwest (N 45°00'00" W), as the case may be, in the absence of a call for visible monuments, or any other description of a line which locates it with reasonable certainty.

NORTH AMERICAN DATUM OF 1927 U.S.C. & G.S. readjustment of all first-order triangulation of the United States, and the readjusted positions, together with certain adopted geodetic data. This datum was based on the Clarke Spheroid of 1866 and the adopted position of an initial point in central Kansas called Meades Ranch. All U.S.C. & G.S. (now NOAA) horizontal control is referred to this datum and values assigned to horizontal control monuments are expressed in degrees, minutes and seconds of the geodetic coordinates. See Chapter 6.

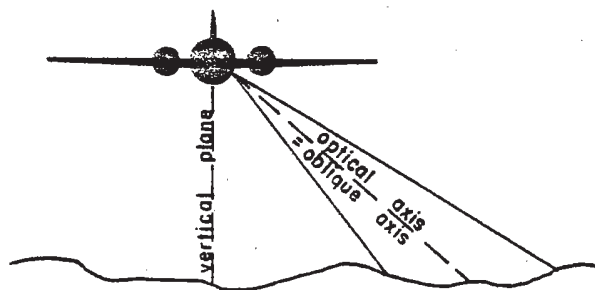
NORTH ZONE A division of the Oregon Coordinate System between north latitude 44°20' and 46°00'. The origin of coordinates is at the intersection of the meridian 120°30' west of Greenwich and the

parallel 43°40' north of latitude. This origin is given the coordinates $x=2,000,000$ feet and $y = 0$ feet. See the map of the Zones of the Lambert Projection in the appendix; and Chapter 7.

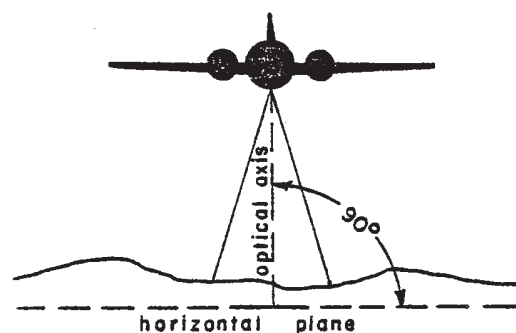
NOTICE STATUTE (Recording of deeds) Not used in Oregon. A compromise between the penalty aspect of the race statute (whereby in, the case of subsequent purchasers, title vests in the first to record the deed; regardless of whether he had notice of a first purchase) and the viewpoint of protecting subsequent purchasers who rely on the recording statute; i.e., they can assume that if no other transfer is recorded, there is none. The notice statute is used in 25 states. The notice statute induces an early record by the first purchaser in that protection is only supplied if he records before the second purchase occurs. If the subsequent purchaser for value has notice of the prior transfer, however, he cannot obtain title. See race notice and race statute.

NUMERICAL MAP A digital representation of a map; usually on computer tape. Cadastral maps in the CAM system are on a numerical map file.

OBLIQUE AERIAL PHOTOGRAPHS Aerial photographs taken at an angle between the horizontal and the vertical. See the following illustrations.



OBLIQUE AERIAL PHOTOGRAPHY



VERTICAL AERIAL PHOTOGRAPHY

OBLITERATED CORNERS Corners where no traces remain of the original surveyor's work. It differs from a lost corner in * that it can be located by competent evidence (such as a witness tree), whereas, a lost corner cannot be replaced by reference to any existing data or source of information.

OBTUSE ANGLE Any angle greater than 90°.

OBTUSE TRIANGLE A triangle in which one angle is greater than 90°.

OCEAN SHORE ORS 390.605 The land lying between extreme low tide of the Pacific Ocean and the line of vegetation as established and described by ORS 390.770. ORS 390.615 states that the ownership of the ocean shore is vested in the State of Oregon. The Oregon Statutes generally coincide with the U.S. Manual of Surveying Instructions which describe the ocean shore as the space between the margin of the water at its lowest stage and the banks of the high water mark.

ODOMETER An instrument for measuring a distance traversed. The odometer is not an accurate measuring instrument for cadastral map purposes; however, it is a good device for making a rough check of measurements.

OFFLINE (Interactive Graphics) Not in direct communication with the central processing unit (CPU) of a computer.

OFFSET LINE A supplementary line close to, and usually parallel to a main survey line to which it is referenced by measured offsets. When the line for which data are desired is in such a position that it is difficult to survey it, the required data are obtained by running an offset line in a convenient location and measuring offsets from it to salient points on the other line.

OFFSET LITHOGRAPHY Indirect method of printing whereby an ink image is transferred from a press-plate to an intermediate rubber blanket and from that to the paper.

OFFSET TRAVERSE The traverse of an offset line.

OFFSHORE A comparatively flat zone of variable width that extends from the outer margin of the rather steeply sloping shoreface to the edge of the continental shelf.

OMITTED PROPERTY Real, personal or centrally assessed property that has been erroneously omitted from the assessment roll. See ORS 311.207 (notice of intention to add omitted property to rolls).

ON-LINE (Interactive Graphics) Operation of peripheral equipment (plotter, decwriter, digitizer, etc.)

under control of the central Processing unit (CPU) of a computer.

ONEROUS TITLE Title acquired by the giving of good and valuable consideration.

OPEN TRAVERSE A traverse starting at a point of known or assumed position, and ending at a point whose, relative position is unknown with respect to the datum of the starting point. See Chapter 6.

OPERATIVE WORDS (of a deed) Words of grant, release, or transfer, in a deed, that are sufficient to transfer an estate from the grantor to the grantee. The words grant, bargain and sell, convey, give, release, alienate, and enfeoff are sufficient to make a deed operative.

OPTICAL, PRINT (Micrographics) A microfilm print made by projection, not contact.

ORDER OF ACCURACY A general definition of the accuracy required for a survey. To define the accuracy required, surveys are divided into six parts: superior, first-order, second-order class I, second-order class II, third-order class third-order, and I class H (requiring the lowest acceptable degree of accuracy in local horizontal control of the National Horizontal Control Network). A seventh order is used in some private surveys. "That is fourth-order (the lowest acceptable degree of accuracy in surveying).

ORDINANCE The local laws made by an authorized municipal body; in distinction from the Laws of the State of Oregon (known as statutes or the Oregon Revised Statutes). Ordinances constitute local regulations for the government of inhabitants of a particular place. They must be adopted with all legal formality provided by Oregon Law.

ORDINARY HIGH WATER LINE ORS 274.005 "Me line on the bank or shore to which the high water ordinarily rises annually in season." For the purposes of Chapter 274, and by ORS 274.015 when the lines of ordinary high water cannot be determined by survey or inspection, then such line shall be determined by use of the annual mean high water for the preceding year. In the case of *Montgomery v. Shaver* (40 Ore. 244, 66 Pac. 923) "the line of navigable water is ordinary high water." See Chapter 10.

ORDINARY HIGH WATER MARK OF LAKES The ordinary high water mark of a nonnavigable lake is a mean or average of the fluctuating high-water marks of the lake. Case of *U.S. v. Otley*, (C.C.A. Or., 127 F. 2d 988, 1000). See Chapter 10.

ORDINARY LOW WATER LINE ORS 274.005. "Mean line on the bank or shore to which the low water ordinarily recedes annually in season." For the

purpose of Chapter 274, and by ORS 274.015 when the lines of ordinary low water cannot be determined by survey or inspection, then such lines shall be determined by use of the annual mean low water for the preceding year.

ORDINARY TIDES A term that has no technical meaning. In law the word 'ordinary', when applied to tides, is equivalent to the word "mean". Therefore, "ordinary high water" may be assumed to be "mean high water".

ORDINATE A line by means of which the position of a point is determined with respect to fixed straight lines, taken as a coordinate axis. The ordinate to a diameter is equal to half the chord through the point which is dissected by the diameter. See Chapter 7.

OREGON ADMISSIONS ACT An act which, in part, designated the western boundary of Oregon as beginning one marine league (three nautical miles) at sea." This act granted Oregon about 800,000 acres of submerged offshore land.

OREGON CITY CANAL See ORS 272.036.

OREGON COORDINATE SYSTEM The State plane coordinate system based on a Lambert Conformal projection and the Clarke Spheroid of 1866. It is a system of plane, cartesian coordinates, established by the U.S.C. & G.S. See discussion and Oregon Laws in Chapter 7.

OREGON EVIDENCE CODE The code contained in ORS Chapter 40, construed to secure fairness in administration, elimination of unjustifiable expense and delay, and promotion of growth and development of the law of evidence to the end that the truth may be ascertained and process in justly determined (ORS 42.020, nde 102).

The code applies to all courts except the Small Claims Division of the Tax Court (as provided by ORS 305.545), the small claims division of a district court (as provided by ORS 46.415), and the small claims department of a justice's court (as provided by ORS 55.080). See ORS 40.015 for other clarification and applicability of the code.

The Oregon Evidence Code, as provided in ORS Chapter 40, is made up of 108 rules (rule 100 through rule 1008). For example, certain presumptions of law contained in rule 311, ORS 40.135, are:

"(a) A person intends the ordinary consequences of a voluntary act."

"(g) A person is the owner of property from exercising acts of ownership over it or from common reputation of the ownership of the person."

"(1) Private transactions have been fair and regular."

"(x) The law has been obeyed."

See: "Kinde of law and relevant evidence."

OREGON REVISED STATUTES The Oregon Laws; abbreviated "ORS."

ORIENT To establish the correct relationship in direction with reference to the points of the compass; to bring into correct relationship in direction with reference to points on the compass.

ORIGIN A reference point with zero value, i.e. station 0+00 or coordinate point N 0,000,000 E 0,000,000.

ORIGIN OF COORDINATES The point of reference or zero-point in a coordinate system.

ORIGINAL (OF A WRITING OR RECORDING--OREGON EVIDENCE CODE) Rule 1001. "(2) 'Original' of a writing or recording is the writing or recording itself or any counterpart intended to have the same effect by a person executing or issuing it. An 'original' of a photograph includes the negative or any print therefrom. If data are stored in a computer or similar device, any printout or other output readable by sight, shown to reflect the data accurately, is an original." To prove the content of a writing, recording or photograph, the original writing, recording or photograph is required, except as otherwise provided in ORS 40.550 to 40.585 or other law." ORS 40.555.

ORIGINAL PLAT Used to distinguish the, first plat from the subsequent additions. Original Town or Original Townsite are employed in the same manner.

ORIGINAL STANDARD CORNERS Standard township, section and quarter section corners; meander corners, corners terminating the survey of a standard parallel, and closing corners in those cases where they were originally established by measurement along the standard line as points from which to start a survey. Corners on the base line are to be regarded the same as those on standard parallels.

ORIGINAL LAND SURVEYS Surveys made prior to the conveyance of real property. A resurvey is a retracement of the original survey.

ORIGINAL TOWN See original plat.

ORIGINAL TOWNSITE See original plat.

ORIGIN OF COORDINATES The point of reference or zero point, in a coordinate system.

ORTHO From the Greek orthos meaning straight, regular or right.

ORTHOCENTER The point of intersection of the three perpendiculars let fall from the angles of a triangle upon the subtending sides, or the sides produced.

ORTHOGON A rectangular figure, or one in which all its angles are right angles.

ORTHOGONAL Right angled; rectangular.

ORTHOGRAPHIC PROJECTION The projection of points on a plane by straight lines at right angles to the plane.

ORTHOPHOTO (OR ORTHOPHOTOGRAPH) An aerial photograph whereby most scale and position distortions, inherent in aerial photographs, have been eliminated. Presently, the most accurate aerial photo; however, there still remain minor displacements that somewhat places limitations on their use in cadastral cartography.

ORTHOPHOTO MAPS A version of an orthophoto quadrangle. Usually an orthophoto with map lines and other map information added.

ORTHOPHOTO QUADRANGLE Either a quadrangle centered orthophotograph or orthophotographs mosaicked in a quadrangle format with minimum cartographic enhancement. U.S.G.S. orthophoto quad photoimagery is corrected within specified geometric limits and meets the same positional accuracy requirements as a topographic map. New U.S.G.S. orthophotoquads are projected on 1000 meter grid of the U.T.M. State plane coordinate grid ticks are also included on the quads. Photoimagery is rectified by optical scanning that sometimes produces double and mismatched images. The quads show highways, roads and other manmade structures, water features, woodland and agriculture lands and selected geographic names. The quads comply with the National Map Accuracy Standards.

ORTHOPHOTOGRAPHY A photogrammetric technique which creates a "corrected" photo of a part of the earth's surface. The image is produced on an instrument that corrects each point of the photo for errors introduced by the effect of terrain relief. Each small area of the photo is relocated to where it would appear if the photo had been taken from infinity. The result is a photo image of high horizontal accuracy, that contain more than enough detail for mapping and appraisal work.

ORTHOPHOTOSCOPE A device used to change the perspective image of a photograph, to an orthogonal projection.

OVERLAP Lands covered by both senior and junior patents (as regards adverse possession).

OVERLAP (Photogrammetry) See aerial photo overlap.

OVERLAY A map or photo on a transparent medium to be superimposed on another photo or map.

OVERLAY (INTERACTIVE GRAPHICS) A section of a drawing. In CAMS up to 33 overlays may be contained in a drawing and each may be viewed or plotted separately or with other overlays.

OVERPRINT New material printed on a map or chart to show data of importance or special use, in addition to that originally printed.

Own (real property or interest in property). To hold absolute and unqualified right to some *thing*, e.g. fee simple absolute title in land, rights in an easement, a right of possession, a life estate. In real property law, the word "own" requires definition in context with what is owned. For example, owning a right of way could mean owning the absolute and unqualified fee simple title in the land (if that 'is the level of estate acquired by the "owner"), or it could mean owning the dominant estate (the easement) to use the land (if that is the right acquired by the "owner"). See: "Ownership."

OWNER The owner of the title to real property or the contract purchaser of real property. ORS 308.670. As used in ORS 308.670 to 308.685: (a) "Owner" includes purchaser under recorded instrument of sale (in reference to single family residence property). ORS 308.740 (in reference to open space lands) owner means the party or parties having the fee interest in land, except that where land is subject to a real estate sales contract, (1.) owners' shall mean the contract vendee. ORS 321.405 (Eastern Oregon Severance Tax) subsection (5) "Owner means any person holding title to harvested timber by virtue of (a) an instrument of conveyance; (b) the harvesting of the timber; or (c) the harvesting of the timber and payment thereof." ORS 321.805 (Special Assessment of Forest Lands.) "Owner means any individual or combination of individuals; partnership, firm, corporation or association of ' whatever nature owning or controlling forest land." ORS 321.705 (Western Oregon Small Tract Optional Tax). "Owner meaning any individual, partnership, corporation or association of whatever nature, owning both the forest land and any timber thereon."

OWNER (GENERALLY) In real property law, this word has no exact technical meaning, but it is generally used to denote the person vested with the title to real property. *Black's* notes: "The term is, however, a *nomen generalissimum* (a general name), and its meaning is to be gathered from the connection in which it is used, and from the subject

manner to which it is applied. The primary meaning of the word as applied to land is one who owns the fee and who has the right to dispose of the property, but the term includes one having a possessory right to land or the person occupying or cultivating it." *Dunbar v. Texas Irr. Co.*, Tex. Civ. App., 195 S.W. 614; *Thompson v. Thompson*, 79 Or. 513, 155 P. 1190, 1191. A mortgagee may be deemed an 'owner' (*Lindholm v. Hamilton*, 159 Minn. 81, 198 N.W. 289, 290), but under different statutes or circumstance 21, all opposite result may be reached (*Huebner v. Lashey*, 239 Mich. 50, 214 N.W. 107, 108). See "equitable owner," "general owner," "legal owner," "real owners," "record owner" and "reputed owner" in *Black's Law Dictionary*, rev. 4th ed., *supra* pp. 1259, 1260.

OWNER (STATUTORY) ORS 308.670 (Single Family Residence). "Owner" includes purchaser under recorded instrument of sale.

ORS 308.740 (Open Space Lands). "Owner" means the party or parties having the fee interest in land, except that where land is subject to a real estate sales contract, "owner" shall mean the contract vendee.

ORS 321.005 (Forst Products Harvest Tax). Note: Here is an example where "owner" denotes the holding of title to something less than fee simple absolute title in real property. "Owner" means any individual or combination of individuals, partnership, firm, corporation or association of whatever nature holding title to harvested timber by virtue of (a) an instrument of conveyance, (b) the harvesting of the timber, or (c) the harvesting of the timber and payment therefor.

ORS 321.405 (Eastern Oregon Severance Tax). Definition same as that of ORS 321.005.

ORS 321.705 (Western Oregon Small Tract Optional Tax). "Owner" means any individual, partnership, corporation or association of whatever nature, owning both the forest land and any timber thereon.

ORS 321.805 (Special Management of Forest Lands). "Owner" means any individual or combination of individuals, partnership, firm, corporation or association of whatever nature owning or controlling forest land,

OWNERSHIP MAPS Cadastral maps.

OWNERSHIP The right of one or more individuals, partnership, firm, corporation or association of whatever nature (including state, county, city governmental bodies and quasi-governmental bodies) to possess and use property to the exclusion of others with no lesser right or interest in the

property. The ownership of real property is a tenancy, whose continuance is contingent on legally recognized rights of tenure, transfer, and of succession in use and occupancy. The right to deposition of property is the 'edge of ownership.' *White v. White*, 108 W.V. 128, 150 S.J.E. 531. "Ownership of the legal or record title to land carrying with it a presumption of possession, but too great reliance must not be placed in a record title once the record does not always disclose the rights that may be held by others in real property Nevertheless, a record title to land is the highest evidence of ownership." See 1 Thompson 6, sec 1.

"OWNERSHIP" has been defined as "the right by which a thing belongs to some one in particular, to the exclusion of all others." It does not always mean absolute ownership. It has been defined to include "one who has the use, control, and occupation of the land with claim of ownership, whether his (or her) interest be an absolute fee or a less estate." 1 Thompson 4, sec 1, Thompson on *Real Property*, *supra*.

OWNERSHIP AND STATUS A collection of property rights including the right of transfer to others, and the availability of a given tract of land or its resources for governmental or private use.

OWNERSHIP MALTA An unprofessional term usually applied to mean "cadastral maps."

PACE A measure of length 2.5 feet long, the ordinary length of a step five feet long. A geometric pace is

PACIFIC SHORE The shore of the Pacific Ocean between ordinary high tide and extreme low tide, from the Oregon-Washington state line to the Oregon-California state line (except portions disposed of by the State prior to July 5, 1947). Declared to be a State Recreation Area by ORS 390.615. Ocean Shore laws contained in ORS 390.605 to 390.770. See Ocean Shore. Also, see Chapter 10.

PANELING (PHOTOGRAMMETRY) Marking a ground station in advance of scheduled aerial photography to positively identify the station without additional fieldwork; the position of the marked station may or may not be known. Panels constitute a material marking so arranged as to form a distinctive pattern over a geodetic or other control point marker, on a property corner or line, or at the position of an identifying point above an underground facility or feature.

PANTOGRAPH A drafting and graphic art tool used for enlarging, reducing, and reproducing pictures, drawings, charts and maps not requiring a large degree of accuracy. Not recommended for use in cadastral cartography.

PARABOLIC CURVES Transitional curves used in both the vertical and horizontal plane in route surveying. See Chapter 8.

PARALLAX A factor contributing to errors made in measuring angles and distances in both surveying and mapping. An apparent displacement or the difference in apparent direction of an object as seen from two different points not on a straight line with the object. See the discussion in Chapter 11 and the illustrations in figures 1119A and 1119B.

PARALLEL Lines and surfaces having the same direction and everywhere equidistant from each other.

PARALLEL OF LATITUDE A line on the surface of the earth at the same latitude at every point.

PARALLELOGRAM A quadrilateral having both pairs of its opposite sides parallel.

PARCEL (1981) The basic unit of the cadastral map system. A contiguous area of land capable of being described in a single description, by a closed traverse; or as one of a number of lots, blocks, sections, or tracts in a subdivision or township; separately owned and capable of being separately conveyed.

PARCEL (SUBDIVISION AND PARTITIONS) A unit of land that is created by a partitioning of land. See ORS 92.010(6).

PARCEL (VERB) To divide an estate. Synonymous with “segregate” and “partition.” As used in ORS Chapter 215, the terms defined in ORS 92.010 shall have the meanings given therein, except that “parcel”:

“(1) Includes a unit of land create&

“(a) By partitioning land as defined in ORS 92.010,

“(b) In compliance with all applicable planning, zoning and partitioning ordinances and regulations; or

“(c) By deed or land sales contract, if there were no applicable planning, zoning or partitioning ordinances or regulations.

“(2) Does not include a unit of land created solely to establish a separate tax account.”

PARCEL IDENTIFIER A numeric, alphabetic, or alphanumeric code used to identify land recognized for a specific application (e.g. assessment and taxation) as a single unit, usually a parcel of land under one ownership. In the Standard Cadastral Map System of Oregon, the tax lot number is the standard parcel identifier. In modern geographic information

systems or multipurpose cadestres, the parcel identifier is used to not only identify parcels and parcel ownerships, it is also used to index and refer to other related land data, and like land related data of various filing systems.

PARCEL NUMBER The part of the taxlot number that identifies a specific parcel of a map. See Chapter 3.

PARCEL SEGREGATION The division of one parcel into two or more smaller parcels.

PARENT ACCOUNT Synonymous with parent taxlot number and parent parcel number.

PARENT PARCEL An indefinite term used in reference to a parcel of land as it existed at a specific time, or as it existed under a specific owner. It is often used in reference to a parcel as it was patented, subdivided or mapped. The term can mean, but does not necessarily mean, the same as parent account, parent parcel number and parent taxlot number.

PARENT PARCEL NUMBER Synonymous with parent account and parent taxlot number.

PARENT TAXLOT NUMBER The correct term used to describe a parcel of land as it was originally shown and taxlotted on a map. A parent taxlot number can mean, but does not necessarily mean, the same as parent parcel. See Chapter 3.

PARITY Equity.

PARK (DEDICATED) “The word ‘park’ written upon a block of land represented upon a map or plan of a city or town, is as significant of a dedication, and the use to which the land is intended to be applied, as the word ‘street,’ written on such plans. The popular and natural meaning of the term when so used is a piece of ground set apart for the enjoyment, comfort and recreation of the inhabitants of the city or town in which it is located; and this is so whether the word be used alone or with some qualifying word, as ‘Hyde Park,’ ‘Regent Park,’ or ‘Central Park.’” *Steel v. City vs Portland*, 8 ch. 31 P. 479, 23 Or. 176, 185, *op cit*.

PAROL AGREEMENT Agreements that are made verbally; agreements made in writing but not signed, or that are not under seal. Parol agreements are not enforceable under the’ statute of frauds.

PAROL CONTRACT A contract not entirely in writing.

PAROL EVIDENCE Oral or verbal evidence; the type of evidence given by a witness in court, e.g. a witness testifying as to the location of a river at a specific time. It is evidence that is not furnished by a document itself, but is derived from outside sources.

PARSI AGREEMENT A verbal agreement; an agreement made in writing but not signed, or under

seal. Parol agreements are not enforceable under the statute of frauds.

PARSI CONTRACT A contract not entirely in writing.

PARSI DEDICATION An implied dedication made without a deed or even without the execution and recording of a plat, orally or by act, a series of acts, or conduct of the donor. A written dedication which has been lost may be proved by parol. In such cases the intent to dedicate must be unequivocally manifested, clearly proven, and open and unambiguous. Such intention is not hidden in the mind of the landowner, but is manifested by the owner's acts. A parsi dedication is a common-law dedication, and, as such, anything which clearly indicates the donor's intention, followed by acceptance by the public, amounts to an irrevocable, legal, common-law dedication. The term "parol dedication" is usually applied to mean the kind or type of common-law dedication not evidenced or expressed in writing, but whether the dedication is 'parol' is of little significance. What is of significance is whether there is an intent to surrender dominion over his or her land to the public, and for a specific use, i.e. whether the intent to dedicate is implied in some manner recognized by the courts.

Thompson says, "To constitute implied dedication (of which includes a parol dedication) by the owner of land of its use for a public highway, there' must be present the intent to appropriate the land for public use. The intent may, however, be expressed in the visible conduct and open acts of the owner. If the acts are such as would lead ordinary prudent men to infer an intent to dedicate, and they are so received and acted upon by the public, the owner cannot, after acceptance by the public, recall the appropriation. In such case, the facts and circumstances must be such as indicate an unequivocal intent to devote the strip of land to the public use." See 2 Thompson 471, sec 370, supra for an excellent discussion on eschat acts constitute a common-law dedication."

PAROL EVIDENCE RULE (OREGON) ORS 41.740 (1) A rule that provides that there can be no claim as to any oral part of a contract which is contradictory of the part in writing. The rule, however, does not preclude the admission of evidence to show fraud. Parol evidence is not admissible to add to, subtract from, vary or contradict written instruments which dispose of property, and which are valid, complete, unambiguous, and unaffected by accident or mistake. (2) "When the terms of an agreement have been reduced to writing by the parties, it is to be considered as containing all those terms, and therefore there can be, between the parties

and their representatives or successors in interest, no evidence of the terms of the agreement, other than the contents of the writing, except where a mistake or imperfection of the writing is put in issue by the pleadings or where the validity of the agreement is the fact in dispute. However, this section does not exclude other evidence of the circumstances under which the agreement was made, or to which it relates, as defined in ORS 42.220, or to explain an ambiguity, intrinsic or extrinsic, or to establish illegality or fraud. The term 'agreement' includes deeds and wills as well as contracts between parties." Note: ORS 42.220: "In construing an instrument, the circumstances under which it was made, including the situation of the subject, and of the parties, may be shown so that the judge is placed in the position of those whose language the judge is interpreting."

PART An integral portion, something essentially belonging to a larger whole. The word is not synonymous with the word fractional.

PARTIBLE LANDS Lands which may be divided.

PARTICULAR ESTATE An estate for life or for years. It is called a particular estate because it is only a small part of an inheritance.

PARTIES Those who have a direct interest in the subject matter.

PARTITION ORS 92.010(7) Partition means either an act of partitioning land or tract of land partitioned as defined in this section.

PARTITION LAND (1981) ORS 92.010(8)

PARTITION LAND (OREGON PARTITION LAW) ORS 92.010. (1) To divide an area or tract of land into two or three parcels within a calendar year when such area or tract of land exists as a unit or contiguous units of land under single ownership at the beginning of such year. It does not include divisions of land resulting from: lien foreclosures, foreclosures of recorded contracts for the sale of real property, or the creation of cemetery lots; and does not include any adjustment of a lot line by relocation of a common boundary where an additional parcel is not created and where a parcel reduced in size by relocation is not reduced below minimum lot size established via zoning ordinance.

(2) "Means to divide land into two or three parcels of land within a calendar year, but does not include:

"(a) A division of land resulting from a lien foreclosure, foreclosure of a recorded contract for the sale of real property or 'the creation of cemetery lots; or

“(b) An adjustment of a property line by the relocation of a common boundary where an additional unit of land is not created and where the existing unit of land reduced in size by the adjustment complies with any applicable zoning ordinance.” See: ORS 92.305 to 92.495 and “Series partitioned lands.”

PARITY Equal includes the sale of subdivision lots even though acquisition prior to sale with other contiguous lots or property by a single owner.

PARTY WALL A wall erected on the line between two abutting estates belonging to different persons, for the use of both estates. See *Odd Fellows’ Hall Association of Portland v. Hegele* (32 P. 679, 681, 24 Or. 16). If a deed calls for a party wall the wording “party wall” should be noted on the cadastral map.

PATENT An instrument by which the United States conveys, to persons entitled thereto, the legal fee simple title to public lands. A patent for land from the government is the highest evidence of title.

PATENT AMBIGUITY An inherent uncertain tie appearing on the face of the instrument, and arises at once on the reading of the instrument.

PATENT DEFECT A defect in a deed or survey, which could easily be discovered by inspection.

PATENTED LANDS Lands conveyed by the United States to private persons.

PEDESTRIAN MALL “One or more city streets, or portions thereof, on which vehicular traffic is, or is to be restricted in whole or in part and which is to be used exclusively or primarily for pedestrian travel.” See ORS Chapter 376.

PEDOMETER An instrument by which paces are numbered as a person walks, and the distance covered is ascertained.

PELORUS An instrument resembling a mariner’s compass, without magnetic needles, and having two sight vanes by which bearings are taken.

PERCENTAGE PROTRACTOR A circle template divided by percentages rather than by degrees.

PERCH 16.5 feet; 1 rod.

PERENNIAL Present at all seasons of the year, e.g. a perennial stream.

PERFECT TITLE Title showing the absolute right of possession and of property in a particular Person. Perfect title, however, does not mean “perfect” in the strict sense of the word. A perfect title must be one that is good and valid beyond all reasonable doubt; free from litigation, palpable defects, and

grave doubts. It should consist of both legal and equitable title. Perfect title is synonymous with merchantable title and marketable title.

PERIMETER In geometry, the length of a line around a plane figure; the line itself. In cadastral cartography, the sides and sum of the sides of a land parcel (or parcel polygon).

PERIPHERY The circumference of a plane figures; the perimeter of a polygon.

PERMANENT BENCHMARK One that is as permanent as practical to establish. Sometimes referred to as benchmark. Abbreviation PBM.

PERPENDICULAR LINES Lines that meet at right angles; lines that are at 90° from each other.

PERPETUAL Never ceasing, continuous forever; unlimited in respect of time.

PERSON (Statutory) ORS 311.605. As used in ORS 311.610 to 311.635 “person” includes any individual, firm, copartnership, company, association, corporation, estate, trust, trustee, receiver, syndicate or any group or combination acting as a unit. (Subdivisions and Partitions) ORS 92.305(6) includes a natural person, a domestic or foreign corporation, a partnership, an association, a joint stock company, a trust and any unincorporated organization. As used in ORS 92.305 to 92.495 the term “trust” includes a common law or business trust, but does not include a private trust or a trust created or appointed under or by virtue of any last will and testament, or by a court. (Assessment of Designated Utilities and Companies by Department of Revenue) see ORS 308.505(2). (War Veteran Defined) See definition of person under ORS 174.100(3),

PERSONAL PROPERTY See ORS 307.020. See also ORS 111.005(25).

PERSONAL REPRESENTATIVE (Probates). ORS 111.005(26) “Personal Representative” includes executor administrator, administrator with will annexed, and administrator de bonis non, but does not include special administrator.

PERSONALTY Personal property.

PHILADELPHIA ROD A two section, combination self-reading and target rod used for precise leveling.

PHOTOCOPY A photograph, microphotograph and any other reproduction on paper or film in any scale. See ORS 192.005(2).

PHOTOGRAMMETRY, AERIAL The science of obtaining reliable measurements by means of either aerial or oblique photographs.

PHOTO INDEX (PHOTOGRAMMETRY) A map showing location and numbers of flight strips and aerial photographs.

PHOTO INTERPRETATION, AERIAL The determination of the nature and description of physical, cultural and geological features on an aerial photograph.

PHOTOMAP An aerial photo overprinted with cartographic details and symbols.

PHOTOMOSAIC See mosaic.

PHOTOTHEODOLITE A combination camera and ground surveying theodolite mounted on a tripod; used for terrestrial surveying.

PHOTOTRIANGULATION See aerotriangulation.

PHYSICAL FEATURES Features of the terrain, that are natural, cultural, or both.

PHYSIOGRAPHY Classification of the genesis of land forms.

PICTURE POINT A feature easily identified on an aerial photograph, where the horizontal and vertical position has been located by a survey.

PIXEL (PICTURE ELEMENT) The smallest resolvable element in a scanned remote sensor image.

PLACER A gravel place where gold is found; especially on a gravel bar by the side of a river, or in the bed of a river or stream. Placers are also mineral deposits occupying the beds of ancient rivers, streams and valleys. Section 2329, 30 U.S.C.A., subsection 35 provides for location of placers, including all forms of deposit excepting veins or quartz or other rock in place.

PLACER CLAIM Ground within definite boundaries, which contains mineral or valuable mineral deposits not in place, but in a loose state and may (in most cases) be collected by washing or amalgamation without milling.

PLACER LOCATION A location in accordance with the acts of Congress of a tract of land for the mineral bearing or other valuable deposits that are not found in lodes or veins in rock in place.

PLANE Without elevations or depressions; level or flat.

PLANE COORDINATES A cartesian coordinate system developed on a plane surface such as a conic conformal map projection. The official plane coordinate system in Oregon is the Oregon Coordinate System. See Chapter 7; also see Oregon Coordinate System in this glossary.

PLANE SURVEY A survey in which the curvature of the earth is usually neglected. The computations of relative positions of stations being made by

plane geometry and plane trigonometry. Most surveys used to develop cadastral maps are plane surveys

PLANE TABLE An instrument used in surveying by means of which a plan (or plat) may be made on the spot without measurement of angles. Also used for leveling.

PLANE TABLE ALIDADE A telescope supported by a pedestal attached to a flat base. Used for sighting when using a plane table. Elevations may also be determined with the plane table alidade. See figure 6-12 of Chapter 6.

PLANETARY CAMERA Used in micrographylucs, cartography and photogrammetry. A camera in which the material being photographed and the camera film remain stationary during exposure. Also known as a flatbed camera.

PLANIMETER An instrument used for the measurement of irregular areas on maps, plans and photos. There are several types of planimeters; however, that used in cadastral cartography is called a compensating polar planimeter. See illustrations of figures 1131 and 1132, Chapter 11.

PLANIMETRIC MAP A cartographic representation of horizontal positions of the natural and cultural features of the earth's surface. A cadastral map is one type of planimetric map.

PLANNED COMMUNITY ORS 94.550. "Planned community means any subdivision under ORS 92.010 to 92.190 which result in a pattern of ownership of real property and all the building, improvements and right located on or belonging to the real property, in which:

"(a) There is a homeowners' association responsible for the maintenance, operation, insurance and property taxes relating to any common property of the planned community or for the exterior maintenance of any property that is individually owned; and

"(b) Owners of individual lots, by virtue of their ownership, automatically are members of the homeowners' association and assume liability for membership fees."

PLANNED UNIT DEVELOPMENT An incorrect term for "planned community." Because planned unit development is not a term defined by statute or recognized by the law, it should not be used (nor should the abbreviation PUD be used) in place of the correct, legal term "planned community." Use of a correct term allows reference to the correct provisions of the law.

PLANIMETRY Mensuration of plane surfaces.

PLAT Commonly used in reference to subdivision plats, replats, and unit ownership plats; however, when used in a deed and/or survey, the word plat might be used to mean any drawing, map, or plan; or, a plat of ground (like in a plot of ground).

PLAT, SUBDIVISION ORS 92.010(9). A, final map, diagram, drawing, replat or other writing containing all the descriptions, locations, specifications, dedications, provisions and information concerning a subdivision.

PL1 (CAMS) Computer language intended to combine certain useful features of FORTRAN and COBOL languages.

PLOTTER (CAMS) An electromechanical device interfaced to a central process unit (or minicomputer) that supplies hard copy output in the form of graphics, maps, plans, and any other drawing contained in computer storage. See plotter, drum and plotter, flatbed.

PLOTTER, DRUM A cylindrical electromechanical device capable of converting digital data, from a central process unit, into a graphic/visual hardcopy representation of the digital data. Drum plotters are capable of high-speed, high-quality plotting (as compared to flatbed plotters); however, if interaction by the cartographer is necessary, or large size mapping is a requirement, the flatbed plotter is

PLOTTER, FLATBED Functions on the same concept as the drum plotter, however, flatbed plotters are not as fast as most drum plotters. Flatbed plotters must be used for large size map output. Plotters, such as that employed in the Department of Revenue CAM system, are capable of multicolor plotting in liquid flow and ballpoint ink, scribing, stripping and film cutting. Resolution of the CAMS plotter is 0.0002 inch; speed (axial) is 30 inches per second and (diagonal) is 40 inches per second. Plotting area is 50" x 82" on vellum, mylar or scribing film.

PLOTTER SYSTEM Generally used in reference to all hardware and software necessary for a complete interactive graphic system. CAMS, for example, uses the following hardware:

- (1) One Data General Nova 2 minicomputer.
- (2) One Tektronix CRT' (11" x 15" screen and alphanumeric keyboard).
- (3) ASR Decwriter terminal and console unit with standard keyboard and hardcopy output.
- (4) One magnetic tape transport; 9track 800/1600 BPI, 45 I.P.S.
- (5) Magnetic disc drive and disc pack 14.5 million 16-bit word storage.

- (6) One 48" x 60" flatbed digitizer with handheld cursor, X and Y coordinate display and keyboard resolution to 0.001 inch.
- (7) One 82" x 59' flatbed plotter.
- (8) One controller minicomputer.
- (9) Interface capabilities to an IBM 370 Model S.
- (10) CGI software in FORTRAN IV language.

POINT OF BEGINNING The beginning point of a property description or survey. Abbreviated P.O.B. The P.O.B. is usually a permanent; easy to locate, well referenced corner. The P.O.B. in subdivision is called the initial point of the subdivision boundary description.

POINTS Graduations marked on a compass. One point equals 11 3/4 degrees. Points are usually shown on a three circle compass rose.

POINTS, CARDINAL North, South, East and West. See Chapter 4.

POINTS, INTERCARDINAL NW, NE, SW and SE. See Chapter 4.

POINTS-OF-CALL (1981)

POINT-OF-CALL RULE (1) Monuments, landmarks, objects, boundaries or other elements of a description, in a deed, that defines the limits of the boundaries of a parcel of land, e.g., "the NW cor of Lot 4," "the left bank of the river," "the north line of the J.P. Smith property", "the center of the county road", etc. The courts have held that where points of calls are inconsistent with the measurements (either by course, angle, or distance) the points of calls are paramount. (2) The courts have held that where point-of-call are inconsistent with the measurements, the points-of-call are paramount. However, when a point-of-call is a river or a road, other principles of law must be considered in construing the intent of the parties to a deed. For example: "When a conveyance describes property as bordering on a street, absent an express provision in the conveyance to the contrary, such conveyance includes the *les to the street*." *Fossi v. Myers*, 271 Or. 611, 532 P.2d 337; *Hurd v. Byrnes*, 264 Or. 591, 506 P.2d 686, all recent Oregon Supreme Court cases. And in *Foszi*, the court further said: "It is held that the presumption of intent to convey to the center is not overcome although the land is described by metes and bounds, and distances stated do not extend to the center of the highway." *Id*.

In *Banks v. Ogden*, 69 U.S. (2 Wall.) 57, 68, 17 L. Ed. 818, the court advised, "It is a familiar principle of... law that a grant of land bordering on a mad or river, carries title to the center of the river or road, unless the terms or circumstances of the grant indicate a limitation of its extent by the exterior

lines.” And the fact that the metes and bounds do not extend to the creator of the non-navigable river is insufficient to show an intent for the grantor to reserve the river.

Regarding the point of call rule, the court in *Boston v. Richardson*, 95 Mass. (13 Allen) 146 explains: “Whenever land is described as bounded by other land or by a building or structure, the name of which, according to its legal or ordinary meaning, incloses the title in the land of which it here has been made a part, as a house, a mill, a wharf, or the like, the side of the land or structure referred to as a boundary is the limit of the grant; but when the boundary line is simply by an object whether natural or artificial, the name of which is used in ordinary speech, as defining a boundary and not as describing title in the land, and which does not in its description or nature include earth as far down as the grantor owns, and yet has width—as in the case of a way, a river, a ditch, a wall, fence, a tree, or a stake and stones—then the center of the thing so running over or standing on the land is the boundary of the land granted.”

POLARIS The visible star nearest the North Pole. Used for making meridian observations in surveying.

POLE 5.5 yards; 16.5 feet; one rod.

POLITICAL SUBDIVISION A city, county, district or any other municipal or public corporation in this state. See ORS 192.005(4).

POLYCONIC PROJECTION A cartographic method used by the NOAA and U.S.G.S., whereas the earth’s surface is divided into an infinite number of zones parallel to the equator. Each of these is then projected upon the cone tangent to that zone and each cone then developed separately.

POLYGON As regards the cadastral map system; a polygon is the plane surface of a map that is circumscribed by 3 or more intersecting linear sides. A parcel polygon of a map is the land parcel itself. The prefix poly means “many” and the suffix gon means “sides.”

POSITION Data defining the location of a point with respect to a reference system. Coordinates that define the location of a point on a grid.

PRACTICAL LOCATION A term used to define a boundary line established, not by a deed, but by an agreement between adjoining landowners, followed by acquiescence in the location made and occupancy in accordance with the agreements which will be binding both on such owners themselves and on their grantees. If a divisional line is well defined and known to the parties, a parol agreement fixing upon a new and different line is seldom binding, because it would amount to a parol conveyance of

land, contrary to the Statute of Frauds. A boundary line established by agreement of adjoining landowners constitutes an agreed boundary, in contradistinction to the “geographical” or “surveyed boundary.” The laws governing practical locations are complicated, and the validity of such boundary lines must be determined by the courts not by the cartographer or assessor.

PRECISION The degree of refinement with which an operation is performed or a measurement is stated. Precision relates to the quality of the operation; accuracy relates to the quality of the result.

PRESCRIPTION (EASEMENT BY) An easement created by use of property for 10 years (the “statutory period”), or “prescriptive period” for adverse possession. To create an easement by prescription, the use must have been open, continuous, exclusive and under a claim of right for the prescriptive period. A “license” to use property can never ripen into an easement by prescription. Mere user is not sufficient to give rights of travel over land, to the public. It must be accompanied by acts, such as working on the roadway, performing maintenance on the roadway, removing obstructions, showing use to have been made under a claim of right. But it is important to note that “easements by prescription are not favored by the law.” *Sbumute v. Robinson*, 52 Or. App. 199, 627 P.2d 1295, in 1981. See: *Curtis v. La Grande*, 20 Or. 34, 23 P. 808 for rules for acquiring right of prescription in lands of another.

PREEMPTIVE PERIOD The period of time it takes for an adverse use of land, for travel, to ripen into an easement by prescription by Oregon law, 10 years (ORS 12.050). The period is the time an owner is provided to take action for the recovery of real property, or for the recovery of the possession thereof. ORS 12.050 is the “statute of limitations” for such action to take place.

PRESUMPTION An attitude of belief dictated by probability, the ground, reason, or evidence lending probability to a belief a legal inference as to the existence or truth of a fact not certainly known that is drawn from the known or proved existence of some other fact.

PRESUMPTION OF LAW “A rule of law that courts and judges shall draw a particular inference from a particular fact, or from particular evidence, unless and until the truth of such inference is disproved,” e.g. a person is innocent until proven guilty. Presumptions of law fall into two basic categories: a “conclusive presumption” and a disputable or rebuttable presumption.

Black’s defines a “conclusive presumption” (or an absolute or irrebuttable presumption) as: “A rule

of law determining the quantity of evidence requisite for the support of a particular averment which is not permitted to be overcome by any proof *that the fact is otherwise.*" *U.S.v. Clark*, 5 Utah 226, 14 P. 288. *Black's* defines a "disputable presumption" (a rebuttable or inconclusive presumption) as: "An inference of law which holds good until it is invalidated by proof of a stronger presumption." *Livingston v. Livingston*, 4 Johns. Ch. N.Y. 287, 8 Am. Dec. 562). Presumptions are sometimes evidence, or at least have the effect of evidence, but are more accurately considered as a substitute for evidence. In civil actions and proceedings, a presumption imposes on the party against whom it is directed the burden of proving that the nonexistence of the presumed fact is more probable than its existence. ORS 40.120, evidence rule 308. If presumptions are conflicting, the presumption applies that is founded upon weightier considerations of policy and logic. If considerations of policy and logic are of equal weight, neither presumption applies. ORS 40.130, evidence rule 310.

Here are examples of presumptions of law provided in ORS 40.135, evidence rule 311:

"(a) A person intends the ordinary consequences of a voluntary act.

"(g) A person is the owner of property from exercising acts of ownership over it or from common reputation of the ownership of the person.

"(1) Private transactions have been fair and regular.

"(x) The law has been obeyed.

"(y) An *uninterruptable adverse* possession of real property for 20 years or more has been held pursuant to a written conveyance."

PRIMA FACIE At first sight.

PRIMARY CONTROL TIDE STATION Tide station at which continuous observations have been made over a of a 19-year Metonic cycle. Its purpose is to provide data for computing accepted values of the harmonic and nonharmonic constants essential to tide predictions and to the determination of tidal datum for charting and coastal boundaries. The data series from this station serves as a primary control for the reduction of relatively short series from subordinate tide stations by comparing simultaneous observations, and for monitoring long period sea level trends and variations. See tide stations and subordinate tide station.

PRIMARY SURVEY A survey that provides controlling data for map triangulation. A primary survey bridges such points, comers and monuments as

section comers, engineering stations, subdivision corners, DLC corners, etc. of other primary surveys, e.g. a subdivision survey or survey of a BPA transmission line. See secondary survey.

PRIME MERIDIAN An initial or zero meridian from which longitudes is reckoned. Most countries as the prime meridian of the earth adopted the Greenwich Meridian.

PRINCIPLE MERIDIAN (System of Rectangular Surveys) A line that conforms to the true meridian, and that is extended from the initial monument, either north or south or in both directions, as conditions require, to the limits of the area to be covered. The Willamette Meridian is Oregon's principle meridian. See Chapter 5.

PRINCIPLE POINT The point of, which the optical axis of the camera intersects the film. When the optical axis is truly vertical, the nadir and principal point coincide. See figure 951 of Chapter 9.

PRINCIPALS OF CONSTRUCTION See: "Rules of construction."

PRINCIPALS OF LAW A fundamental truth or doctrine of law; a settled rule of action, procedure, or legal determination; a truth or proposition so clear that it cannot be proved or contradicted unless by a proposition which is still clearer. *Black's Law Dictionary*, rev. 4th ed., *supra* p. 1537.

PRIVATE EASEMENT A privileged service or convenience which one neighbor has of another by prescription, grant, or necessary implication, without profit.

PRIVATE LAND GRANT A grant by a public authority vesting title of public land in a natural person.

PRIVATE LAND OF STATE, COUNTY, CITY Usually, the term "private" is applied to something that is owned or possessed by a private person, persons, corporations, partnerships, etc. But it has a proper use when applied to mean "property of the state," "of the county," or "of a city" that is not for the free, open, unobstructed, unrestricted use of the public. There is a distinction between purposes "purely public" and purposes of a private nature. For example, a city jail, county jail, or state prison are examples of land owned by a city, a county, or the state, that is of a "private" nature, as opposed to "public" property that is open, free and unobstructed for the use of the general public. In this sense, a city hall is "private" property of a city, even though it is open to the public at certain hours of the day, certain days of the week. And the constitutional provision that private property cannot be taken without just compensation protects

the rights in property of cities and counties, as well as in their citizens.

PRIVATE STREET is an impossibility because *‘the word ‘street’ has only one meaning. When the owner of land makes a plat and refers to a strip of land as ‘street’ he does not mean a private way; but the term signifies a public way in all that public way implies.’* McCoy v. Thompson, 84 Or. 141. Revised, as used in the Oregon Subdivision Law, the word “street” can mean a private way, but only when that intent is expressed in clear, unmistakable, unambiguous language. If “street” is used on any plat, with no wording that shows an intent to reserve the way for private purposes, the Oregon courts have held that it means “public street.” The wording “private street” on such a plat would probably suffice to show an intent to reserve the way for a private use. But this is a rebuttable presumption that could be defeated if the acts and conduct, or other written statements of the subdivider showed an intent to devote the way to a public use. See ORS 92.010(11).

PRIVATE WATERS At common law, one owning both banks of a nonnavigable stream likewise owns the entire bed thereof, and the waters are private waters. Although Oregon Law does provide for private ownership of the beds of nonnavigable streams, ORS 537.110 makes the private ownership of the water impossibility. ORS 537.110 All water within the state from all sources of water supply belong to the public. (1909 Appropriation Act.) This act does not, however, take away any person’s right to or use of such waters (see ORS 537.120). See also waters of this state.

PRIVATE WAY An easement of right over or under another person’s estate. It is an incorporeal hereditament. Not necessarily synonymous with private driveway.

PRIVITY Successive relationship or ownership to the same property from a common source. Privity exists between two successive holders of an estate, when the later takes under the earlier, as by descent or by will, grant or voluntary transfer of possession.

PRIVY A privity in estate.

PROBATE In American Law, a general term used to include all matters of which probate courts have jurisdiction. In common usage, the term is used with reference to the proceedings incident to the administration and settlement of, decedents’ estates and also as applying to any of the incidents of administration. In Oregon Law, probates are provided for in Chapter 3 of the Oregon Revised Statutes.

PRO EMPTORE As a purchaser; by the title of a purchaser.

PROFILE A vertical, section, through a work or section of country, to show the elevations and depressions; the side view.

PROGRAM The implementation of a procedure by the use of a computer programming language. A set of instructions which direct a central process unit in the performance of a specific task.

PROJECTION, MAP Systematic formation of lines on a surface (usually a plane) to represent the parallels of latitude and the meridians of longitude of the Earth.

PROLONGATION In cartography and surveying, the extension or continuation of a line on the same bearing of the line being extended.

PROPERTY All property, real and personal, tangible and intangible. . As used regarding the cadastral map, property would relate to some or all of the land and improvements of an owner.

PROPERTY (HB 2968, 1979 Laws) “Property” or “condominium” means the land, whether leasehold or in fee simple and whether contiguous or noncontiguous, all buildings, improvements and structures thereon, and all easements, rights and appurtenances belonging thereto, which are submitted to the provisions of ORS 91.500 to 91.671 and 91.990.

PROPERTY, PERSONAL See personal property.

PROPERTY, REAL See real property.

PROPORTION A relation among quantities such that the quotient of the first divided by the second is equal to the quotient of the third divided by the fourth; thus 5 is to 10 as 8 is to 16; or, that in which the difference of the first and second is equal to the difference of the third and fourth.

PROPORTIONAL MEASUREMENT A measurement that gives concordant relation between all parts of the line, i.e., the new values given to the several parts, as determined by the remeasurement, shall bear the same relation to the record lengths as the new measurement of the whole line bears to that record.

PRO RATA Proportionately.

PRORATE To allot proportionally.

PROTRACT In cartography, to plot a map with a protractor and scale; to plot the lines and to scale; to plot the lines and angles of the lines.

PROTRACTION In surveying, the act of plotting or laying down on paper the dimension of a field or plot of ground.

PROTRACTOR A drafting instrument for laying down and measuring angles.

PUBLIC AGENCY The United States or any agency thereof, the State of Oregon or any agency thereof, or any county, city, district organized for public purposes or other public corporation or political subdivision of this state.

PUBLIC BODY Synonymous with public agency, public corporation and governmental body.

PUBLIC CORPORATION ORS 536.210 (Water Resources). Any city, county or district organized for public purposes.

PUBLIC DOMAIN In general, this term is synonymous with public lands and public domain lands. Webster defines public domain as the territory belonging to a state or general government; public lands. The concept of public domain excludes that of private ownership. Public domain, however, also includes any information, the source of which is available to anyone, and is not subject to copyright, e.g. U.S.G.S. quadrangle maps, county cadastral maps; the locations of natural and cultural features of the lands; and any product produced via public funds.

PUBLIC DOMAIN LANDS Land owned by the United States by virtue of its sovereignty.

PUBLIC ENTITY Synonymous with public agency, but includes private corporations which have the power to exercise the right of eminent domain

PUBLIC GRANT Refers to the granting of title to public lands by a governmental body. The authority to grant title to public lands is given by Congress or the Oregon Legislative Assembly. The grant can be by a special act expressly transferring certain lands to certain parties, or by a general act expressing the means by which individuals may acquire title to public lands. In the first type, the special legislative act serves as evidence of title. In the second, persons acquiring title under a general legislative act receive a "patent" from the U.S. government.

PUBLIC HIGHWAYS In general, any public street, alley, county road, the ocean shores, "local access road, state highway, etc. As regards state highways, the entire width between the boundary lines of every state highway.

PUBLIC LANDS (General) Any lands owned by a public body. The true meaning of the term is to be determined by the context in which it is used.

PUBLIC LANDS (Surplus Lands of the State of Oregon). See ORS 273.605(3).

PUBLIC LANDS (of the U.S.) That part of the original lands of the United States (including lands turned over to the U.S. by the Colonial States; areas acquired by purchase from, or treaty with the native Indians; or with the foreign powers that had previously exercised the sovereignty) still under Federal ownership which has not been set aside for uses such, as National Parks and National Forests.

PUBLIC LAND SURVEYS In general, the survey of Federal or State lands or the lands of any other public bodies. The term, however, is commonly used to designate the cadastral survey of the public lands of the U.S.; originally the Government Land Office surveys (abbr. G.L.O. surveys); the present surveys executed, by the Bureau of Land Management (B.L.M.). Synonymous with rectangular surveys of the U.S. lands; or the rectangular survey system. See Chapter 5.

PUBLIC LAND SURVEY SYSTEM A rectangular survey system used in all public land states; in Oregon, consisting of 6-mile-square townships and 1-mile-square sections; B.L.M. definition. The Act of Sept. 27, 1850 (9 Stat. 496) created the office of surveyor general in Oregon and extended the rectangular system to that territory. It also allowed the "geodic method" for executing the surveys (using an alidads and plane tablet making a topographic map at the time as the survey of township and section lines. This method was never used, except that a special set of geodetic notes were made along the Willamette Meridian). This act also initiated the Donation Law (often referred to as the Donation Land Claim Act).

PUBLIC RECORD A document, book, paper, photograph, file, sound recording or other material, such as court files, mortgage and deed records, regardless of physical form or characteristics, made, received, filed or recorded in pursuance of law in connection with the transaction of public business, whether or not confidential or restricted in use. See ORS 192.005(5). Assessment cadastres are public records (this includes the cadastral map).

PUBLIC RECORD EVIDENCE RULE ORS 40.570, Rule 1005. "The contents of an official record or of a document authorized to be recorded or filed and actually recorded or filed, including data compilation in any form, if otherwise admissible, may be proved by copy, certified as correct in accordance with ORS 40.510 or testified to be correct by a witness who has compared it with the Original. If such a copy cannot be obtained by the exercise of

reasonable diligence, then other evidence of the contents may be given."

PUBLIC ROAD Any road intended for use of the general public, whether designated and known as a state, county, district, or any other kind of road. See ORS 368.010.

PUBLIC STREET (Legal def.) The fundamental meaning of the term street is not only that of being "public," but public for all purposes of free and unobstructed passage which is its chief and primary, but by no means sole use. The term public street, literally speaking, means no more than street; a certain class of public highway.

PUBLIC USE A use concerning the whole community as distinguished from particular individuals. The term is used in constitutional provisions restricting the exercise of the right to take property by virtue of the right of eminent domain. The courts have held that the term "public" cannot exclude any member of our society, "for so long as any citizens are excluded from a common use, it is not a public road." Elliott's *Roads and Streets*, 1st ed., *supr.*

PUBLIC USAGE ROADS This term has no exact, legal meaning, but is often used to identify public roads that were not established by dedication, were not county roads, and were not state highways. Some roads referred to are what are legally designated as "local access roads" in ORS 368.001. Others are public ways by common law dedication, and some are, or could be public easements by prescription. When used to denote a public road that is not a county road, state highway or federal road, the term "local access road" should be used.

PUBLIC WATERS Used in contradistinction to private waters.

PUBLIC WAYS All lands within the boundary of any county road, and all dedicated streets and alleys in any incorporated or unincorporated city or town, within' the State of Oregon. Under ORS 307.200, public ways are exempt from assessment and taxation (when used as such).

PYTHAGOREAN THEOREM The 47th proposition of the first book of Euclid's Elements, that in a right-angled triangle the sum of the squares on the legs is equal to the square of the hypotenuse. See Chapter 9. ,

QUAD A quadrangle map.

QUADRAN The fourth part; the quarter of any number, measure, or quantity.

QUADRANGLE In mapping the term has no definite meaning other than a map of a tract of country

shown in rectangular format. For example a map of the NE $\frac{1}{4}$ of a section could be said to be quadrangle (a quadrant) of that section. A map of the NE $\frac{1}{4}$ NE $\frac{1}{4}$ could be said to be a quadrangle (a quadrant) of the NE $\frac{1}{4}$ of that section. U.S.G.S. quadrangle maps can be 30-minute quads (for 30' of latitude and longitude), 15 minute, quads (for 15' of latitude and longitude) and 7.5 minute quads (for 7.5' of latitude and longitude).

QUADRANGLE MAPS A map of a rectangular shaped tract of country; usually related to latitude and longitude. The term is commonly used in reference to U.S.G.S. 7.5 minute, 15 minute and 30 minute quadrangle maps. Most quadrangle maps show contours and elevations, highways, roads and other manmade structures, water features, woodland areas, bench marks, triangulation stations (some), geographic names, section lines, etc.

QUADRANT Any of four quarters into which something is divided by two real or imaginary lines that intersect each other at right angles. 90° of a circle; one-quarter of a section (the NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ and SE $\frac{1}{4}$ of a section are each quadrants of a section); one-quarter of a quarter section.

QUADRILATERAL Any four-sided figure; quadri meaning "four" and latera meaning, "side." There are six kinds of quadrilaterals: parallelograms, trapezoids, rectangles, squares, rhombuses, and trapeziums

QUAIFIED ESTATE An interest in real property that is not absolute and unconditional.

QUALIFIED FEE An estate that may continue forever, but could end on the happening of a possible event; a base or determinable fee.

QUARTER CORNER See quarter section corner.

QUARTER QUARTER-SECTION CORNERS Corners placed on the section line midway between the quarter section corner and the section corner (except on the last half-mile of section lines closing on the west boundaries of the township, or on other times between fractional and irregular sections). Few quarter-quarter comers were set in the original surveys of the U.S. public lands.

QUARTER SECTION The quadrant of a section in the subdivisional lines of that section, and not the exact quantity, which a perfect ad measurement of an unobstructed surface would declare. Either the NW $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ or SE $\frac{1}{4}$ of a section.

QUARTER SECTION CORNER The corners on a section line that was established halfway between the section corners. They were established and marked as part of the U.S. Public Land survey. Although

the general plan for the system called for quarter section corners to be located halfway between section corners, few such corners are mathematically halfway between the section corners.

QUARTER SECTION LINES The lines that divide the sections into four parts.

QUASI A Latin word signifying as if, almost, or almost as if it were.

QUASI EASEMENT An easement, usually arising from implication or reservation, that is continuous, apparent and reasonably necessary to the beneficial enjoyment of an estate for which it was claimed; an apparent servitude; a necessary and continuous easement, not created by express grant, that is enjoyed by the dominant tenement and imposed as a burden upon the servient tenement, that would be obvious to a prospective purchaser of either the dominant or servient estate by such examination of the premises, as is ordinarily made by one desiring to purchase.

QUIET ENJOYMENT enjoyment. See covenant of quiet

QUIETING TITLE To settle a particular claim, determine all conflicting claims and remove all clouds from title. See ORS 105.605 to 105.615 (suits to quiet title and remove cloud).

QUITCLAIM To release to, by a deed, without covenants of warranty against adverse and paramount titles. The word quitclaim used in a conveyance does not restrict the conveyance if the other language employed in the instrument indicates the intent to convey the land itself. The words bargain, sell, release, quitclaim and convey, as used in a deed, are merely words of release and quitclaim of grantor's interest and estate in the land described; whatever that interest or estate may be. See quitclaim deed.

QUITCLAIM DEED The simplest form of deed is the quitclaim deed. This is a deed that states, in effect, that the grantor is transferring her or his rights, if any, in the property described to the grantee. When a quitclaim deed is used to convey property, there is no implication in the instrument that the grantor has good title, or any title at all. If the grantor has good title, then the grantee receives good title by means of a quitclaim deed. However, a transfer by quitclaim deed does not carry with it any implication that the grantee will receive any after acquired rights. ORS 93.110 provides, "A deed of quitclaim and release, of the form in common use, is sufficient to pass all the estate which the grantor could lawfully convey by a deed of 'bargain and sale.'" In addition, ORS 93.865 provides a

recognized deed form for a quitclaim deed, then add "(2) A deed in the form of subsection (1) of this section shall have the effect of conveying whatever title or interest, legal or equitable, the grantor may have in the described property at the date of the deed but shall not transfer any right or interest which the grantor may thereafter obtain nor shall it operate as an estoppel. "(3) A grantee taking title by way of a quitclaim deed shall not, merely because of receipt of title by or through such a deed, be denied the status of a good faith purchaser for value."

RACE NOTICE Recording law that carries the notice statute one step further (see notice statute). That is, not only must a subsequent purchaser take title without notice, but he also must record his title first. Oregon Law recognizes the race notice concept. See ORS 93.640.

RACE STATUTE (Not used in Oregon). The first type of recording law used in the United States. It gave priority to the first person who recorded the title to the property (See R.G. Patton, Land Titles, subsection 8 at 32; 1957) even if the subsequent purchaser recorded first. That is, priority was awarded the person who won the race to record a deed. The fact that the subsequent purchaser had knowledge of the first transaction had no effect on this law. The race statute in 25 states has been amended to conform to the notice statute and in the other 25 states to conform to the race notice law (Oregon). See notice statute and race notice.

RACEWAY A manmade canal or channel cut in the ground.

RADAR IMAGERY A process whereby photo images are produced by a radar device that transmits microwave pulses to the earth and receives reflected pulses that vary with objects on the ground. The resultant images resemble aerial photos.

RADIAL DISPLACEMENT The distortion of the images on the outer edges of aerial photos. The result of distance from the edge of the aerial photo, to the camera, being greater than from the center of the photo to the camera.

RADIAL LINE A straight line projected from the radius point of a circle to the circumference of a circle.

RADIAL SEGMENT A segment with one end point at the center of a circle and the other end point on the circumference of that circle. The radius of a circle is the length of the radial line segment. Synonymous with radial line.

RADIAL TRIANGULATION A technique of extending horizontal control from aerial photographs.

RADIAN A unit of circular measure equal to $57^{\circ}17'44.8''$; an angle subtended by an arc of a circle having a length that equals the radius of the circle. One degree equals 0.01745 radians. (Radian tables are included in the appendix.)

RADII More than one radius.

RADIUS The length between the center of a circle to the arc of that circle. The length of a radial line or segment. The semidiameter of a circle (or a sphere). In trigonometry, the whole sine, or sine of 90° .

RAILROAD PEN An ink ruling-drafting pen used for simultaneous ruling of parallel lines. See Chapter 11.

RAILROAD (State Land Grants) See ORS 273.751 for laws relating to right-of-way widths, station grounds, shops, side tracks, depots, turntables and water stations, rights to materials, and rights relating to construction of bridges. See ORS 273.755 for information on laws requiring filing of maps or railroad locations and depot sites.

RANDOM LINE A line runs in a random traverse.

RANDOM TRAVERSE When one end of a line is not visible from the other end of a line, a traverse is run at random (but as direct as possible) from one end of the line to the other end.

RANGE The north-south row of townships.

RANGE LINES The north-south, township boundary lines.

RANGE OF TIDE The difference in height between consecutive high and low waters. The mean range is the difference in height between mean high water and mean low water.

RAPIDOGRAPH PEN A modern drafting pen for making ink lines. See figure 115 of Chapter 11.

RASTERSCAN (CA.MLS) A line by line sweep across a display surface of a map to generate or record an image.

REAL ESTATE Leaseholds and licenses to use as well as any and every interest in land, whether corporeal or incorporeal, whether freehold or nonfreehold, whether held separately or in common with others and whether the land is situated in this state or elsewhere. (See ORS 696.010.) See real property.

REAL ESTATE ESCROW See escrow, real estate.

REAL LAW The common law relating to real property.

REAL PROPERTY ORS 307.010(l) defines "land," "real estate" and "real property" as: the land itself, above or under water, all buildings, structures,

improvements, machinery, equipment or fixtures erected upon, under, above or affixed to the same; all mines, minerals, quarries and trees in, under or upon the land; all water rights and water powers and all other rights and privileges in any wise appertaining to land; and any estate, right, title or interest whatever in the land or real property, less than fee simple. (2) Where the grantor of land has, in the instrument of conveyance, reserved or conveyed. (a) Any of the timber standing upon the land, with the right to enter upon the ground and remove the timber, the ownership of the standing timber so reserved or conveyed is an interest in real property. (b) The right to enter upon and use any of the surface ground necessary for the purpose of exploring, prospecting for, developing or otherwise extracting any gold, silver, iron, copper, lead, coal, petroleum, gasses, oils or any other metals, minerals or mineral deposits in or upon the land, such right is an interest in real property. (See ORS 307.020 for definition of personal property.)

REAL PROPERTY SALES CONTRACT An agreement wherein one party agrees to lease or convey title to real property to another party upon the satisfaction of specified conditions set forth in the contract.

REAL PROPERTY (State Highways) Any right, title or interest in real property. (See ORS 366.332.)

REALTY Real property.

RECESSION (Retrogression) Continuing landward movement of the shoreline; a net landward movement of the shoreline over a specified time.

RECITAL A statement in a deed of some fact in connection with the conveyance, i.e. the parties, interests conveyed, etc. Recitals are supposed to be statements of fact, not inferences.

RECORDING INDEXES Indexes maintained by the county clerk or recording officer, to the books, or microfilm for the recording of deeds; and for the recording of mortgages. The indexes can be direct or indirect. They contain alphabetically, the name of every party to each instrument recorded by that party, with reference to the book and page or microfilm document where it is recorded (See ORS 93.630).

RECORD OWNER The owner of real estate at the time in question, as revealed by an instrument of conveyance, by the records of a loan institution, title company, assessor's cadastre or the records maintained by the county clerk or recording officer. This term must be defined in context with the law or statute in which it is to be applied. For example, if an owner of real property fulfills the assessor

with a copy of the deed to his or her real property, and that deed is noted and filed in the assessment records, the owner will be the “record owner,” or “owner of record,” in the assessment cadastre. This term can mean “record owner” in the records maintained by the county clerk or recording officer if that definition is the intent and purpose of the law. However, in general use, the term is not synonymous with “owner of a recorded deed.”

RECORD, PUBLIC See public record.

RECTANGULAR SURVEY SYSTEM The term is used in reference to the U.S. Public Land survey by township, range, section and subdivision of section. See Chapter 5.

RECTIFICATION OF AN AERIAL PHOTOGRAPH Projection of an aerial photograph (mathematically, graphically, or photographically) from its plane onto a horizontal plane by translation, rotation, and (or) scale change to remove displacement due to tilt of the aircraft.

REDDENDUM A clause in a deed which specifies a reservation.

REDEMPTION A method, provided by ORS 312.120, for removing property from a foreclosure list.

REFERENCE, DEED The recording number of a deed or mortgage recorded in the office of the county clerk or recorder. Usually by book and page or by microfilm number.

REFERENCE MONUMENT Where the site of a corner is such that a permanent monument cannot be established, or where the monument would be liable to destruction, and bearing trees or nearby bearing objects are not available, a reference monument is established at a suitable place.

REFERENCE POINT Points established, or used, to aid in finding or relocating survey points or monuments; i.e. bearing trees.

REGISTERED DEEDS Recorded deeds. Not to be confused with registered title.

REGISTERED PROFESSIONAL LAND SURVEYOR ORS 672.002(7) defines registered professional land surveyor as a land surveyor who is registered in this state and holds a valid certificate to practice land surveying in this state.

REGISTERED TITLE See Torrens System and registration of title.

REGISTRATION Correct positioning of one component of a composite map image in relation to the other components. Achieved, for example, by punching sets of holes, having a fixed horizontal relationship to each other, in each component sheet and then

attaching the components together using specially designed fasteners.

REGISTRATION OF A DEED The registration of a deed under the recording system. Not synonymous with registration of title.

REGISTRATION OF TITLE The registration of the title to, real property called the Torrens System. Repealed in Oregon. Not synonymous with registration of a deed.

RELEASE An “express” release is an act of writing by which some right, claim, or interest is surrendered to another person. An implied release arises from acts of the creditor or owner, without any express agreement. In a quitclaim deed release means discharge. The word is appropriate to extinguish an easement. In Oregon Law dealing with mortgages, the word discharge is used instead of release.

RELEVANT EVIDENCE “Evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.” ORS 40.150, Evidence Rule 401. ORS 40.155, Rule 402, provides: “All relevant evidence is admissible, except as otherwise provided by the Oregon Evidence Code, by the Constitutions of the United States and Oregon, or by Oregon statutory and decisional law. Evidence which is not relevant is not admissible.”

RELICION The uncovering of land by the gradual subsidence of water. Reliction must not be confused with dereliction as when the water shrinks below the usual watermark. Reliction is a horizontal act of nature and dereliction being a vertical act of nature. Real property boundaries can change by an act of reliction. See Chapter 10.

RELIEF The undulations or surface elevations of the earth.

RELIEF MAP A map representing in three dimensions, a part of the surface of the earth.

RELINQUISHMENT An abandoning of; giving over a right to.

REMEDY, STATUTORY A remedy afforded by statutory law to a private party insofar as that party’s private and individual rights have been injured by a wrong or injury, an offense, or violation of public or private duty. A statutory means is provided to enforce a right or redress an injury, usually in a court of law. For example, ORS 92.018 provides a remedy for a buyer who has purchased an improperly created lot or parcel, i.e.: “ORS 92.018. A person who buys a lot or parcel that was created without approval of the appropriate city or county

authority may bring an individual action against the seller in an appropriate court to recover damages or to obtain equitable relief. The court may award, in addition to the remedies provided in this section, both reasonable attorney fees and costs incurred on trial and on appeal."

REMISS To release a claim to; or surrender a deed.

REMNANT RULE A rule whereby the width of an undimensioned lot in a subdivision plat is the length of the block minus the total width of the dimensioned lots.

REMOTE SENSING (see also manual definition) Detecting and (or) monitoring chemical or physical properties of an area by measuring its reflected and emitted radiation.

REMOVAL See ORS 541.605 relating to removal of material from any waters of this State.

REPEATING THEODOLITES See theodolite.

REPRESENTATIVE FRACTION Scale of a map or chart expressed as a fraction or ratio that relates unit distance on the map to distance measured in the same unit on the ground

REPRODUCTION The summation of all the processes involved in printing copies from an original drawing. A printed copy of an original drawing made by the process of reproduction.

RESERVATION The creation, in the grantor, of a new right issuing out of the thing granted. In a deed, reservation is a portion removed from the land clearly granted. An exception, in a deed, is a part of the estate not intended to be granted. Reservation implies a new right; exception implies an existing right in the land granted.

RESERVATION AND EXCEPTION (Distinguished). See reservation.

RESERVED LAND Public lands withheld or kept back from sale or disposition.

RESIDUARY ESTATE Everything that remains of an estate not otherwise disposed of; what is left of an estate after all debts and expenses of administration, legacies and devises have been satisfied.

RESOURCES, GEOTHERMAL The natural heat of the earth, the energy, in whatever form, below the surface of the earth present in, resulting from, or created by, or which may be extracted from, the natural heat, and all minerals in solution or other products obtained from naturally heated fluids, brines, associated gases, and steam, in earth, exclusive of helium or of oil, hydrocarbon gas or other hydrocarbon substances, but including specifically: (a) all products of geothermal processes

embracing indigenous steam, hot water and hot brines; (b) steam and other gases, hot water and hot brines resulting from water, gas or other fluids artificially introduced into geothermal formations; (c) heat or other associated energy found in geothermal formations; and (d) any byproduct derived from them. See ORS 522.005(7).

RESTRICTIVE COVENANTS See: "Covenant." Covenants that place certain restrictions in the use of the land conveyed, or that prohibits the grantee from doing or not doing a certain act concerning his or her land. Such covenants are enforceable in a court of equity unless they are against public policy. For example, ORS 93.270 provides that a restrictive covenant that is discriminatory is unlawful in this state, and that any instrument executed in violation of the provisions of subsection (1) is void and unenforceable.

RESURVEY A retracement of a survey or surveys.

RESURVEY, PUBLIC LAND The reestablishment or reconstruction of the land boundaries and subdivisions by the rerunning and remarking of the lines that were represented in the field note record and on the plat of a previous official survey. The adjective dependent applied to the term resurvey is employed for emphasis, and specifically to suggest the recovery and restoration of the prior official survey. See retracement survey. See Chapter 5.

RETRACEMENT SURVEY One made for the purpose of verifying the direction and length of lines and to identify the monuments and other marks of an established prior survey. The retracement, as such, does not modify the former line or lines, excepting where renewing the marks or monuments. The field notes, however, do afford new evidence of the character and condition of the previous survey, including careful redetermination of the direction and length of all lines retraced, and whether the retracement is corroborative of the former record field notes and plat, or not, so in any particular. See Chapter 5.

RETRIEVAL SYSTEM A system for retrieving references documents maps facts, etc. from a file (whether or not the file is in cabinets, on microfilm, in a computer, etc.).

REVERSE CURVES Simple curves that are abutting, but turn in opposite directions. See Chapter 8.

REVERSION *Webster's New Collegiate Dictionary* defines "reversion" as "the part of a simple estate remaining in the control of its owner after that owner has granted therefrom a lesser particular estate; an act or the process of returning to a former conclusion." *Black's* supplies this defini-

tion: "A reversion designates the estate left in the grantor during the continuance of a particular estate, and also the residue left in the grantor or the grantor's particular estate." By those definitions it would seem safe to say that "reversion" would be an appropriate designation of a servient estate left in the donor of a public easement during the continuance of the dominant estate in the public. However, "reversion" usually applies to the situation where B sells to A for life, and upon the death of A the land reverts to B and the heirs of B. B, in this situation, has a reversionary interest in the land during A's life. Another type of reversion is where B purchases a subdivision lot from A, with restrictive covenants promised by B that B's estate will terminate and "revert" to A if the promise is broken. In this situation, A has a reversionary interest that may or may not ripen into an estate in fee. See: "Reversionary interest" and "Revert."

REVERSIONARY INTEREST A future interest in property left in the grantor or the grantor's successor. The right of succession or future possession or enjoyment in land. The right of a dedicator, or his or her successor or grantees, to the land of a vacated public way. The level of estate that reverts upon vacation is the "dominant estate" because the fee in the public way, the servient estate, never left the dedicator at the time the way was donated to the public. It passed from the dedicator to the subsequent owners of land abutting the way.

There is an important distinction between the reversionary interest of a dedicator, and the reversionary right to regain land because of a condition broken. The former is a fee simple estate existing in the dedicator and subsequent purchasers of land abutting a public way; property within the constitutional prohibition against taking property, without just compensation, for a public use (only). The latter is not an existing estate; rather it is a future estate, not really vested in anyone, contingent on an event that may never happen.

Although the reversionary right of entry for a condition broken is a legal right, it is not a right that is as sacred as an existing fee simple interest in real property. That is, in many states, such as Oregon, laws have been enacted to limit the time a condition subsequent or other limitations may restrict a fee simple interest (ORS 105.770). A right to the bed of a vacated way, however, is an existing fee simple estate. As such, it is protected by the Constitutions of the United States and Oregon. Consequently, it is not within the jurisdiction of the legislature, and cannot be taken for private use, and cannot be taken for public use without just compensation. See: "Reversion," "Revert," and the subsection of this

publication on "Clarification of the Words 'Revert' and 'Reversion.'" *Revert*. Black's defines "revert" as "turn back, to return to." With respect to property, to go back to and lodge in the former owner who parted with it by creating an estate in another (which has expired)." This term is often used incorrectly in statements to the effect that "the fee in a vacated street 'reverts' to the donor or subsequent purchasers of land abutting the street." Since the donor of a dedicated street does not part with the fee in the land of the street, how is it possible for the fee to "revert" to the donor upon vacation? In other words, how can something be returned that was never parted with? The courts have pondered this question, but have held that "revert" is the more appropriate term for the action, and that it is the "dominant estate" that "reverts" as the result of a statutory vacation. Better stated, "the vacation of a public way frees the fee simple estate of the burden of the public easement."

REVERT Return to; go back to; or fall back.

REVISED STATUTES Either the Oregon Revised Statutes (abbr. ORS; being Oregon Law) or the United States Revised Statutes (abbr. R.S.).

REVULSION A sudden, violent, perceptible change in the location of a river or stream; revulsion results in an avulsion.

RHOMBUS An oblique angled equilateral parallelogram whose sides are equal and opposite sides are parallel; but the angles are unequal, two being obtuse, and two acute.

RHUMB LINE A line of constant bearing.

RIGHT A legally enforceable claim of one person against another that the other shall do, or not do, a given act. Land is a gift of nature. Every person has rights in it, including the right to living space and the right to get subsistence from it. Title to land, an accumulation of rights, is not an exclusive right as in the case of chattels (such as farm animals or machinery). Some of the rights included in the title to land are always retained by the public. The titleholder has use rights. However, these rights can be eliminated through condemnation proceedings under the power of eminent domain (if the land is needed for public or quasi-public use. These rights can also be regulated under the police power of the state *if the restriction imposed is in the interest of health, safety, morals, convenience, or the general welfare of the public*). Miller, Frank, April 1970, ALREA Appraisal Journal.

RIGHT ANGLE An angle formed by two lines perpendicular to one another at the vertex. A right angle is 90°.

RIGHT BANK OF A STREAM The bank on the right when facing DOWNSTREAM.

RIGHT OF EMINENT DOMAIN The right of government to take property for public uses. See eminent domain.

RIGHT OF EMINENT DOMAIN One of the oldest rights of government. It is the sovereign right of a government (U.S., Oregon, counties, cities, and quasi governmental bodies) to take private property within its jurisdiction for public use without the owner's consent upon paying due compensation. The power, of eminent domain is inherent in the state; the Oregon and federal constitutional provisions are not grants but limitations of the power. Although the right or power is delegable to subordinate agencies of the state, the delegation must be by express statutory authority. Such authority will not be implied, nor can the power be exercised for purposes other than public use or benefit. *Olcott v. Hawk*, 105 Or. 319. This point was made in *Huddleston v. Eugene*, 34 Or. 343: "Statutes authorizing the condemnation of private property for a public use are wholly in invitum, and since they are in derogation of vested rights, must be strictly construed."

RIGHT OF ENTRY The right of taking or resuming possession of land by entering on it in a peaceable manner. (See Black's Law Dictionary, Revised Fourth Edition).

RIGHT OF INGRESS AND EGRESS A right to go upon and cross the land of another.

RIGHT OF WAY (1) This term has two significant meanings. It sometimes is used to describe a right belonging to a party, of passage over another's land (an easement); and it is also used to describe the taking of a fee simple interest in the land itself. A right-of-way is one kind of easement and is also a corporeal hereditament, but easement is the broader term, since it includes charges on real estate other than rights-of-way. A mere "right-of-way" overland should always be regarded as an easement. A deed reading "a 25 foot strip of land for road purposes" should be regarded as meaning "subject to an easement for road purposes." See Chapter 13 for legal references. (2) "The right of passage over another (person's) ground; and its legal and generally accepted meaning, a mere easement in the land of others. It would be using the term in an unusual sense by applying it to an absolute purchase of the fee simple in lands." Black's Law Dictionary, rev. 4th ed., *supra* In *Highway Commrr v. Pacific Shore Land Co.*, 201 Or. 142 269 P.2d 512, the court held, "In common parlance the term 'right of way' signifies an easement. In

absence of special circumstances indicating a contrary meaning the courts generally construed the term in accordance with common usage." *Cit. in Cappelli v. Justice*, 262 Or. 120, 496 P.2d 209. Regardless, the courts have acknowledged that "right of way" can mean the fee simple title when used in instrument for acquiring land for a state highway, especially state through ways where the fee in the land is necessary to bar the right of access that an abutting owner might acquire if the limited access highway was merely an easement. In *Highway Comm. v. Pac. Shore Land Co.*, *supra*, the court explained, "But the legislature has authorized the Department of Transportation to acquire fee title when acquiring land for 'right of way purposes'; so the term right of way includes land acquired in fee (when that level of estate is necessary), as well as land where only an easement has been acquired. See: Problem 2 is in Volume 4 under the subsection on "Vacation Problems."

RIGHT-OF-WAY, COUNTY ROAD Easements for the construction of public highways of a county road system. The right of the county and public in public highways (includes county roads) is exempt from adverse possession. Refer to ORS 368.620.

RIGHT-OF-WAY, HIGHWAY Land taken by donation, agreement, or exercise of the power of eminent domain for the construction of State highways. In all cases where title to real property is acquired by the Department of Transportation, for right-of-way, by any of the above methods, a title in fee simple may be taken. See ORS 366.360, 366.315 (widths of right-of-way), 366.320 (acquisition of rights-of-way), and 366.340 (acquisition of real property generally).

RIGHT READING COPY Printed or drawn page on which the lettering and (or) images are presented in their normal orientation, for example, reading from left to right. Oregon standard cadastral maps are right reading.

RIPA The banks of a river.

RIPARIAN Related to, living on, or located on the banks of a natural watercourse. To be riparian, the land must abut the stream. The word littoral should be used in reference to lands and rights abutting, tidewaters and lakes. See title of riparian owner and Chapter 10.

RIPARIAN OWNER One whose lands abut upon a river or stream. See title of riparian owner and Chapter 10.

RIPARIAN RIGHTS The word riparian stems from ripa, which means "bank." To be riparian, lands must abut a body of water. Therefore, riparian rights are the rights incidental to the ownership of land bor-

dering on water. They pass with the transfer of the property (even when not so designated in a deed). They connote the rights and profits to the owner of the upland arising from its connection with the water. They are natural property rights; a part of the soil, they go with the soil. See discussion on riparian rights in Chapter 10.

RIPARIAN UPLANDS The lands that touch the line of ordinary high water. See: Volume 5 of the *Oregon Cadastral Map Systems Mapping Riparian Lands*.

RIPARIAN UPLAND OWNER The proprietor of riparian uplands. One whose property lines run to the ordinary high water line (or mean high water line) of a navigable body of water, or to the ordinary high water line and extending to some point in the bed of a non-navigable body of water. The term is used synonymously with "riparian owner," but the latter term includes the owner of the bed of a body of water, who does not own riparian uplands. For example, the State of Oregon is a riparian owner in most of the navigable part of the Willamette River because it owns the bed of that river as a consequence of its navigable status. However, it is a riparian upland owner in only certain situations where it owns the riparian uplands. Where the owner of the bed of a body of water also owns riparian uplands abutting that part of the bed, either "riparian uplands owner" or merely "riparian owner," are appropriate designations of the ownership. The word "uplands," by itself, is not synonymous with "riparian uplands." Technically, any land not in the bed of a body of water is "uplands." However, it is common for riparian uplands to be referred to as merely "uplands," and such use of the word is acceptable (but not preferred).

RIPRAP ORS 541.620 The facing of a stream bank with rock or similar substance to control erosion in accordance with regulations promulgated by the Division of State Lands.

RIPUARIAN Synonymous with riparian.

RIVER BANKS The bank containing the waters of a river at its highest ordinary flow.

ROAD (As used in Chapters 366 and 367 of the ORS) Road or highway includes necessary bridges and culverts, and city streets, subject to such restrictions as Oregon Law provides. (See ORS 366.010.)

ROAD (Subdivisions and Partitions) (1981) A public or private way created to provide ingress or egress for persons to one or more lots, parcels, areas or tracts of land, excluding a private way created to provide ingress and egress to such land in conjunction with the use of such land for forestry, or agricultural purposes. (Based on ORS 92.010(10).)

ROAD ASSESSMENT DISTRICTS Districts formed to provide for the improvement, repair or reconstruction of the public roads within the area of land covered by the district. (See ORS 371.410.)

ROAD DISTRICTS, DIVISIONAL Refer to ORS 368.430, 371.055, 371.070, 371.061, 371.305, and 371.305 to 371.361 (specifically ORS 371.336).

ROAD OR STREET (SUBDIVISION LAWS) "Road" or "street" means a public or private way that is created to provide ingress or egress for persons to one or more lots, parcels, areas or tracts of land, excluding a private way that is created to provide ingress or egress to such land in conjunction with the use of such land for forestry, mining or agricultural purposes. Regardless of that definition, "road" and "street" in legal acceptance means the same as "public highway," unless (1) prefixed by private," (2) the language of the plat is such to show intent to reserve the "road" or "street" for private use, or (3) some other acceptable evidence shows intent to reserve these ways for private use.

ROAD (STATUTORY, ORS 368.001, HIGHWAY AND ROAD LAW) "Road" means the entire right of way of any public or private way that provides ingress to, or egress from property by means of vehicles or other means that provide travel between places by means of vehicles. "Road" includes, but is not limited to:

- a. Ways described as streets, highways, throughways or alleys,
- b. Road related structures that are in the right of way, such as tunnels, culverts, or similar structures, and
- c. Structures that provide for continuity of the right of way, such as bridges.

ROADS, TERRITORIAL See territorial roads.

ROADWAYS In general, not synonymous with road, highway or street. The word usually denotes land improved, designed, or ordinarily used for vehicular travel; whereas, the words road, highway and street covers not only that portion used for vehicular travel, but also that portion used for parking, sidewalks and pedestrian travel. Curbs are usually considered as part of the roadway.

ROD 16.5 feet in length.

ROD, STADIA A surveying instrument used, with theodolite, transits and levels, for measuring distances where it is impractical to use surveyors tapes or chains. See figures 614 and 615 of Chapter 6.

ROOD OF LAND The fourth part of an acre in square measure or one thousand two hundred and ten square yards.

ROTARY FLOW CAMERA (Mirographics) A microfilm camera that photographs material moved by the camera's carrier. The material carrier (or document carrier) is connected to the film carrier and both move in unison.

ROUNDING-OFF The mathematical process of shortening the number of significant figures in a number. See Chapter 9 for instructions.

ROUTE The course; the way to be traveled; the way traveled; a way used for going from one place to another, line of travel; and transit.

ROUTE SURVEYS Also classified as engineering surveys. Surveys of highway routes (r/w), county road right-of-ways, transmission line easements, pipe line easements, railroad right-of-ways, etc.

RULE OF CONSTRUCTION A rule which either governs the effect of an ascertained intention, or points out what the court should do in the absence of express or implied intentions, e.g. the following rule of construction from the Oregon case of *P & W.V.R. Co. v. City of Portland*, 14 Or. 188: "A deed purporting to convey land that is intended for a public highway will, in absence of some indicia of a contrary intention of the parties, be construed as passing an easement only, and not fee simple absolute title." It is important to understand, "Rules of construction are not to be invoked to contradict the plain meaning and purport of language of a grant." *Minto v. Salem Water Etc. Co.*, 120 Or. 202, 250 P. 722. "It is the duty of the court to declare the meaning of what is written in the instrument, not of what was intended to be written" *Id.* This rule of construction supplied in *Fendali v. Miller*, 99 Or. 610, 196 P. 381, is relevant to the cadastral mapping process: "Every word or clause in a written instrument should be given its sufficient effect, if possible to do so." And, "It is a well-settled rule of law that, where there is an exception or reservation of one thing, it will be presumed that no other exceptions or reservations are intended than those expressed."

RULE OF INTERPRETATION Rules governing the ascertainment of the meaning of the parties to an instrument. For example, as provided in ORS 42.210 to 42.300, i.e.:

ORS 42.210. "The language of a writing is to be interpreted according to the meaning it bears in the place of execution, unless the parties have reference to a different place."

ORS 42.220. "In construing an instrument, the circumstances under which it was made, including the situation of the subject and of the parties, may be shown so that the judge is placed in the position of those whose language the judge is interpreting."

ORS 42.230. "In the construction of an instrument, the office of the judge is simply to ascertain and declare what is, in terms or in substances, contained therein, not to insert what has been omitted, or to omit what has been inserted; and where there are several provisions of particulars, such construction is, if possible, to be adopted as will give effect to all."

ORS 42.240. "In the construction of an instrument the intention of the parties is to be pursued if possible; and when a general and particular provision are inconsistent, the latter is paramount to the former. So a particular intent shall control a general one that is inconsistent with it."

ORS 42.250. "The terms of a writing are presumed to have been used in their primary and general acceptance, but evidence is admissible that they have a technical, local, or otherwise peculiar signification and were used and understood in the particular instance, in which case the agreement shall be construed accordingly."

ORS 42.260. "When the terms of an agreement have been intended in a different sense by the parties, that sense is to prevail, against either party, in which the party supposed the other understood it. When different constructions of a provision are otherwise equally proper, that construction is to be taken which is most favorable to the party in whose favor the provision was made."

ORS 42.270. "When an instrument consists partly of written words and partly of printed form, and the two are inconsistent, the former controls."

ORS 42.280. "When the characters in which an instrument is written are difficult to be deciphered, or the language is not understood by the court, evidence of persons skilled in deciphering the characters, or who understand the language, is admissible to declare the characters or the meaning of the language."

ORS 42.290. "A written notice is to be construed according to the ordinary acceptance of its terms. Thus, a notice to the drawers or indorsers of a bill of exchange or promissory note, that it has been protested for want of acceptance or payment, shall be held to import that it has been duly presented for acceptance or payment and refused, and that

the holder looks for payment to the person to whom the notice is given."

ORS 42.300. "Except for the recital of a consideration, the truth of the facts recited from the recital in a written instrument shall not be denied by the parties thereto, the/r representatives or successors in interest by a subsequent *tifie*." It may be generally stated that the rules of interpretation are rules of construction.

RULE OF PROPERTY A settled legal principle governing the ownership and devolution of property.

RULES OF CONSTRUCTION (STATUTORY) ORS 93.310 "The following are the rules for construction the descriptive part of a conveyance of real *property*, when the construction is doubtful, and there are no other sufficient circumstances to determine it:

"(1) Where there are certain definite and ascertained particulars in the description, the addition of others, which are indefinite, unknown or false, does not frustrate the conveyance, but it is to be construed by such particulars, if they constitute a sufficient description to ascertain its application.

"(2) When permanent and visible or established boundaries or monuments are inconsistent with the measurement, either of lines, angles or retraces, the boundaries or monuments are paramount.

"(3) Between measurements which are inconsistent with each other, that of angles is paramount to that of surfaces, and that of lines paramount to both.

"(4) When a road or stream of water not navigable is the boundary, the rights of the grantor to the middle of the road, or the thread of the stream, are included in the conveyance, except where the road or bed of the stream is held under another title." See: *Cross v. Talbot*, 121 Or. 270, 254 P. 827 for clarification of this rule; and *Fossi v. Meyers*, 271 Or. 611.

"(5) When tidewater is the boundary, the rights of the grantor to low watermark are included in the conveyance, and also the right of this state between high and low watermark."

Note: The statutes governing submerged and submersible lands will control as to the exact boundary between uplands and tidelands (ordinary high water) and between tidelands (submersible lands) and submerged lands (ordinary low water).

"(6) When the description refers to a map, and that reference is inconsistent with other particulars, it controls them, if it appears that the parties acted with reference to the map; otherwise the map

is subordinate to other definite and ascertained particulars." See: "Rules of interpretation."

RULES OF EVIDENCE The statutory provisions known and cited as the "Oregon Evidence Code." The rules were established to "secure fairness in administration, elimination of unjustifiable expense and delay, and promotion of growth and development of the law of evidence to the end that the truth may be ascertained and proceedings justly determined." ORS 40.020, Rule 102. An example of a rule of evidence is the "Hearsay Rule," Rule 102: ORS 40.460. "Hearsay is not admissible except as provided for in ORS 40.450 to 40.475 or as otherwise provided by law."

RULES OF INTENT Synonymous with "rules of interpretation" and "rules of construction."

RULES OF PROPERTY Settled legal principles governing the ownership and devolution of property.

RULING PEN In general any pen used to lay out and draw ink lines. In common use, it is a special drafting pen that has adjustable blades for making various thickness of ink lines. The pen stores the ink between the blades; therefore, the ink has a tendency to dry rapidly. This has been overcome by a new kind of ruling pen that has an enclosed ink reservoir, i.e., the Rapidograph Pen.

RUNNING THE SHORE As used in deed descriptions means running by the shores.

"RUNNING TO A HIGHWAY" (or road) Expressive of an intention in a deed to convey to the middle of the highway (or road); but, when from the description it is manifest that the parties intended to restrict the conveyance to the line of the highway or road, no part of that highway or road passes.

"RUNNING TO A HIGHWAY," "RUNNING TO A ROAD," "RUNNING TO A STREET," ETC Expressive of an intention in a deed to convey to the middle of the highway, road, street, etc. But, when the description is manifest that, in no uncertain terms, the parties intended to restrict the conveyance to the line of the highway or road, no part of that highway or road passes.

Note-. In *Cross v. Talbot*, 121 Or. 270, 254 P. 827, the court held, "The presumption of an intent to convey title to the center of a street or highway is not overcome by the fact that the land conveyed is described by metes and bounds, and that the distances stated in the description of the deed do not extend to the center of the street or highway." See: "Rules of construction," ORS 93.310(4) and "note."

RUNNING WITH THE LAND That which touches or concerns the land granted or demised so that it passes with ownership. ‘

RURAL FIRE PROTECTION DISTRICT A taxing district proposed to be organized under, or subject to ORS Chapter 478. See ORS 478.010 (Territories Not Included). Abbr. RFPD. These are not the same as fire patrol.

SAFETY FILM (Micrographics) A comparatively non-flammable film that meets the American National Standard specifications.

SAID A word, of reference meaning previously mentioned or written in the deed; previously stated in the deed. Where the word “said” is used as, one reference, and there is a contention as to which two antecedents it was intended to apply, it is held to refer to the last.

SALE OR SELL (Subdivisions & Partitions) “Sale” or “Sell” includes every disposition or transfer of land in a subdivision or partition or an interest or estate therein. ORS 92.010(11).

“SALE” OR “LEASE” (Oregon Subdivision Control Law) “SALE” or “LEASE” includes every disposition or transfer of land in a subdivision or an interest or estate therein, by a subdivider or a developer, or their agents, including the offering of such property as a prize or gift when a monetary charge or consideration for whatever purpose is required by the subdivider, developer or their agents. ORS 92.305.

SALIENT POINT Any point on the shore that has an effect on the location of a median line. See Chapter 10 for discussion, illustrations and formulae.

SALTZMAN PROJECTOR A vertical reflecting projector used for projecting photographs and sections of opaque maps. The projector has the capability of enlarging to scale or reducing to scale.

SANCTUARY, ESTUARINE Research area which may include any part or all of an estuary, adjoining transitional areas, and adjacent uplands, constituting to the extent feasible a natural unit, set aside to provide scientists and students the opportunity to examine over a period of time the ecological relationships within the area established under provisions of the Coastal Zone Management Act (CZMA). An example is the South Slough Estuarine Sanctuary in Coos Bay.

SAND BAR Sand forming an obstruction to navigation. Sand bars are usually below average high-water elevation; submersible lands.

SCALE A drafting tool used for measuring and setting out lengths and distances on maps, floor plans,

mechanical drawings, or other types of plots or drawings. There are several types of scales: metric scales, chain scales, architect’s scales, engineer scales, etc. See Chapter 11.

SCALE, ARCHITECTS A drafting tool used for measuring and setting out lengths and distances when making mechanical, structural or architectural drawings. It is divided into proportional feet and inches. Do not make map measurements with this type of scale. See figures 118A, 119 and 1110 of Chapter 11.

SCALE, CHAIN A cartographic tool used for measuring lengths and distances in chains. See figures 118D and E of Chapter 11.

SCALE, ENGINEER’S An engineering draftsman or cartographer’s tool for setting out and measuring lengths and distances when making maps, plot plans and construction drawings. Graduated into feet and tenths of a foot. See figures 118B, 1111 through 1116 and the discussion of Chapter 11.

SCALE, MAP The ratio of map measurements. Scales are shown in inches to feet (e.g. 1” = 2000, or as a ratio (e.g. 1:2400). See table 9 in the appendix.

SCALENE TRIANGLE A triangle with three sides; all being of different lengths.

SCALES, STANDARD CADASTRAL MAP The four standard map scales of the Oregon State Standard Cadastral Map System: V= 100’, 1”= 200’, 1”= 400’ and 1”= 2,000’. Special map scales are: 1”= 20’, 1”= 50’ (for condominiums) and 1”= 800’ (for mining claim detail maps).

SCENIC EASEMENTS In Oregon Law, an aggregation of easements, covenants or conditions running with the land, designed to preserve or maintain all or part of the natural or existing state or recreational, cultural, scenic, historic or other appropriate places of public significance.

SCENIC WATERWAY A river or segment of river that has been designated as such in accordance with ORS 390.805 to 390.925 or any subsequent act, and includes related adjacent land. See ORS 390.805(4) for a definition of related adjacent land. See Chapter 10 for a list of rivers designated as scenic waterways.

SCHOOL DISTRICT Districts formed, by legislative authority, for the erection, maintenance, administration, and support of the public schools within the territory of the district, and in accordance with the general school laws of the State of Oregon. The districts have the power of self-government and local taxation.

SCHOOL LANDS Section 16 and 36 in each township were granted to the state by the Act of February 14, 1859 (11 Stat. 383). Lands selected for internal improvements, under the Act of September 4, 1841 (5 Stat. 455), and diverted for common schools with consent of Congress by the Joint Resolution of February 9, 1871 (16 Stat. 595). Lands selected for capitol building purpose under the Act of February 14, 1859 (11 Stat. 383). See ORS 273.251.

SCRIBING Marking material with a pointed instrument. Removal of portions of a photographically opaque coating from a transparent base with engraving tools.

SEA LEVEL The level of the surface of the sea at its mean position between mean high water and mean low water. Zero sea level is not zero tidal level.

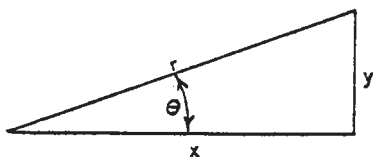
SEA LEVEL DATUM OF 1929 The datum: for vertical control in the U.S. and Canada. This datum is based on 1929 combined first-order level networks of both countries added to U.S.C. & G.S. general adjustments. That datum was readjusted for Oregon in 1947. See the charts in the appendix.

SEA LEVEL, MEAN The average level of the sea for all stages of the tide over an 18.6 year period, as determined from hourly height readings. See the charts in the appendix.

SEASHORE The margin of the sea in its usual and ordinary state.

SEAWARD BOUNDARY OF LAND Under common law, the mean high tide of the sea waters.

SECANT OF AN ANGLE The ratio of $r \div x$ of the following triangle:



$$\text{SECANT } \theta = r / x$$

SECOND A sexagesimal division of a unit equal to $1/360$ of a degree. There are sixty seconds in one minute of arc.

SECONDARY STATE HIGHWAYS The system of highways improved, maintained and repaired under jurisdiction of the Department of Transportation, Highway Commission. By mutual agreement with the County Courts, the Commission designates and adopts select market roads or other county roads or available locations or routes as secondary state highways. The intent of the secondary state highway system is to contribute to and best pro-

mote the completion of an adequate and connected system of highways, intercounty in character and correlated with the state highway system.

SECONDARY SURVEYS A subordinate survey to a larger or controlling survey. The survey of a lot in a subdivision is considered secondary. The subdivision survey itself is the primary.

SECTION A subdivision of a township that, under the general plan of the cadastral survey of the U.S. public lands, contains as nearly as possible six-hundred and forty acres; each section being one mile square. The sections are numbered one through 36 (one township in Klamath County has a section 37). It is doubtful that any section of the rectangular survey is exactly 640 acres or exactly one mile in either length or width. See Chapter 5 for additional information on sections.

SECULAR VARIATIONS The most important magnetic variation in the needle of a compass. Secular variations cannot be predicted; however, historic variations have been, and can be recorded in tables and charts. When retracing old surveys it is important to know the magnetic variation as it was at the time of that survey, and the present variation.

SEDIMENTATION Deposition of eroded particles by hydraulic action.

SEGMENT OF A CIRCLE That part of a circle contained between a chord and the arc of that circle; as much of a circle as is cut off by a chord.

SEGREGATION A division out of a parent parcel of land.

SEISED Denotes a possession in fact by one having or claiming a freehold interest, which is known as a "seisen in deed," or a right of immediate possession, which is known as "seisen in law." The word is used in sense of "owned" In its technical sense, applies only to real property.

SEISEN In American jurisprudence "seisen" or "seizing" generally means "ownership." It means possession in land of at least a freehold estate. It means ex vi termini, "the whole legal title, and nothing short of it will satisfy." Mere occupancy does not constitute "seisen" in the legal sense of the term.

SEISEN IN DEED Actual possession of the freehold estate.

SEISEN IN LAW Right of immediate possession according to the nature of the estate.

SEIZEN Synonymous with "seisen."

SELF-CHECK DIGIT A digit added to the right of an account number so that the validity of the account

number can be checked by a computer each time the account number is entered at a data station. The computer assigned check digit works as follows:

- (1) Assume desired account is 62135.
- (2) Multiply every other digit by 2 beginning with the unit 1, then 2, 3, and ending with 0, or 1230 (2 and 3 being from the number 62135). If this would have been a six-digit number, the zero would have been the amount of the sixth digit in the number.
- (3) The sum of the new digits 1, 2, 3 and 0, and the old digits 2 and 3, equals 11.
- (4) The number required to raise 11 to the next multiple of 10 is 9. Nine is, therefore, the self-check digit.
- (5) The total account number including the self-check digit would be 621359.

NOTE: This entire operation is done in the computer. Seller. The grantor. The party transferring, granting, or selling the property. The one who disposes of a property for consideration.

SEMITANGENT The projected tangent, of an arc, to the point of intersection of the next (or last) tangent projected. See Chapter 8.

SENIOR RIGHTS The rights of a party (to a boundary line or ownership conflict) having the earlier, or "senior," deed. The party having the more recent deed would have "junior rights." One principle of law applied in cases of conflict between junior and senior conveyances is: "A junior conveyance, in conflict with a senior conveyance, yields to the senior," ie. "He who conveys an interest in land to one party, cannot at a later date sell the same interest to another." In the order of importance of conflicting elements, "senior rights" is second in importance (after "right of possession" and before "written intention of parties").

SENIOR SURVEY Between two surveys, the older survey. In *Wing v. Wallace*, 42 Idaho 430, 246 P. 8, the court said, "A resurvey does not affect rights previously vested, its purpose being to ascertain the lines of the original survey without regard to their correctness. Where there is a conflict between the field notes of different surveys, the field notes of the senior survey will prevail," 6 Thompson 603, sec 3050. "A surveyor's call to a junior survey has been held not to control over another call to a senior survey," *rd. cit.: Weatherly v. Jackson*, 98 S.W.2d 1037. "Subsequent surveys may aid in finding lost corners, but where the old and recognized corners are well known, these must control," *Id. cit.: Hess v.*

Meyer, 88 Mich. 339, 50 N.W. 290. "A resurvey purporting to change the line to correct inaccuracies is not admissible to show the true line fixed by the original plat," *Bishop u. Johnson*, 100 So.2d 817.

SERVIENT In an easement there are always two distinct tenements: the "dominant" tenement to which the easement right belongs, and the "servient" tenement upon which the obligation rests. Where A sells an easement for a road to B (across Xs land) A has the servient estate and B has the dominate estate.

SERVIENT ESTATE (or servient tenement) The estate "subject to" the easement. See "servient."

SERVITUDE (1) A civil law term for "easement" in common law; the right of the owner of one parcel of land to use another's land for a special purpose of his own not inconsistent with general property rights in the other owner. It is a burden imposed on one tract of land for the benefit of another. (2) A burden imposed on land for the benefit of other land or the public. A public easement for travel is a servitude. The closing of a through street would be a "new servitude" on any property affected by the closure; a servitude that would be a taking, and could require compensation as provided for in the U.S. and Oregon Constitutions.

SEGMENT Includes, as to a decedent, the full process of administration, distributing and closing.

SETTLEMENT Includes, as to a decedent, the full process of administration, distributing and closing.

SEVERALITY A sole, separate and exclusive possession, dominion or ownership;

SEVERANSE DAMAGES In the case of a taking, the diminution of the market value of the area remaining.

SEXAGESIMAL One sixtieth. Pertaining to the number 60.

SEXAGESIMAL SYSTEM The system of dividing the compass circle (or any circle) into 360 degrees; each degree consisting of 60 minutes of arc, and each minute consisting of 60 seconds of arc.

SHORE Land covered and uncovered by the rise and fall of the normal tide. In its strictest use, the term applies only to land along tidal water.

SHOREFACE Narrow zone seaward from the low-tide shoreline permanently covered by water over which the beach sands and gravels actively oscillate with changing wave conditions.

SHORELINE Intersection of the land with the water surface. The term has no legal significance. In ar-

areas affected by tidal fluctuations, mean high water is considered as the shoreline.

SHORE OF NAVIGABLE WATER The land between the high and low water marks.

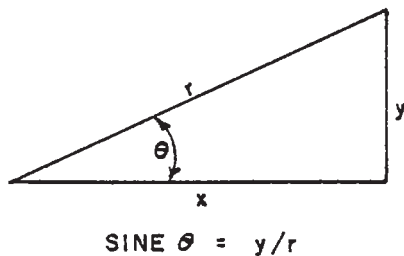
SIDE LAP The amount expressed as a percentage, that one aerial photo overlaps the area of an aerial photo in an adjoining flight.

SIDE LINES OF A ROAD, STREET, ALLEY, HIGHWAY, ETC The boundary, or margin, of a right of way; the limit of the public's easement; the lines used to determine the width of the easement. Synonymous with "right of way." Sidelines are not synonymous with "edge of pavement."

SIDEREAL TIME Equal to the hour angle at the vernal equinox.

SIMPLE CURVE A curve with an arc of one constant radius. See Chapter 8.

SINE The straight line drawn from one extremity of an arc perpendicular to the diameter passing through the other extremity. If, from any point on one side of a plane angle, a perpendicular be let fall upon the other side, thus forming a right-angled triangle, the ratio of the hypotenuse of this triangle to the perpendicular, is the sine of the angle. The ratio y/r is the sine of the angle θ in the following illustration.



SINGLE PROPORTIONATE MEASUREMENT A new measurement made on a line to determine one or more positions on that line. The method is generally applicable to the restoration of lost corners on standard parallels and other lines established with reference to definite alignment in one direction only. All lost $\frac{1}{4}$ corners within a township must be restored by this method. Intermediate corners on township exteriors and other controlling boundary lines are to be included in this class (as per B.L.M. Instructions).

SIXTEENTH-SECTION CORNERS The $\frac{1}{4}$ $\frac{1}{4}$ corners of a section (except the section, $\frac{1}{4}$ and center section corners). Synonymous with "sixteenth corners."

SOFTWARE (CAMs) The set of programs used to instruct the computer, digitizer, plotter, etc. in performing functions and solving problems. In

CAM systems it consists of operations software, command software and applications software.

SOLAR OBSERVATIONS Observations of the sun to determine the true north-south meridian.

SOUTH When used in a deed description, and not controlled or modified by any other words or monuments, means due south; the meaning depending on the context.

SOUTHEAST The southeast quadrant of a section ($\text{SE}\frac{1}{4}$), quarter section ($\text{SE}\frac{1}{4} \text{ NW}\frac{1}{4}$), etc. The quadrant between south, and east. Where the term is employed to designate a boundary or line in the description of a deed, it should be construed as equivalent to a call to run due southeast (or $\text{S } 45^{\circ}00'00'' \text{ E}$), as the case may be, in the absence of a call for visible monuments, or any other description of the line which locates it with reasonable certainty.

SOUTHERLY From the north towards the south. When not controlled by definite courses, monuments, or other descriptions, usually means due south. This term must always yield to monuments or other definite calls.

SOUTHERNMOST Farthest part to the south; most southern part.

SOUTH SOUTH EAST Part of the southeast quadrant, or $22^{\circ}30'$ east of south. $\text{S } 22^{\circ}30' \text{ E}$.

SOUTH SOUTH WEST Part of the southwest quadrant, or $22^{\circ}30'$ west of south. $\text{S } 22^{\circ}30' \text{ W}$.

SOUTHWEST The southwest quadrant of a section ($\text{SW}\frac{1}{4}$), quarter section ($\text{SW}\frac{1}{4} \text{ NE}\frac{1}{4}$), etc. The quadrant between south and west. Where the term is employed to designate a boundary or line, it should be construed as equivalent to a call to run due southwest (or $\text{S } 45^{\circ}00'00'' \text{ W}$), as the case may be, in the absence of a call for visible monuments, or any other description of the line which locates it with reasonable certainty.

SPECIAL INTERESTS Undivided interests in real estate or other special interests, mineral rights (mineral only), and improvements only. See Chapter 3 for treatment of special interests in the tax lot number.

SPECIAL ROAD DISTRICTS See "road districts."

SPECIAL WARRANTY, COVENANT OF One of which the operation is limited to certain persons or claims.

SPECIAL WARRANTY DEED As provided in ORS 93.855 (special warranty deed form, effect), "A deed in the form of subsection (1) of this section shall have the same effect as a warranty deed as described in

ORS 93.850, except that the covenant of freedom from encumbrance shall be limited to those encumbrances created or suffered by the grantor and the covenant of warranty shall be limited to read: That the grantor warrants and will defend the title to the property against all persons who may lawfully claim the same by, through or under the grantor. (3) If the grantor desires to exclude any encumbrances or other interests from the scope of the covenants of the grantor, such exclusions must be expressly set forth on the deed."

SPECIFIC DEVISE A devise of a specific thing or specified part of the estate of a testator that is so described as to be capable of identification. It is a gift of a part of the estate identified and differentiated from all other parts.

SPHERICAL COORDINATES Latitude and longitude.

SPIRAL CURVE Also known as a transitional curve, spiral transitional curve, or transitional spiral curve. Used in highway design to balance the centrifugal force of a vehicle passing around a curve, whereas, the design of the curve allows for the transition of an automobile from a straight line to the central simple curve, and from the central simple curve to the next straight section of highway. See Chapter 8 for a detailed discussion and instructions for plotting spiral curves.

SPITE STRIP A strip of land, usually in a subdivision, reserved by the subdivider at the end of the street or alley to prevent an abutting owner (outside of the subdivision) from using the street. If reserved by private persons, these small strips of land must be mapped, taxlotted, appraised, assessed and taxed. If they are dedicated as "future" streets and alleys, and not reserved by the donor, the fee in the strips of land vests in the owners of abutting land (within the subdivision) in accordance with the principles of law governing any dedicated way. Until used by the public for travel from place to place, they constitute assessable real property. The addition of wording to the effect the strips are "dedicated to the county" or to the city for future public ways are insufficient to overcome the abutting owners' fee in the ways.

SPLASH DAM A dam constructed and used in the floating and driving of logs and other lumber products whereby water behind the dam is released for the purpose of causing or aiding the floating of logs or other lumber products on a navigable or nonnavigable river in the waters thereof below the location of the dam; however, "splash dam" does not mean any device used on the waters of this state for the assembly or storage of logs or other lumber products, or for any purpose inci-

dental thereto. (See ORS 541.450). Splash dam are unlawful in Oregon as per ORS 541.455.

SPOT ELEVATION Point on a map or chart whose height above a specified datum is noted, usually by a dot or a small sawbuck and elevation value.

STADIA Greek for "unit of length." 600 Greek feet equals 606 feet and 9 inches under the English system of measure. "Stadia" is also the cross wires in a transit telescope. A stadia rod is used to make stadia measurements. The word "stadia" is often used in reference to making measurements by the stadia methods.

STADIA METHOD (For making measurements). A rapid method of making measurements where it is impractical to measure distance with a surveyor's chain. The method involves lining the stadia hairs of a transit with marks on the stadia rod. In most transit telescopes, the interval between the cross hairs gives vertical intercept of one foot on a rod that is positioned 100 feet from the telescope.

STADIA ROD A surveying rod graduated in feet, tenths and hundredths, that is used in the stadia method to measure distances to the nearest foot. See Chapter 6.

STAGE (MICROGRAPHICS) A device used on a microfilm reader for moving microfiche from image to image.

STANDARD CORNER On correction lines there are offsets in the range lines and two sets of standard corners, for the lines to the north, and closing corners for the lines to the south.

STANDARD LINES Base lines, standard parallels and guide meridians.

STANDARD METROPOLITAN STATISTICAL AREA (SMSA) Integrated economic and social unit with a population nucleus of at least 50,000. An SMSA always includes a city (or cities) of specified population which constitutes the central city and the county (or counties) in which it is located.

STANDARD PARALLELS Correction lines. They are extended east and west from the principle meridian at intervals of 24 miles north and south of the base line, in the manner prescribed for the survey of the base line. Some standard parallels were placed at 30 and 36 miles (once permissible). In such cases intermediate correction lines are established to initiate new or close the extension of older surveys. These intermediate lines have local names, e.g. 'Fifth Auxiliary Parallel North" of "Cedar Creek Correction Line."

STANDARD TAX LOT NUMBER The parcel identifier of the Oregon cadastral map system. See Chapter 3.

STARE DECISIS To abide by, to adhere to; a policy of the courts to stand by precedent and not disturb settled point; forming pre-cedsnt not to be departed from.

STATE AGENCY Each state branch, institution, department, board, commission or activity of whatever nature.

STATE AGENCY Each state branch, institution, department, board, commission or activity of whatever nature. For organisational purposes, the Executive Department has grouped state agencies by program similarity into eight major areas: (1) economic development and consumer service, (2) education, (3) human resources, (4) natural resourcee, (5) public safety, (6) transportation, (7) administrative and support services, and (8) other programs. *See the Oregon Blue Book* published by the Secretary of State.

STATE HIGHWAYS ORS 366.005. "Any road or highway designated as such by law or by the Oregon Transportation Commission pursuant to law and includes both primary and secondary state highways." In this state there are two systems of highways those designated as state highways, and those designated as county roads. *Huggett et ux v. Moran et ur.*, 201 Or. 105, 266 P.2d 692. State highways were first so designated by the Legislative Assembly by Chapter 237, Oregon Laws, 1917.

In Postal Telegraph Co. v. State Highway Commiuiion, 276 F. 958, 961, it was stated:

"Prior to the authorization of this class of highways, there were no such roads in the state. Whatever roads existed were known as county roads, except that, earlier in the history of the country there were certain highways known as toll roads, and certain others known as territorial roads. By statute, however, all territorial roads were declared to be county roads (sec 38, title 1, ch. 47, General Laws of Oregon; 1845-1864)."

STATE LAND BOARD A board created by statute, that consists of the 'Governor, Secretary of State and the State Treasurer. The board carries out the duties prescribed by Section 5, Article, VIII of the Oregon Constitution, and any other such duties imposed upon it by law. The Governor acts as the chairman of the State Land Board.

STATE LANDS, DIVISION OF A division created by statute that consists of the Director of the Division of State Lands and all officers and employees of the division acting under the State Land Board.

STATE PLANE COORDINATE SYSTEM See "Oregon Coordinate System." See Chapter 7.

STATE PLANE SYSTEM Commonly used in reference to the Oregon Coordinate System. See Chapter 7.

STATE RECREATION AREA A land or water area or combination thereof, under jurisdiction of the Department of Transportation, pursuant to subsection 3 of ORS 366.205, used by the public for recreational purposes.

STATE STANDARD CADASTRAL MAP SYSTEM The cadastral map system prescribed by the Department of Revenue and thirty-two counties; as defined and described in this manual.

STATE STANDARDS Cadastral map standards described in this manual.

STATIONING The engineering surveying system for marking 100 intervals along a traverse (a station) and intermediate points (plus stations); beginning at station 0+00, the station at the first. One hundred feet is 1+00; at two hundred feet 2+00; at, three hundred and sixty feet from the point of beginning 3+60, etc. See Chapter 8.

STATIONING The engineering survey system for marking 100-foot intervals along a traverse, and at intermediate points on the traverse, beginning at 0 + 00 (the beginning of the traverse, but not always the beginning point of a route). The points at 100-foot intervals are called "stations." For example, at the 300-foot mark, the station is 3+00, and at the 1,500-foot mark, the station is 16+00. Points on the traverse that are at intermediate intervals are called "plus stations." For example, at 1,931 feet, the 'plus station' is 19+31. At 2,006.19 feet, the plus station is 20+05.19.

STATUTE (1981) Civil law, law enacted by the legislative branch of government. In Oregon, these laws are called the Oregon Revised Statutes, abbreviated ORS. Statutes do not repeal common law, but merely inactivate it as long as the statute is in effect. Although common law can be altered by the legislation, any alteration is subject to the strictest legal interpretation *because: Where a common law exist, it very likely has the consequence of a property right protected by Amendments V and XIV to the United States Constitution, and Article L Section 18, and Article XI, Section 4 si the Oregon Constitution.* Since those who framed the constitution contemplated them as formula the fundamental and paramount law of the nation (and of the State of Oregon), it stands to reason that an act of the legislation, repugnant to any constitutional provision, is not law. The legislature as well as the courts are bound to and by the constitutions. See: *Marbury v. Madison*, 1 Cranch 137. This wisdom provided in *Roberts v. Mills*, 290 Or. 441, must be applied when interpreting a statute: "This court is committed to

the proposition that statutes are to be construed so as to satisfy the constitution unless no other construction is possible," cit: *State v. Smyth*, 286 Or. 293, 296.

STATUTE OF ANNE The priority established by recording first is a modification to the common law rule that an estate, which a grantor conveys, cannot be affected by a subsequent conveyance. That modification is known as the Statute of Anne.

STATUTES OF LIMITATION A pure statute of limitation merely limits the time which a right, otherwise unlimited, may be exercised. It is any law which fixes the time which parties may take judicial action to enforce rights, or else be thereafter barred from enforcing the, "Statutes of limitation are no doubt passed to promote the general welfare. The mischief which they are intended to remedy 'is the general inconvenience resulting from delays in the assertion of a legal right which is practicable to assert.'" *Evans v. Finley*, 166 Or. 238, c17 R.C.J., Limitations of Actions.

STATUTORY Relating to statutes (either the Oregon Revised Statutes or the United States Revised Statutes).

STATUTORY CONSTRUCTION Rules, prescribed by statute, for construing public and private writings. See: "Rule of construction," "Rules of construction (statutory)" and "Rules of interpretation."

STATUTORY DEDICATION A statutory dedication is one that complies fully with the provisions of the Oregon Revised Statutes enacting that certain formalities, when observed, operate as a dedication of lands to the public. In *Menstell v. Johnson*, 125 Or. 161, 162, the court said: "A valid statutory dedication cannot be created unless every provision of the laws are adhered to." A statutory dedication is one of two legally recognized forms of dedication; the other is a "common-law dedication" which has the same legal effect as a statutory dedication. A statutory dedication operates by way of grant (of an easement to the public), a common-law dedication by way of an estoppel *in pais*. The statutory dedication concludes the owner upon compliance with the provisions of the statutes under which it was made. The common-law dedication concludes the owner upon the grounds that he or she has suffered the public and individuals to acquire rights upon the faith that he or she has devoted the land to the use of the public as a road or street. A dedication that fails as a statutory dedication can become a common law dedication where the donor sells a lot, with reference to a plat showing the streets and alleys as ways of public travel.

STATUTORY PERIOD The period, defined by statute, which actions may be brought upon certain claims or within which certain rights may be enforced & See "Statutes of limitation," "Prescriptive period" and the following:

STATUTORY PERIOD; PRESCRIPTION The period set by a statute as a limitation beyond which actions for the recovery of real property cannot be maintained to defeat a claim of an easement by prescription. ORS 12.050 provides that such action shall be commenced within 10 years. See *Bayard v. Standard Oil*, 38 Or. 438, 63 P. 614. However, the fact that a party has used a strip of land for 10 years is not, in itself, evidence that a prescriptive right has been acquired. Such a judgment is for a jury, taking other factors into consideration. See "Prescription."

STEP AND REPEAT CAMERA (Micrographics). A microfilm camera that exposes a series of separate images on film according to a planned format, usually in rows and columns.

STEP TABLET (Micrographics) A length of film that has graduations of density that may or may not be calibrated.

STEREO IMAGE ALTERNATOR A stereo plotter-viewing device equipped with rapidly rotating shutters synchronized so that the right and left eye can only see images from the corresponding right and left projector.

STEREOCOMPARAGRAPH A special photogrammetric stereoscope used for measuring parallax. It is equipped with a tracing arm for transferring data. The data transferred, however, is not accurate enough for cadastral cartography.

STEREOCOMPILED Production of a map or chart manuscript from aerial photographs and geodetic control data by means of photogrammetric instruments.

STEREO IMAGE ALTERNATOR A stereo plotter-viewing device equipped with rapidly rotating shutters synchronized so that the right and left eye can only see images from the corresponding right and left projector.

STEREOMODEL (or Stereoscopic Model) Mental impression of a three-dimensional model which results from two overlapping photogrammetric instruments.

STEREOPLOTTER Instrument for plotting a map or obtaining spatial solutions by observation or stereo models formed by pairs of photographs.

STEREOSCOPE A photogrammetric and cartographic instrument used to obtain a three-dimensional view of aerial photographs. Viewing a two-di-

mensional object in three-dimension requires that the condition for natural depth perception be artificially reconstructed, and necessitates the following (a) two slightly different views of the same object, or scene, from different angles; (b) that a person have normal binocular vision.

STEREOSCOPE PLOTTER A stereoscope with plotting attachments that is used to compile planimetric and topographic maps. Most plotters consist of component systems for projection, viewing, measuring and tracing.

STEREOSCOPIC VISION Binocular vision that enables the observer to obtain the impression of depth by means of two different perspectives of an object (as two photographs taken from different camera stations).

STICK-UP (OR PASTE-UP) Adhesive or wax-backed film or paper on which map names, symbols, and descriptive terms, have been printed for application to a transparent base in map and chart production.

STILL WATER LEVEL The level that the sea surface would assume in the absence of wind waves; not to be confused with mean sea level or half tide level.

STRAIGHT ANGLE A straight line or 180° angle.

STRAIGHT EDGE A drafting tool made of wood, metal, plastic, aluminum, etc. which can be used as a guide for constructing straight lines. Engineer and chain scales should never be used as a straight edge. Straight edges for map work should never be used as a cutting guide.

STRAIGHT LINE The shortest distance between two points.

STREET A public or private way that is created to provide ingress or egress for persons to one or more lots, parcels, areas or tracts of land, excluding a private way that is created to provide ingress and egress to such land in conjunction with the use of such land for forestry, mining or agricultural purposes (as used in Chapter 92 of the ORS). In common use, the word "street" denotes a "public" way and not a private way.

STRIP MAPS Maps used to show route survey; specifically, highway traverse and right-of-way maps.

STUB TRAVERSE A spur that branches off the main traverse.

SUBCHORD On a curve, the subchord is the straight line between any two stations on the arc of the curve.

SUBDIVIDE LAND (Oregon Subdivision Law). ORS 92.010, "Subdivide land" means to divide land into four or more lots with-in a calendar year.

SUBDIVIDE LANDS (Approval of Plan; Plats) (1981) ORS 92.010(12). To divide an area or tract of land into four or more lots within a calendar year when such area or tract of land exists as a unit or contiguous units of land under a single ownership at the beginning of such year. See ORS 92.305(9) for the definition of "Subdivided Lands" and "Subdivision" as used in the Oregon Subdivision Control Law.

SUBDIVIDED LANDS AND SUBDIVISION (OREGON SUBDIVISION AND SERIES PARTITION CONTROL LAW) ORS 92.305. Means improved or unimproved land or lands divided, or created into interests, or sold under an agreement to be subsequently divided or created into interests, for the purpose of sale or lease, whether immediate or future, into 11 or more undivided interests or four or more other interests. "Subdivided lands" and "subdivision" include but are not limited to a subdivision of land located within this state subject to an ordinance adopted under ORS 92.044 and do not include series partitioned lands. "Subdivided lands" and "subdivision" do not mean property submitted to ORS 94.004 to 94.460 or property located outside this state which has been committed to the condominium form of ownership in accordance with the laws of the jurisdiction in which the property is located.

SUBDIVIDER Any person who causes land to be subdivided into a subdivision for himself or for others, or who undertakes to develop a subdivision, but does not include a public agency or officer authorized by law to make subdivisions. See ORS 92.305(10) of the Oregon Subdivision Control Law.

SUBDIVISION (Approval of Plan; Plats) ORS 92.010(13). Either an act of subdividing land or an area or a tract of land subdivided as defined in ORS 92.010(12).

SUBDIVISION LAW (OREGON) The laws as defined in Chapter 92 of the Oregon Revised Statutes. The laws were created to control the development of subdivisions; and to protect the public from fraud, deceit and misrepresentation in the promotion, sales and leases of subdivision property.

SUBDIVISION OF SECTIONS $\frac{1}{4}$ sections, $\frac{1}{4}$ $\frac{1}{4}$ sections and the government lots of sections.

SUBDIVISION OF TOWNSHIPS The sections and subdivisions of sections.

SUBDIVISION PLAT The plat of subdivision as required by Chapter 92, of the Oregon Revised Statutes.

SUBDIVISION SURVEY (Subdivisions of ORS Chapter 92) The survey of subdivisions made in accordance with ORS 92.050, 92.060, 92.065 and 92.070.

SUBDIVISION SURVEY (System of Rectangular Surveys of the U.S. Public Lands) The survey of townships into sections; sections into $\frac{1}{4}$ sections, $\frac{1}{4}$ $\frac{1}{4}$ sections, government lots; as per the methods described for the survey of the Public Lands of the U.S.

SUBJECT TO A term used in deeds in reference to existing rights in property; liable, subordinate and subservient.

SUBMERGED LANDS In rivers, streams and lakes, the lands lying below the line of ordinary low water (navigable or nonnavigable). In reference to the states ownership the term does not 'apply to nonnavigable stream. See Chapter 10 for laws and discussion.

SUBMERGED LANDS, TIDAL 'See "tidal submerged lands." See chart in the appendix and Chapter 10.

SUBMERSIBLE LANDS Lands lying between the line of ordinary high water and the line of ordinary low water of all navigable waters and all islands, shore lands or other such lands held by or granted to this state by virtue of her sovereignty, wherever applicable, within the boundaries of this state as heretofore or hereafter established, whether such waters are tidal or nontidal.

SUBORDINATE TIDE STATION (1) Tide station from which a relatively short series of observations is reduced by comparison with simultaneous observations from a tide station with a relatively long series of observations, (2) a station listed in the tide tables for which predictions are to be obtained by means, of differences and ratios applied to the full predictions at a reference station.

SUBSIDENCE OF LAND The decrease in the elevation of land without removal of surface material due to tectonic, seismic, or artificial forces.

SUFFICIENCY OF DEED DESCRIPTION "Where licensed surveyor and engineer testified that he could locate the land in question by descriptions in deeds, the descriptions were sufficient to convey such land." *Gubser v. Town and Stoutenburg*, 202 Or. 55, 273 P.2d 430. "It is the established rule that the courts will be liberal in construing descriptions of premises conveyed by deed and that a description of land is sufficiently definite and certain if it is possible for a surveyor to ascertain from the description,

'aided by extrinsic evidence,' what property was intended to be conveyed." *O'Hara v. Brace*, 258 Or. 416, 482 P.2d 726, *cit.* ' *Sequin et al v. Maloney-Chambers*, 198 Or. 272, 281, 253 P.2d 252.

SUIT TO QUIET TITLE AND REMOVE CLOUD See "quieting title" and "cloud on title." See also: ORS 105.605 "suits to determine adverse possession;" ORS 105.610r "suits to cancel patent of donee under Donation Law;" ORS 105.615 "action by tenant in common against cotenants" to establish adverse possession.

SUITS TO CANCEL PATENT OF DONEE UNDER DONATION LAW "Whenever any person claims real property as a donee of the United States by virtue of a settlement thereon under the Act of Congress approved September 27, 1850, commonly called the Donation Law, or the Acts amendatory thereto, and the patent for such property, or any portion thereof, was wrongfully issued to another, the person may maintain a suit in equity against the person to whom the patent was issued, or those claims under the person, for the purpose of having the patent cancelled, and the state or interest of the plaintiff in the property ascertained and established."

SUMMIT The highest point. The summit of the Cascade Range is described in ORS 321.805(3).

SURF ZONE Area between the outermost breaker and the limit of wave uprush.

SURVEY, CADASTRAL Commonly applied to the establishment of the land boundaries and subdivisions by the running and marking of the lines that are required by the "general plan" for the U.S. Public Lands Survey. It includes the field note record of observations, measurements, and monuments descriptive of work performed, and the official plat that represents the survey.

SURVEY CADASTRE See "cadastre, survey."

SURVEY PLATS Existing survey or cadastral survey plats showing observations, measurements and monuments documenting the field work performed by surveys. In the B.L.M. Automated Lands and Minerals Records System (ALMRS), the term includes field notes of observations and measurements.

SURVEYING The science of measuring and locating lines, angles and elevations on the surface of the earth, within underground workings, in the beds of bodies of water, and in outer space.

SURVEYOR One that is registered in this state as an Oregon Registered Professional Land Surveyor. See 672.002. See Chapter 6.

SURVEYOR'S COMPASS A compass used to run landlines that must be retraced. The instrument has a metal base that is fitted with two vertical sighting vanes placed at each end, and a compass in the center.

SURVEYOR'S LEVEL A level consisting of a telescope and a spirit level mounted on a tripod and revolving on a vertical axis.

SURVEYOR'S MEASURE Commonly used in reference to the "chain" and "rod" units of measure. Surveyor's measure today would be either the "English" or "Metric" units of measure.

SUSPENSION APERTURE CARD (Mirographics) A card that suspends the microfilm frame in the aperture between two sheets of transparent film that completely cover the aperture.

SWAMP LANDS ORS 273.251(5) Lands claimed by the State under the act of September 28, 1850 (9 Stat. 519), and extended to the State of Oregon by the Act of March 12, 1860 (12 Stat. 3):

SYSTEMATIC ERROR An error that, as long as conditions are unchanged, will always have the same magnitude and the same algebraic sign.

SYSTEM OF RECTANGULAR SURVEYS The system of surveying the U.S. Public Lands into rectangular townships, ranges, sections and subdivisions of section. Also referred to as: the "U.S. Public Land Survey," "survey of the U.S. Public Land" the "general plan" or "rectangular survey system."

TACHYMETRY Surveying methods such as "stadia" for quickly determining the distances, bearings and elevations of distant objects.

TACIT Implied or indicated, but not actually expressed.

TAIL Limited, reduced, curtailed.

TAIL, ESTATE IN An estate limited to a person and the heirs of his body.

TAILINGS Discarded products of mining and ore treatment, milling or processing.

TAKE AN ESTATE To lay hold of, seize, deprive one of possession, or to assume ownership of an estate.

TAKING Seize, capture, lay hold of, secure. It is not limited to being obtained by force. That which is taken or received. A taking of property for "public use" means a "taking altogether," an entire change of ownership. However, the purpose for which property is taken must be authorized by law, and, of course, any owner of land taken for a public use must be compensated. A taking of private property for private use is not provided for by the con-

stitutions. However, a taking for a public use by a private condemner (a private corporation that has the power to exercise the right of eminent domain) is lawful. ORS Chapter 35.

A taking by condemnation proceedings includes every interference, under right of eminent domain, with the ownership, possession, enjoyment of value of real property.

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TANGENT The trigonometric function that for an acute angle in a right triangle is the ratio of the side opposite to the side adjacent.

TANGENT CURVES Curves that have a common tangent where the curves abut. Compound simple curves are tangent curves. See Chapter 8.

TANGENT, LINE A straight line that is the limiting position of a curve through a fixed point and a variable point on the curve as the variable point approaches the fixed point.

TANGENT PLANE The plane through a point of a surface that contains the tangent lines to all the curves on the surface through the same point.

TANGIBLE That which may be seen, weighted, measured, and estimated by the physical senses and which is capable of being possessed.

TAPE, SURVEYORS Surveying equipment used for linear measurement.

TARGET An object to which a surveying instrument is pointed, e.g. a plumb bob, plumb bob chord, range pole, nail in a stake, or any other object which provides a sharply defined, stationary line or point. See stadia target, in figure 635.

TAX CODE AREA A specific area of land within which there is a unique combination of taxing districts yielding a given composite tax rate "code lines" code area numbers designates tax code areas on cadastral maps.

TAXING BODY ORS 457.410(4). The state, city, county, or any other taxing unit which has the power to levy a tax.

TAXING DISTRICT A taxing body.

TAXING DISTRICT, AD VALOREM A district that may (by law) levy a special assessment on an ad va-

lorem basis, for the purpose of providing funds to pay for local public improvements which are not political or government in nature, and which have been determined by the Legislature to be of special benefit to the people and property within that district. See ORS 308.225 for filing requirement.

TAXING DISTRICT MAP A map that defines all or part of the boundary lines of one or more taxing districts.

TAX LOT 'One parcel of real property, on a cadastral map, that contains one tax lot number.

TAXLOT (one word; verb) To assign a tax lot number to a parcel of land.

TAX LOT NUMBER The parcel identifier of the State Standard Cadastral Map System. See Chapter 3.

TAX LOTTING The act of assigning tax lot numbers to parcels of land on a cadastral map.

TAXPAYER An individual, a partnership, corporation or association, chargeable with a tax, and does not include one who is exempt from taxation, or who actually pays no taxes. Note: the taxpayer of a parcel of land is not always the owner of the land.

TAX STATEMENT REQUIRED IN CONVEYANING INSTRUMENT ORS 93.260

"(1) All instruments prepared for the purpose of conveying or contracting to convey fee title to any real estate shall contain on the face of such instruments a statement in substantially the following form:

"Until a change is requested, all tax statements shall be sent to the following address:

"(2) Failure to contain the statement required by this section does not invalidate the conveyance and if an instrument is recorded without the statement required by this section, the recording is valid.

"(3) This section applies to all instruments executed after January 1, 1974."

See "Warning required in instruments of conveyance."

TAX TITLE The title by which one holds lands purchased at a tax sale. If valid, it is a breaking of all other title and extinguishes all prior claims against the land that are not expressly excepted.

TAXES, PROPERTY; TAXPAYER'S RESPONSIBILITY

Grant Co. v. Guyer, 296 Or. 14. "Taxes, as been many times stated, are a very practical matter. They are the lifeblood of the state, and the property owner's most ultimate liaison--although often a waspish one--with the state. In construing tax statutes, it

must be borne in mind that the law of taxation places upon property owners the duty to keep themselves informed about the recurrent liability of their property for taxes, and charges them with knowledge that neglect to pay a tax will result in foreclosure proceedings." *Knapp v. Josephine Co.*, 192 Or. 327, 353, 235 P.2d 564.

TENANCIES CLASSIFIED BY STATUTE "Tenancies are as follows: Tenancy at sufferance, tenancy at will, tenancy for years, tenancy from year to year, tenancy from month to month, tenancy by entirety, and tenancy for life. The times and conditions of the holdings shall determine the nature and character of the tenancy." ORS 91.020.

TENANCY Implies a right of possession in tenant exclusive of the landlord, an interest in land passed to the tenant and a possession exclusive of the landlord except as a lease permits his entry and saving the landlords right to enter to demand rent or make repairs.

TENANCY AT SUFFERANCE (or "by sufferance's) A tenancy whereas the one who came into possession rightfully, continues in possession wrongfully after the right thereto is terminated.

TENANCY AT WILL An estate in realty that comes within the term lease, and that is based on the express or implied consent of the landlord. The holding of possession of realty by consent of owner for an indefinite period of time.

TENANCY BY ENTIRETY An estate held by husband and wife by virtue of title acquired jointly after marriage. To create a tenancy by entirety, there must be unity of estate, unity of possession, unity of control and unity in conveying or encumbering entirety property. It is a tenancy in common between husband and wife for their joint life with the remainder to the survivor in fee. A joint tenancy modified by the common law theory of unity of husband and wife.

TENANCY BY ENTIRETY OR FOR LIFE ORS 91.030 "A tenancy by entirety and a tenancy for life shall be such as now fixed and defined by the laws of the State of Oregon." Generally, a tenancy by entirety is an estate held by husband and wife by virtue of title acquired jointly by marriage. To create a tenancy by entirety, there must be unity of estate, unity of possession, unity of control and unity in conveying or encumbering entirety property. A tenancy by entirety is tenancy in common between husband and wife for their joint life with the remainder to the survivor in fee; a joint tenancy modified by the common law theory of unity of husband and wife.

TENANCY FROM MONTH TO MONTH ORS 91.070. One who holds the lands or tenements of another, under the demise of the other, and no certain time has been mentioned, but a monthly rental has been reserved, is considered a tenant from month to month.

TENANCY FROM YEAR TO YEAR ORS 91.060. "One who enters into the possession of real estate with the consent of the owner, and no certain time is mentioned, but an annual rent is reserved, is considered a tenant from year to year."

TENANCY IN COMMON A joint estate in which there is unity of possession, but separate and distinct titles. It is a relationship between persons and not an estate.

TENANCY IN COMMON A joint estate in which there is unity of possession, but separate and distinct titles. It is a relationship between persons and not an estate. ORS 93.180. "Every conveyance or devise of lands, or interest therein, made to two or more persons, other than to husband and wife, as such, or to executors, or, as such, creates a tenancy in common unless it is in some manner clearly and expressly declared in the conveyance or devise that the grantees or devisees take the lands with right of survivorship. Such a declaration of a right of survivorship shall create a tenancy in common in the life estate with cross-contingent reminders in the fee simple. Joint tenancy is abolished and the use in a conveyance or devise of the words 'joint tenants' or similar words without any other indication of an intent to create a right of survivorship shall create a tenancy in common."

TENANCY, WHEN DEEMED TO EXIST ORS 91.010. A tenancy is deemed to exist under this chapter and ORS 105.115 and 105.120 when one has let real estate to another to hold of him as a landlord.

TENANT A purchaser of an estate entitled to exclusive possession; or one renting land and paying for it either in money, services, or part of crop or equivalent. One who occupies another's land or premises in subordination to such other's title and with his assent, express or implied.

TENANT A VOLUNTE (French) A tenant at will.

TENANT IN FEE SIMPLE One that has lands, tenements, or hereditaments, to hold to him and his heirs, forever..

TENANT IN TAIL One presently entitled to the possession of an estate.

TENEMENT Property held by a tenant.

TERMINUS The boundary. A limit of space.

TERRESTRIAL PHOTOGRAPHS Photographs exposed on the ground.

TERRESTRIAL PHOTOGRAPHS Photographs taken from the ground.

TERRITORIAL Reference to the Oregon Territory prior to statehood. The territory was organized in 1848.

TERRITORIAL GOVERNMENT, OREGON Provisional government of the Oregon Territory.

TERRITORIAL LAND LAWS Prior to the Territorial Act of 1848, a settler held only the mere possession of land. The first settler on a tract of land could not charge the land, in the hands of successors in interest, with any easement or encumbrance. *Oregon City v. Oregon & California Railroad Co.*, 44 Or. 165. Consequently, a settler could not burden the land with a dedication of land for any public use.

In 1848, when Congress organized the Oregon Territory, it declared that the laws of the United States should be in force in the territory "So far as the same, or any provision thereof, may be applicable." Apparently, many were not applicable. Laws existing in 1848 were discussed in *Carter v. City of Portland*, 4 Or. 338. For example, the Preemption Act of May 26, 1824, was an act "granting to the counties or parishes of each state or territory of the United States, in which the public lands are situated, the right of preemption to a quarter-section of land for seats of justice in the same." The Oregon Supreme Court consistently held that this act was not in effect in Oregon.

In 1844, Congress enacted the Townsite Act. This was a special and temporary act, intended for a town already built up, whereby an occupant's right of selection as to the pertiodar land he would occupy was mlbordlnAte to "the law of the community who constitute the occupants of the town." And that "such portions of the town as the community may designate as streets or public grounds, for that reason becomes so, and are not liable to individual occupation." It was held by the Supreme Court that this act did not extend to the territory. *Carter v. City of Portland, supra*. In fact, the court, in *Carter v. City of Portland, supra*, *Lownzdale v. Parrish*, 1 Or.; and *Lownzdale v. The City of Portland*, 1 Or., discussed the question of which laws were extended to the Territory of Oregon by the congressional act of 1848, and all decisions were in harmony. The court held that "Congress passed no law in anywise affecting title to the lands in Oregon Territory till 27th September, 1850," the "Donation Law" (often referred to as the "Donation Land Claim Law"). See: "Donation law."

Note: The 1844 Townsite Act was extended to the territory by a special Act of Congress July 17, 1854.

TERRITORIAL Reference to the Oregon Territory prior to statehood.

TERRITORIAL ROADS Roads in existence prior to statehood. ORS 368.420 provides that “all territorial roads in this state are declared county roads.”

TERRITORIAL SEA The zone off the coast of a nation immediately seaward from a base line. Complete sovereignty is maintained over this zone by the coastal nation, subject to the right of innocent passage to ships of all nations.

TESTATE A deceased person who died leaving a will. “Intestate” is used in reference to one who dies leaving no will.

TESTATE SUCCESSION A succession to an estate which depends, at least in part, on the provisions of a will.

TESTATOR A person who leaves a will or testament in force at his death.

TESTATRIX A woman who makes a will or testament; who dies leaving a will or testament.

TEST OF NAVIGABILITY See “navigability, test of.”

THEMATIC CARTOGRAPHY The making of geographical maps that show such concepts as the distribution of densities, gradients, spacial relationships, magnitudes, and other relationships and aspects that show the distributional characteristics of the earth’s phenomena.

THENCE As used in a deed description of a parcel of land, means “from that place.”

THENCE DOWN THE RIVER Running with the meanders (not the meander lines) of the river, unless there is positive evidence that the meander line as written was where the surveyor, in fact, ran it.

THEODOLITE A precision surveyor’s instrument for measuring horizontal and vertical angles. There are two general classes of theodolites: (1) repeating theodolites, and (2) direction theodolites that read directions rather than angles. See Chapter 6.

THINGS REAL Lands, tenements and hereditaments.

THREAD OF A STREAM An indefinite term that means (1) the middle line between the shores, irrespective of depth of the channel, taking them in the natural and ordinary stage of the water at medium heights, neither swollen by freshets or shrunk by droughts; or (2) CENTER OF THE MAIN CHANNEL; THE MIDDLE LINE BETWEEN THE SHORES OF THE MAIN CHANNEL AT ITS LOWEST FLOW (not at

the time of mean high water). In cadastral cartography the second definition must be used when the deed description does not contain wording that shows a contrary intent. See Chapter 10 for discussion and legal references.

THREE ARM PROTRACTOR A device, for measuring angles, that has a center around which two arms rotate.

THROUGH LOT A lot that abuts a street at each end.

THROUGHWAY A highway or street especially designed for through traffic, over, from, or to which owners or occupants of abutting land, or other persons, have no easement of access or only a limited easement of access, light, air or view by reason of the fact that their property abuts upon the throughway or for any other reason. (ORS 374.010.)

THROUGHWAY, COUNTY As applied to ORS 374.420 to 374.430, “A proposed or existing county road especially designed for through traffic, which has been designated by resolution of the county court or board of county commissioners as a throughway, over, from or to which owners or occupants of abutting land or other persons have no easement of access or only limited easement of access, light, air or view, merely because of the fact that their property abuts upon the throughway or for any other reason.” ORS 374.420.

THROUGHWAY, STATE ORS 374.010 defines a throughway as used in ORS 374.005 to 374.095 to mean: “A highway or street especially designed for through traffic, over, from or to which owners or occupants of abutting land or other persons have no easement of access or only limited easement of access, light, air or view, by reason of the fact that their property abuts upon the throughway or for any other reason.”

TIDAL Relating to the tides. The periodic rising or falling, or flowing and ebbing waters.

TIDAL BASIN Basin affected by tides particularly one in which water can be kept at a desired level by means of a gate.

TIDAL LANDS Includes the “tidal submerged lands” and the “tidelands” of an estuary. All estuary lands covered by or alternately uncovered and covered by the ebb and flow of the tides.

TIDAL SUBMERGED LANDS Land below the line of ordinary low water of all navigable waters within the boundaries of this state as established by statute. Called submerged lands” by statute (ORS 274.005(7)).

TIDE The regular and predictable perpendicular daily rise and fall of the waters as a result of astronomical forces.

TIDE CURVE A graphic representation of the rise and fall of the tide in which time is represented by the abscissas and the height of the tide by the ordinates of the curve. For a normal tide, the graphic representation approximates a cosine curve.

TIDE, DIURNAL Having a period of cycle of approximately one tidal day.

TIDE GAUGE Instrument for measuring rise and fall of the tide.

TIDEBEAD Inland limit of water affected by a tide.

TIDELANDS The coastal waters situated above ordinary low water and below ordinary high water (or above ordinary low tide and below ordinary high tide), particularly as they are alternately uncovered and covered by the ebb and flow of the daily tides. "Tidelands" are only part of the "tidal lands." See Chapter 10 for legal references and discussion.

TIDELAND SALES ACT An act of 1872, which provided that a public easement to a common fishery follows the title of all tidelands sold by the State of Oregon.

TIDEMARK High-water mark left by tidal water, the highest point reached by a high tide; a mark placed to indicate the highest point reached by a high tide, or occasionally, by any specified stage of tide.

TIDE STAFF Tide gauge consisting of a vertical graduated staff from which the height of the tide can be read directly.

TIDE STATION Geographic location at which tidal observations are conducted. Also, the facilities used to make tidal observations. These may include a tide house, tide gauge, tide staff and tidal benchmarks.

TIDE TABLES Tables which give daily predictions of the times and heights of high and low waters. These predictions are usually supplemented by tidal differences and constants through which additional predictions can be obtained for numerous other places.

TIDE WATERS Waters, whether salt or fresh, wherever the ebb and flow of the tide is felt.

TIDEWAY The land between the high and low water marks.

TIE The bearings and dimensions, or other evidence or information, that accurately defines the location of a point or monument.

TIE POINTS Reference points or monuments used to locate other points, monuments or stations.

TIER The east-west row of townships.

TIMESHARING An interest in property whereby a number of persons own or have the exclusive right to use property for a specified time period, 20 W.L.R. No. 2 pp. 283, 302.

TIMESHARING OWNERSHIP Owning an undivided fee simple percentage in one timesharing unit, with all purchasers taking as tenants in common, 20 W.L.R. No. 2 pp. 283, 302.

TITLE The union of all elements constituting legal ownership in something, or legal ownership in some right or interest in something. The instrument (as a deed) that is evidence of a right (*Webster's New Collegiate Dictionary*). See "Title in land."

TITLE TO PROPERTY The evidence of a person's right to land and real estate, or to the extent, of that person's interest in land or real estate. The means whereby the owner is enabled to assert or maintain his possession. The right of the owner considered with reference to the manner his right or interest has been acquired, or its capacity of being effectual transferred. An estate in fee.

TITLE BY ADVERSE POSSESSION A title to property obtained by one in adverse possession of property. See "adverse possession."

TITLE BY DESCENT A title by which one person upon the death of another acquires real estate of the latter as his heir at law.

TITLE BY PRESCRIPTION The right, which a possessor acquires to property by reason of the continuance of his possession for the statutory period. It cannot be based on permissive possession. The elements of "title by prescription" are open, visible and continuous use under a claim of right, adverse to and with knowledge of the owner of the land. See "prescription."

TITLE BY PURCHASE Title by means except descent, by adverse possession and by prescription.

TITLE DEED A deed, which constitutes evidence of title to, lands.

TITLE FROM NATURE Title arising from either accretion or reliction. "Accretion" is the increase of land caused by gradual and imperceptible additions thereto caused by the washing of water. "Reliction" is the gradual subsidence of waters, leaving dry land where there had formerly been water.

TITLE FROM PUBLIC POLICY Under certain circumstances, an individual may take titles or use property contrary to the wishes of the owner of the property, *Le.* "Adverse possession" and "Prescription."

TITLE IN FEE A full and absolute estate beyond which and outside of which there is no other interest, right, or shadow of right.

TITLE IN FEE A full and absolute estate beyond which, and outside of which, there is no other interest, right, or shadow of right. The largest estate and most prevalent title to land; title to the entire property in land; having the complete ownership of land. Although there are fee estates less than fee simple absolute (fee simple determinable and fee simple conditional), the term "title in fee," without any other qualification, is usually synonymous with "title in fee simple" or "title in fee simple absolute." See "Fee simple absolute" and "Fee simple conditional."

TITLE IN FEE SEVIPLE The title to the whole of the estate absolute.

TITLE INSURANCE A contract to indemnity against loss through defects in title or against liens or encumbrances that may affect title at the time when the policy is issued.

TITLE OF RIPARIAN OWNERS (of lakes and ponds drained under ORS 274.210 to 274.260). See ORS 274.260(1).

TITLE POLICY A title insurance policy.

TITLE SEARCH An examination of the official books and documents for the purpose of discovering if there are any mortgages, judgements, tax liens, clouds, or other encumbrances upon a title.

TITLE TO LAND The means whereby an owner has just possession of his property. It is the evidence of his right, extent of his interest, or means whereby he is able to assert, maintain, or continue his possession.

TITLE TO LAND The means whereby an owner has just possession of his property. It is the evidence of one's right, extent of one's interest, or means whereby the owner is able to assert, maintain or continue possession. The word "title," when used in reference to land or real estate, implice an estats in fee. However, "title in real property" could be title in a lesser estate in the lands, such as an easement. As was held in *Shodgrass v. Coppie*, 203 Mo. 480, 101 S.W. 1091, "Title does not necessarily mean a fee interest, but covers all the lesser estates in lands."

TITLE TO PROPERTY See definition in Chapter 13.

TITLE TO REAL ESTATE Synonymous with "title to land."

TO HAVE AND TO HOLD The words, in a deed, is but a habendum clause, the purpose of which is merely to define the estate which the grantee is to take in the property, conveyed.

TOPOGRAPHIC FEATURES The natural and manmade features of a place or region.

TOPOGRAPHIC MAP A map or chart that shows the horizontal and vertical positions of the physical and cultural features of the earth's surface.

TOPOGRAPHIC SURVEYS Surveys made to determine the configuration of the surface of the earth including its relief and the position of its natural and manmade features. Topography.

TORRENS LAW (Repealed in Oregon by enactment of Oregon Law 1971, Chapter 478.) A system of title registration, designed by Sir Robert Torrens (an English Knight) in 1857, whereas any land owner who was issued a Torrens certificate of title was conclusively presumed to be the owner of the land described in the certificate. Under the present system of recording a deed, the "deed" is registered. But under the Torrens system the "title" was registered. The purpose of the repeal in Oregon was to discontinue the little used Torrens system and bring all real property title records under the deed recording system.

TOWNSHIP A division of the U.S. Public Land Survey containing (in theory) 36 sections.

TOWNSHIP EXTERIORS The boundaries of a township. The "township lines."

TOWNSITE (or Town Site) A portion of the public domain segregated by proper authority and procedure as a site for a town. In the typical townsite the blocks were usually 300 feet square, and not over 320 feet by 340 feet, with a 20-foot alley running the long dimension of the block. The principal streets were usually 80 feet in width, though frequently as much as 100 feet were needed or desirable, and the less important intersecting streets were seldom less than 60 feet wide. Alleys were normally to be placed in the center of the block and parallel with the principal street system. The normal frontage of the lots was to be 50 foot, which were to run back in rectangular form to the alley. See the B.L.M. 'Manual of Surveying Instructions.'

TOWNSITE ACT OF MAY 23, 1844 (5 Stat. 657) A general townsite law for lands occupied as a townsite. Townsite entry had to be made before the lands were put up for public sale and could not exceed 320 acres, taken by legal subdivision. The lands

could be entered by appropriate authorities to be held in trust for the occupants. The Townsite Act was extended to the Territory of Oregon by the July 17, 1854, Act of Congress.

TOWNSITE SURVEYS In the public land surveying practice the name is applied to the marking of lines and corners within one or more regular units of the township subdivision by which the land is divided into blocks, streets and alleys as a basis for the disposal of title in parcels known as village or town lots.

TRACING The finished cadastral map, in ink and on mylar. The tracing is the master copy of the cadastral map.

TRACT An indefinite stretch of land. In a subdivision, a defined area of land.

TRADITIONARY EVIDENCE Evidence derived from tradition, reputation, or declarations made by persons since deceased, in regards to ancient property boundaries and monuments, where no living witness can be produced having knowledge of the facts.

TRANSCRIBED FIELD NOTES The record of a survey that is extended from the field tablets, usually typewritten on regulation field notepaper.

TRANSFER An act by which title to property is conveyed from one living person to another. The words "convey" or, "transfer," as operative word in a deed, is of equivalent signification and as effective as the word "grant." Synonymous with "sale."

TRANSFER, STRAIGHT The direct sale of the whole parcel of land, or of an interest in the whole parcel of land; whereas, the term "name change" is less definite and implies either a direct sale of the whole parcel, or a change in name only; and the word "segregation!" implies a sale of only part of a larger parcel of land, or a division of the larger parcel. The word transfer alone could mean either "straight transfer" or, "segregation."

TRANSITION CURVE A spiral or compound curve. A curve designed to provide gradual entry, or transition, from the straight part of a highway to the sharpest part of a highway curve. See Chapter 8.

TRANSIT A theodolite with the telescope mounted so that it can be transited. The instruments are used for measuring vertical and horizontal angles to the nearest minute, or to 10, 15, 20, or 30 seconds of arc, depending on the quality of the transit. The three main types of transits are the (1) American transit, (2) builder's transit, and (3) engineer's transit. See Chapter 6.

TRANSIT STATION A marked point over which a transit is, has been, or will be accurately positioned.

TRANSVERSE MERCATOR PROJECTION (UTM) See discussion in Chapter 7.

TRAPEZIUM A quadrilateral having no sides parallel.

TRAPEZOID A quadrilateral having two, and only two, sides parallel.

TRAVERSE A method of surveying in which a sequence of lengths and directions of lines between points are measured.

TRAVERSE, CLOSED See "closed traverse."

TRAVERSE, OPEN See "open traverse."

TRAVERSING Running a traverse.

TREE, BEARING See "bearing tree."

TRIANGLE (DRAFTING) A three-sided tool for drawing lines at various fixed angles. See Chapter 11.

TRIANGLE A three-sided polygon. The sum of the angles of a triangle always equal 180 degrees;

TRIANGLE, ALTITUDE OF (GEOMETRY)." See "altitude

TRIANGLE, BASE OF The side upon which the triangle rests. The other sides are called the arms (or legs).

TRIANGULATION A system of joined or overlapping triangles in which the length of an occasional side, known as a "base line," is measured and the other sides are computed from angles measured at the triangle vertices.

TRIANGULATION STATION A station point used in a triangulation net.

TRILATERATION A method of surveying in which the lengths of the triangle sides are measured.

TRUE MERIDIAN The geodetic meridian as defined by the axis of the earth's rotation. The meridian of the general plan of the U.S. Survey of the Public Lands.

TRUST An estate, legal title' to which is vested in the trustee, while equitable title is held by an individual or individuals who bear no contractual relations among themselves. An equitable right, title, or interest in property, real or personal, distinct from legal ownership thereof.

TRUST DEED ORS 86.705(3) a deed executed in conformity with ORS 86.705 to 86.795, and conveying real property to a trustee in trust to secure the performance of an obligation owed by the grantor or other person named in the deed to a beneficiary. See discussion in Chapter 13, and figure 138.

TRUSTEE OIRS 86.705(4). A person to whom the legal title to real property is conveyed by a trust deed, or his successor in interest.

TRUSTOR One who gives a deed of trust, by way of a mortgage. One who creates a trust is said to settle it on another, and bears such designations as “donor,” “settler” or “trustor,” while he to whom the property is given in trust is the trustee.¹¹

U.H.R. (Micrographics) microfilming; above 90X.

ULTRAFICHE (Micrographics) reduced more than 90X. Ultra high reduction in Microfiche images

UNDEVELOPED SUBDIVISIONS See ORS 92.205 for “policy.”

UNDEVELOPED SUBDIVISIONS Any subdivision that is not developed as determined by ORS 92.225. In that statute, any subdivision is considered “developed” if any of the following conditions are found to exist:

- a. Roadways providing access into and travel within the subdivision have been or are being constructed to meet the specifications prescribed therefor by the agency or body that approved the plat of the subdivision,
- b. Facilities for the supply of domestic or industrial water to lots created by the subdivision have been or are being constructed,
- c. Sanitary sewerage disposal facilities have been or are being constructed for lots created by the subdivision, or septic systems have been or are being installed on the land or permits have been issued for their installation on the land,
- d. *Buildings* have been or are being constructed upon the land or permits have been issued for the construction of *buildings upon the land, and*
- e. One or more lots described in the plat of the subdivision have been sold or otherwise transferred prior to the date of the initiation of the review provided for in ORS 92.215.

Undeveloped subdivision policy and review. The 1973 Legislative Assembly found that many subdivisions for which plats had been approved and recorded had not been developed. Many such subdivisions were approved prior to the adoption of a comprehensive plan, zoning regulations and ordinances and modern subdivision control standards by the jurisdiction within which the lands described in the subdivision plats are situated. Consequently, the Assembly provided for review of undeveloped subdivisions to protect the public health, safety and welfare. The review could modify such subdivision, if necessary, to comply

with the current comprehensive plan, zoning ordinances and regulations and modern subdivision control standards. If modification was not feasible, then the nonconforming, undeveloped subdivisions and any lands dedicated for public use as described in the plat, might be vacated. See “Undeveloped subdivision.” See ORS Chapter 92.

UNDIVIDED INTEREST An undivided interest in title, right, or title to an undivided interest in real property or personal property that is owned by one of two or more tenants in common or joint tenants before partition. Undivided interest implies that of an undivided interest in the whole property, and implies that the property is not subject to partition, and not to be divided, setoff, and allotted to individual owners of the undivided interests, to hold in severalty.

Although the value between owners of undivided interests can be divided, **THE ACREAGE CANNOT BE DIVIDED**. For example, it is incorrect to assign 10 acres to one owner of an undivided 1/2 interest in a 20-acre parcel of land and to assign the other 10 acres of that parcel of land to the owner of the other undivided 1/2 interest. Just as no specific part of the estate can be recognized as belonging to one or the other of the owners, no specific amount of acreage can be identified as belonging to any specific owner.

UNIMPROVED LANDS Lands that have never been improved and are in a state of nature. Lands that were once improved but have reverted to a state of nature.

UNIT (Condominium) A building, room or rooms (on one or more floors) or parts thereof, intended for any type of independent ownership, with exit directly or via a common area to a public street or highway. By statute could include temporary parking or storage area (even if no building exists) when part of the condominium. See ORS 91.500 (1979 rev.) for statutory definition.

UNIT (Oregon Condominium Act). ORS 94.004 “A part of the property consisting of a building or one or more rooms occupying one or more floors of a building or a part or parts thereof, intended for any type of independent ownership, the boundaries of which are described pursuant to ORS 94.029 (1)(c), and a direct exit to a public street or highway or to a common area or areas leading to a public street or highway. An area used for temporary parking or storage of automobiles, boats, campers or other similar recreational vehicles or equipment may be considered a unit even though consisting of air space only without any building or structure, when such area is auxiliary to a condominium in

which the remainder of the units are in or are a part of a building or buildings.”

UNIT DESIGNATION ORS 91.500. The number, letter or combination thereof designating a unit in a declaration.

UNIT OWNER ORS 91.500. Person owning any interest recognized under the laws of this state ‘in a unit except when such interest is held solely for security purposes.

UNITED STATES PUBLIC LAND SURVEYS Synonymous with “Rectangular Survey System” “Public Land Surveys” and “Surveys of the U.S. Public Lands.”

UNITIZE (Micrographics) Separating a roll of microfilm into individual frames to insert into a carrier.

UNIVERSITY LANDS See ORS 273.251(8).

UNMARKETABLE TITLE A title may be regarded as unmarketable if a reasonable and prudent man, familiar with the facts, would refuse to accept title in the ordinary course of business; it is not necessary that the title be actually bad in order to render it unmarketable; it is only necessary that there be reasonable doubt rather than mere suspicion against the title.

UPLANDS All lands not classified as submerged submersible, swamp or marshlands. However, to be “riparian uplands,” the lands must abut (touch) the water.

URBAN Pertaining to a city, town, the suburbs of a city, or the suburbs of a town.

USQUE AD MEDIUM FLLUM VIAE (Latin) Meaning “up to the middle of the stream or road.” *Black’s Law Dictionary*, rev. 4th ed.

VACATE To cancel, rescind, or put an end to; as to vacate in accordance with the proper statutes a road, alley or street.

VACATION OF A COUNTY ROAD The can I cancellation of the public’s easement across a strip of land designated as county road. Vacations must be in accordance with ORS 368.565 to 368.580. ORS 368.620 provides for unopened and unused roads.

VACATION OF A STREET The cancellation of the public’s easement for road purposes) across land dedicated to the public, in accordance with Chapter 271 of the Oregon Revised Statutes, Special Notes:

- (1) Mere nonuse by the public, and adverse use by any private person, does not vacate a road or extinguish the public’s easement.
- (2) Taxation of streets (not yet vacated) being occupied or used by taxpayers does not extinguish the public’s easement.

(3) Where a replat of a subdivision has been recorded, the replat suffices to vacate the lots and blocks of the former subdivision, but does not serve to vacate the streets and alleys of the former subdivision. If the old street right-of-ways occupy different lands than those of the new subdivision, and some lots and blocks of the new subdivision (to be sold) are platted over the older streets and alleys, it will be necessary to vacate the older streets and alleys (in accordance with the laws of this state) to extinguish the public’s easement in those streets and alleys.

(4) Time does not extinguish the public’s easement in streets and alleys; that can only be accomplished by vacation (as per statute).

(5) Vesting of title in a vacated street and alley is as per ORS 271.140. See procedures described in Chapter 13.

(6) If, in the vacation of a subdivision, it is the purpose ‘to vacate the streets and alleys, the wording of the vacation should be such that it is clear that the public’s easement in those right-of-ways is being extinguished. Wording such as . . . “vacate the lots and blocks” will not suffice to include the streets and alleys.

(7) Upon vacation of a street or alley the lot boundaries and corners remain at the sideline, or right-of-way line of the originally dedicated street or alley. Only “ownership” changes not lot and block boundaries. See Chapter 13.

VACATION OF A PUBLIC WAY (STREET, ALLEY, COUNTY ROAD, LOCAL ACCESS ROAD, ETC.) The formal, recognized process for alienating or abandoning the public’s right to use the land for the purpose of travel from place to place. The courts recognize “vacation” as the process whereby the lawful owner of the fee, the “servient tenant,” regains right of exclusive possession and enjoyment of the dominant estate, the bed of the former public easement. No other significance should be assigned the vacation protein.

Elliott says in “*Roads and Streets*,” “While a highway exists there is nothing more than a mere suspension of the abutter’s right.” In other words, a dedication of a street, alley, road, etc., is not a grant of the fee, it is a right created in favor of the public and is in the nature of an estoppel *in pals*. *Carter v. Portland*, 4 Or. 339. As stated in *McQuaid v. Portland & V. Ry.*, 18 Or. 237; *Huddleston v. Eugene*, 34 Or. 343; 43 L.R.A. 44; and *C.W. Nell et al v. Independent Realty* and cited in many other Oregon cases, 317 Mo. 1233: “In this state the rule is that where land has been dedicated or appropriated for a public street,

the fee in that street remains in the original owner subject only to the public easement. The fee passes to the purchasers of abutting lots in accordance with the intent of the grantor.” To this effect see: *P. & W.V.R. Co. v. City of Portland*, 14 Or. 188;

Meier v. Portland C. Ry. Co., 16 Or. 500; *Lankin v. TerwiUiger*, 22 Or. 94; *Oliver v. Newberg*, 50 Or.; *John P. Sharkey Co. v. City of Portland*, 58 Or.; *Kurtz v. Southern Pac. Co.*, 80 Or. 217; *Menstell et al v. Johnson et al*, 125 Or. 161, 162; *Portland Base-bail Club v. Portland*, 142 Or.; *McAdarn et ux v. Smith et al*, 221 Or. 48; *Fahey v. Bend*, 252 Or. 267; *Hurd o. Byrnes*, 264 Or. 591, 506 P.2d, 1973, and *Cross v. Talbot*, 121 Or. 270. As a consequence, the act of vacating a street merely extinguishes the public’s easement and frees the lawful owner’s estate of the burden of the easement.

Although vacation statutes imply that the process gives the governing body power of disposal of the vacated land, such power could not be vested in the governing body because the underlying fee in a public way is private property within the meaning of the constitutional prohibition against any unlawful taking of private property. Any vacation statute enacted by the legislature that would act to take the property lawfully held by any owner of abutting real estate, and vest it in some other party, would be void for want of jurisdiction. It would be repugnant to the constitution. Consequently, it would not be law.

VACATION OF A SUBDIVISION The cancellation of subdivision resulting from a replat of that subdivision; or as per ORS Chapter 271. See “vacation of a street,” notes 3 and 6. Vacation of addition by sole owner: ORS 271.050.

VACATION OF A TOWNSITE See ORS 271.040.

VACATION, STATUTORY The only lawful way to vacate a subdivision or a public way (other than a state highway).

1. Subdivisions in cities ORS 271.080 to 271.230.
2. Undeveloped subdivision and streete: ORS 92~05 to 92.245.
3. A street along a railroad easement: ORS 271.180.
4. Property under the jurisdiction of a county: ORS 368.326 to 368.366.
5. Vacation effected by replatting: ORS 92.180 to 92.190.

The above statutory provisions include the lawful means to vacate a dedicated park, square, etc. But in these situations (parks, squares, etc.), the fee

vests in the city (ORS 271.140) or the county (ORS 368.366).

Validating and curative acts. Statutes provided to cure past errors and omissions and thus make valid whet was invalid or doubtful, but they grant no indulgence for the correction of future errors. For example:

ORS 93.810. “The following are subjects of validating or curative Acts applicable to this chapter;

“(1) Evidantiary and recordation of conveyances before 1854.

“(2) Evidentiery effect and recordation of certified copies of deeds issued by State Land Board prior to 1885 when original deed was lost.

“(3) Defective acknowledgements of married women to conveyances prior to 1891.

“(4) Foreign instruments executed prior to 1903.

“(5) Deeds of married woman before 1907, validity; executed under power of attorney and record of evidence.

“(6) Conveyances by reversionere and remaindernen to life tenant.

“(7) Decrees affecting lands in more than one county.

“(8) Irregular deeds and conveyances; defective aknowledgements; irregularities in judicial sales; sales and deeds of executors, administrators, conservators and guardiAnA; vested rights arising by adverse title; recordation.

“(9) Defective acknowledgements.

“(10) Title to lands from or through aliens.”

And, ORS 275.370. “All deeds and conveyances of the several county courts executed and delivered prior to January 1, 1941, conveying real property thereto set aside by such county courts as public parks and recreational areas under ORS 275.320 hereby are validated and declared to be legal and of full force and effect, both in law and in equity.”

ORS 273.900. “The title to all tide lands within this state, and all tide fiats not adjacent to tim ahore in the waters of this state, which have been heretofore sold to purchasers by the State of Oregon, where the purchaser has, in good faith, actually paid to the state the purchase price, and the same has been received by the state, and the purchaser has not putchased from the state to exceed 320 acres of that character or class of land, are hereby confirmed to ell such purchasers and grantees of the state, their heirs, successors or assigns, when such tide lands have not been fraudulently obtained, and without

reference to the amount of any other character of lands purchased by such purchaser theretofore from the state (formerly ORS 274.050).” Note: 1872 Or. Laws p. 129, as amended by 1874 Or. Laws p. 76 and 1876 Or. Laws p. 69--subsequently repealed by 1876 Or. Laws p. 41 sec 34--provided: “The title of this state to tide or overflowed lands upon said Willamette, Coquille, Coos and Umpqua rivers is hereby granted and confirmed to the owners of the adjacent lands, or when any such tide or overflowed lands have been sold, then in that case, to the purchaser or purchasers of such tide or overflowed lands from such owner of such adjacent lands, or some previous owner thereof, as the case may be.”

ORS 273.902. “(1) All the rights and title of the State of Oregon to the swamp and overflowed lands of this state, and claimed by persons who have completed settlement thereon, or who may hereafter complete settlement under provisions of the preemption or homestead laws of the United States, and have obtained a patent or certificate of final proof therefore, hereby are granted and confirmed unto such claimant, or the heirs or assigns of the claimant respectively.

“(2) Upon application of any such claimant to the division, with proof of claim evidenced by United States patent or final certificate of settlement and payment, issued from the United States Land office, the division shall execute and deliver to such claimed, without charge, a quitclaim deed of the state’s right and title to the lands so claimed. (Formerly ORS 274.120).”

ORS 273.903. “The division shall not call in question the title of any person to any swamp lands which the person may not have acquired by full and complete compliance with the pre-emption or homestead laws of the United States, nor shall the division sell to anyone any unsurveyed swamp lands, swamp lands on which any settler shall have made and perfected bona fide legal entry under the laws of the United States. ‘Swamp Lands,’ as used in this section, means lands classified as swamp lands pursuant to ORS 273.251. (Formerly ORS 274.130).”

ORS 273.905. “All deeds prior to February 20, 1891, to state, school, and university lands, the purchase price of which was paid to the board of commissioners for the sale of school and university lands and for the investment of the fund arising therefrom, hereby are confirmed to the grantees of the state, or to their lawful heirs or assigns, together with all righte, title or interest which the state might or could have in any of the said lands. This section shall not apply to or confirm the title to any

lands which were procured by false swearing or by fraudulent representations.”

ORS 273.910. “In all cases prior to May 21, 1917, where state deeds were issued to lands claimed by this state under the laws of the United States, the legal title to which had not yet vested in the state at the date of such deeds, the after acquired of this state in or to such lands shall be deemed vested in such purchasers who purchased such lands in good faith, and their heirs and assigns, from the time such legal title passed or may pass out of the United States. Nothing in this section shall prevent the State of Oregon from proceeding at any time to set aside on the ground of fraud any deed made by the state, nor shall anything contained in this section be deemed to prejudice the rights of any person claiming title to any public land adversely to the State of Oregon or to the United States. (Formerly ORS 273.270).”

ORS 273.915. Releue of Claims Under Pre-1947 Deeds Reserving Right of Way. “The State of Oregon hereby remisses, releases and forever quitclaims unto the grantees therein, their heirs and assigns, all rights, title and interests that may have remained or vested in the State of Oregon under deeds executed prior to July 5, 1947, by the State Land Board wherein there was attempted to be reserved a right of way for ditchss, canals and reservoir sites for irrigation purposes, constructed, or which may be constructed by authority of the United States, (Formerly ORS 273.170).”

ORS 273.920. “All leases and conveyances granting the right to explore or pruspect for minerals or oil and gas, and for the drilling, mining and removal of the same on or from lands or mineral rights under the jurisdiction and control of any state agency, board or commission, which were executed and delivered by such agency, board or commission prior to August 9, 1961, are hereby validated and declared to be legal and enforceable. (Formerly part of ORS 517.410).”

VACATIONS PURPOSES OF, REDEDICATION See ORS 271.160.

VARIATION, ANNUAL The annual I change in the declination of the magnetic needle of a compass that amounts to less than one minute of arc. See Chapter 4.

VARIATION, DAILY Change in declination of the magnetic needle of a compass, that averages approximately eight minutes of arc. The needle reaches its extreme declination about 1:30 p.m.; the mean declination occurring at about 8 p.m. Synonymous with “diurnal variation.” See Chapter 4.

VARIATION, DIURNAL Daily variation. See Chapter 4.

VARIATION, IRREGULAR Unpredictable change in the declination of the magnetic needle of a compass, caused by magnetic disturbances and magnetic storms. See Chapter 4.

VARIATION, SECULAR An unpredictable, but important change in the declination of the magnetic needle of a compass. These changes are charted from observation by the National Oceanic and Atmospheric Administration (NOAA). When retracing old property lines run by compass, one must consider the magnetic declination of the area at the date of the original survey, and the present date. See "magnetic declination.,,"

VECTOR A course or compass direction.

VEGETATION LINE (General). The high water marks at the line where ordinary high water deprives the soil of vegetation. See the following definition.

VEGETATION LINE (The Ocean Shore Statutory) The line defined by ORS 390.770 (the exceptions are as per ORS 390.760). In the form of x and y coordinates of the Oregon Coordinate System. In general, does not run at a line greater than 16 feet in elevation. It is the upland boundary of the Ocean Shore. This line must be used to divide taxable property from exempt property lying seaward of the vegetation line. See the charts in the appendix.

VERNIER The small movable scale of a drafting machine, theodolite or other graduated instrument. The vernier is used for measuring a fractional part of one of the equal divisions on the graduated fixed scale.

VERTEX A turning point; the highest or principle point; apex, top, crown or summit.

VERTEX OF AN ANGLE The point in which the two lines meet to form the angle.

VERTEX OF A CURVE The point from which the diameter is drawn; the intersection of the diameter and the arc (where the radii meet; the radius point).

VERTICAL AERIAL PHOTOGRAPHS See "oblique, aerial photographs."

VERTICAL CIRCLE That part of a transit that makes it possible to make vertical measurements.

VERTICAL CONTROL The establishment of a series of benchmarks or other points of known ELEVATION.

VESTED Fixed. Not in a state of contingency or suspension.

VESTED ESTATE An interest clothed with a present, legal, and existing right of alienation; an estate

which is not contingent. An estate is vested where there is an immediate right of present enjoyment or present right of future enjoyment.

VESTING OF TITLE IN PUBLIC SQUARES VACATED See ORS 271.060.

VESTING OF TITLE IN STREETS VACATED See ORS 271.140. See Chapter 13.

VOLUNTARY CONVEYANCE A conveyance made without any valuable or substantial consideration.

WARRANT To secure to the grantee an estate granted.

WARRANT AND DEFEND Means that the grantor warrants a quiet enjoyment; but is not an assurance against all encumbrances.

WARRANTEE One to whom a warranty is made.

WARRANTOR One who makes a warranty.

WARRANTY A promise that a proposition of fact is true. Protection of or indemnification for what is given.

WARRANTY DEED One providing a full warranty. It actually conveys the estate, not just the right, title and interest in the estate. ORS 93.850 defines the effect of a warranty deed in Oregon Law. This statute is quoted in Chapter 13 of this manual.

WARRANTY DEED, STATUTORY A deed provided in ORS 93.850. A deed in that form conveys the entire interest in the described property "at the date of the deed which the deed purports to convey." It estops the grantor, the heirs, successors and assigns of the grantor, from asserting that said grantor had, at the date of the deed, an estate or interest in the land less than that estate or interest which the deed purported to convey "and the deed shall pass any and all after acquired title." It includes covenants (each running in favor of the grantee and successors in title), as if written in the deed: That at the time of delivery of the deed the grantor is seized of the state being conveyed; that the deed is free from encumbrances not listed in the deed; that the grantor warrants and will defend the title to the property against all persons who may lawfully claim the same." See ORS 93.850 for complete language of the law.

WARRANTY, GENERAL The name of a covenant of warranty, inserted in deeds, by which the grantor binds himself, his heirs, etc. to "warrant and defend" to the grantee, his heirs, etc., the title thereby conveyed, against the lawful claims of all persons whatsoever.

WARRANTY, IMPLIED Occurs when the law derives the warrantee by implication or inference from the

nature of the transaction or the relative situation or circumstances of the parties.

WARRANTY, SPECIAL See “special warranty deed.”

WASHBOARDS (Mirographics) Alternate bands of varying intensities sometimes found on films exposed on rotary cameras. Causes include uneven lighting, faulty documents, and film advance.

WATER COURSE (or watercourse) A channel cut by running water, with well defined banks, through which water flows for substantial periods of the year and discharges itself into some other body of water or drainage basin. It need not be consistent to be a watercourse, but must constitute more than surface drainage caused by extraordinary factors.

WATERLINE This term has no legal significance. The juncture of land and sea. The line fluctuates, changing with the tide or other water fluctuations.

WATERMARK A mark indicating the highest point to which water rises, or to the lowest point which it sinks.

WATERS OF THE UNITED STATES All waters of the U.S. which are navigable for the purpose of commerce, or whose navigation successfully aids commerce.

WATERS OF THIS STATE The natural waterways, including all tidal and nontidal bays, intermittent stream, constantly flowing streams, lakes and other bodies of water in this state, navigable and nonnavigable, including that portion of the Pacific Ocean which is in the boundaries of this State; and including the “Ocean Share” to the statutory vegetation line. See ORS 541.605.

WATER RESOURCES Includes not only the water itself, but also the aquatic life and habitants therein, and all natural resources in and under waters of this state. See ORS 541.605 and 536.210 for a more detailed legal definition. See also Chapter 10.

WATER RIGHTS A right to USE water of a river, natural stream, lake, ditch, pond, canal, etc., for general purposes (irrigation, mining power, etc.). NOT SYNONOMOUS WITH RIPARIAN RIGHTS.

WAY A road, passage, street, etc.

WAY As explained in *Huggett et ux v. Moran et ur.*, 201 Or. 105, 266 P.2d 692: “While strictly speaking ‘way’ is not synonymous with ‘road’ (the word ‘way’ being more generic than the word ‘road’, and referring to many things besides roads: *Kister v. Reeser*, 98 P. 1, 4, 42 Am. Rep. 608), as used in a statute authorizing the establishment of county roads, it must be construed as including therein county roads.”

Webster’s New Collegiate Dictionary, supra, defines ‘way’ as a thoroughfare for travel from place to place. Elliott, supra, says, “Ways can be either public or private, and a way open to all people is a ‘highway,’ *Le.* streets, alleys, bicycle paths, bridges, and public walkways, ferries, and state highways.”

WAYS OF NECESSITY A way established to solve the problem of ingress and egress to lands not reached or conveniently reached by a public road. It is not a street or county road. Chapter 376 of the Oregon Laws provide for “Ways of Necessity.” ORS 376.105 to 376.140.

WELL See ORS 537.145.

WEST When not controlled by definite courses, monuments or descriptions, means “due west.” Must yield to monuments and calls.

WESTERLY From the west or towards the west. When not controlled by definite courses, monuments or other definite descriptions, means “due west.” “Westerly” always yields to monuments and other definite courses, monument or points of call.

WESTERLY COURSE Generally, a “westward” course; not due west.

WESTERNMOST Farthest to the west; most western.

WESTWARD Having a direction toward the west.

WILL The legal declaration of a person’s intention, to be performed after his death, concerning the disposition of his property, the guardianship of his children or the administration of his estate. It is a testamentary instrument executed by any person who is competent.

WTITNESS CORNER Corners used to identify and locate other comers or monuments. They can be stakes, trees, rocks, etc.

WTINESS TREE A tree used to identify or locate a monument or point. Also called a “bearing tree.” See Chapter 6.

WYE A track with two railway branches, one joining the main track of the railway from one direction, and the other joining the main track from another direction.

WYE LEVEL A surveying instrument, used for leveling, that has a telescope resting on wye supports. This type of leveling instrument is simpler to adjust than the dumpy level because the telescope is removable and can be turned end for end.

ZONE, BEACH The Ocean Shore.

ZONE LINE, BEACH See “beach zone line.”