# 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

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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 Statues.

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 cadastres.
- 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:

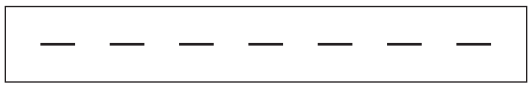
Either Hollow or Shadow font is used; they are not mixed. Text may be specified as Light, Normal, or Bold. Text sizes, where specified, are in inches on the printed map.

## 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.

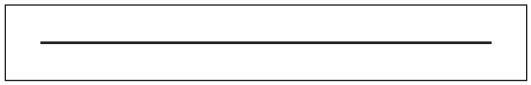
**Section Lines** from the Public Land Survey System are used only when needed.

Weight 1, dashed



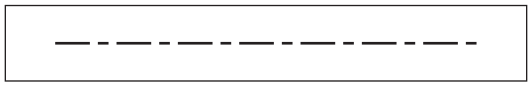
**Public Road Right-of-Way Lines** show the legal right-of-way independent of physical features; they always form a property boundary.

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

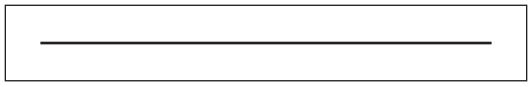


**Public Road Name Text** includes the legal name, the common name, previous names, and county road numbers. It is placed within the right-of-way, scaled to the street width with a maximum size of .2".

Roman, regular font

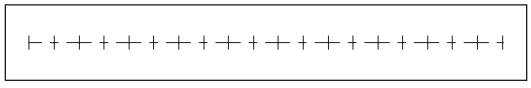

The **Railroad Right-of-Way** forms a property boundary.

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.

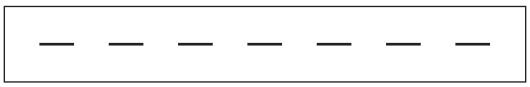
Roman, regular font


**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

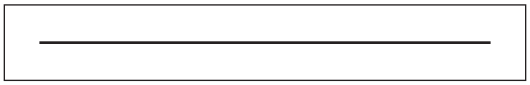
**Meander Lines** are shown if deeds or surveys reference them.

Weight 1, dashed



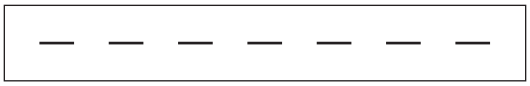
Hydrography Text, Italic, Regular font


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

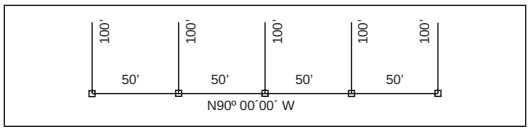


**Supplemental Boundary Lines** are former boundary lines other than the original lot lines that are shown because they may be referenced on deeds or surveys.

Weight 1, dashed

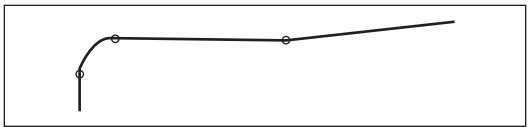
**Lot Corners** are .04" squares placed at each of the original lot corners in a subdivision or partition plat, parallel with the bottom of the map.

Weight 0



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

Weight 0

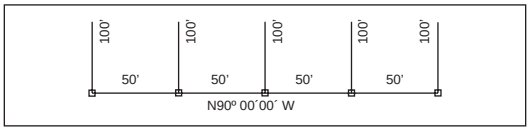


**Bearing Text** shows the bearing of a line and is placed parallel to the line.

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"

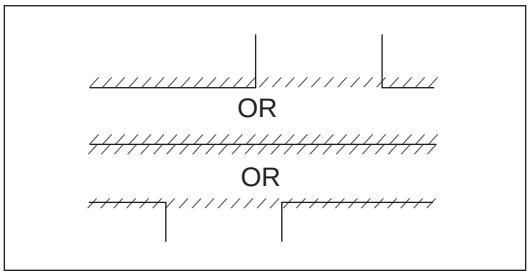
**Acreage** is placed when required by the manual. Acreages should never be calculated from the map when it is possible to calculate them from a deed description or survey.

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



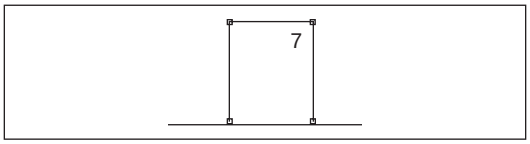

**Subdivision Name** is either Hollow or Shadow text, and it should be consistent throughout the county. It is sized to fit with a maximum size of .24".


**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.

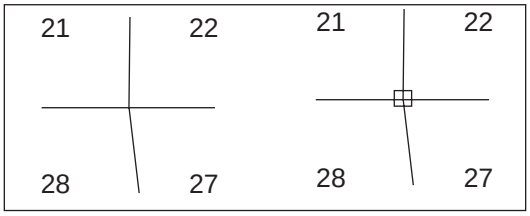
The **Block Number** is placed as Roman, Regular, .125", in a circle near the center of the block and parallel with the bottom of the map, or it is placed Bold without a circle.


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.

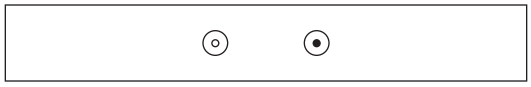
Roman, Regular, .08″

| 4 | LOT 4 | LOT 4 |
|---|---|---|
| 35.04 | 35.04 | |
| 1″=2000′ | 1″=800′ - 1″=200′ | 1″=100′ 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.

Weight 0



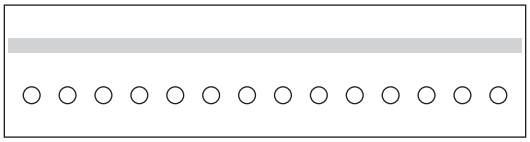
**D.L.C. Text**. All D.L.C. lines will be labeled so that the line or corner will be identified in each printed map.

Roman, Regular, .08″

S/L JOHN DOE D.L.C. NO. 56

**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.

Roman, .5″.

104

**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 of 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 date collection and post processing utilized.

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

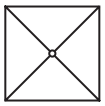
| | |
|---|---|
| Order AA | 1 pp billion |
| Order A | 1 pp 10 million |
| Order B | 1 pp 1million |
| Order C1 | 1 pp 100,000 |
| Order C2-1 | 1 pp 50,000 |
| Order C2-2 | 1 pp 20,000 |
| Order C3 | 1 pp 10,000 |

**Federal Geodetic control Subcommittee distance accuracy standards for conventional surveys:**

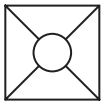
| | |
|---|---|
| First Order | 1:100,000 |
| Second Order, Class I | 1:50,000 |
| Second Order, Class II | 1:20,000 |
| Third Order, Class I | 1:10,000 |
| Third Order, Class II | 1:5,000 |

# RELIABILITY CODES

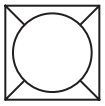
CODE 1
1 ft or less



CODE 2
3 ft or less



CODE 3
10 ft or less



CODE 4
40 ft or less