

## **CHAPTER 3**

ALABAMA STATE SPECIFICATIONS FOR PROPERTY OWNERSHIP MAPS, MANUAL  
MAPPING GIS/COMPUTER ASSISTED MAPPING AND AERIAL PHOTOGRAPHY

TABLE OF CONTENTS

**CHAPTER 3**..... 1

ALABAMA STATE SPECIFICATIONS FOR PROPERTY OWNERSHIP MAPS, MANUAL  
MAPPING GIS/COMPUTER ASSISTED MAPPING AND AERIAL PHOTOGRAPHY ..... 1

INTRODUCTION ..... 7

SECTION A – LAWS AND REGULATIONS ..... 8

SECTION B – PARCEL OWNERSHIP ..... 9

1. *RECORD RESEARCH* ..... 9

2. *UNIFORM PARCEL NUMBERING SYSTEM*..... 9

3. *ENLARGEMENT OF ORIGINAL BASE MANUSCRIPTS/OWNERSHIP MAPS* ..... 13

SECTION C – VESTING INSTRUMENTS ..... 14

4. *PARTS OF A DEED*..... 14

5. *GLOSSARY OF DEEDS* ..... 14

SECTION D – PLOTTING AND DRAFTING METHODS ..... 18

SECTION E – MAINTENANCE/UPDATING PROCEDURES ..... 33

6. 1. *OWNERSHIP MAPS*..... 33

7. 2. *PLACEMENT OF DRAFTING INFORMATION* ..... 36

8. 3. *OWNERSHIP INDEX SYSTEM* ..... 38

9. 4. *PROPERTY CHANGE FORM*..... 38

10. 5. *STORAGE* ..... 40

SECTION F:..... 41

Spacing of Photographs.....	50
Endlap.....	50
Sidelap.....	50
Crab.....	51
Tilt.....	51
Aircraft.....	51
Aerial Camera.....	51
Aerial Film.....	52
Disposition of Aerial Film.....	52
Roll Film Container.....	52
Image Quality.....	53
Film Labeling.....	53
Contract Prints of Aerial Photography.....	54
Screened Halftone Reproductions.....	54
Paper Enlargements.....	54
Locator Index.....	54
Certified Engineer.....	55
Special Instructions to Bidders.....	55

### **Computer Assisted Mapping**

Introduction.....	58
Minimum Map Layering.....	59
Minimum Software Capabilities.....	60
General Information.....	62
Placement of Drafted Information.....	63
Data Standards.....	64
Converting Parcel Map into Digital Format.....	65
Digitizing.....	66
Edge Matching.....	67
Conversion of Insert Maps.....	67
Contract Requirements.....	68
Map Layers/Levels.....	69
Glossary.....	72

**APPENDIXES**

APPENDIX A - Map Size and Format

APPENDIX B - Legend Sample

APPENDIX C - Drafting Specifications

APPENDIX D - RP 17 Mapping Register

APPENDIX E - RP 11 Change Form Register

APPENDIX F - RP 15 Property Change Form

APPENDIX G - RP 2 Cross Index Cards

APPENDIX H - RP 16 Parcel Error Change Form

APPENDIX I - Typical Section Map

APPENDIX J - Metes and Bounds Description

APPENDIX K - Formulas for Computing Area

APPENDIX L - Illustration of Division of a Section

APPENDIX M - Uniform Parcel Number

APPENDIX N - Pen Weight and Lettering Template

APPENDIX O - Metric Conversion Table

APPENDIX P - Digital Ortho Photography



## **INTRODUCTION**

To assess real estate correctly, the assessor must have complete maps of all property in the jurisdiction, updated regularly to show changes in parcel boundaries or other physical characteristics.

Tax maps are an essential tool in the development and maintenance of an equitable assessment system. They are indispensable in inventorying all properties in the county and assuring their inclusion on the tax roll. They are essential for the location and identification of properties to be assessed, and are a requisite for determination of dimensions/area necessary in calculating land valuations.

A tax map, as defined in *The Glossary for Property Appraisal and Assessment*, is “ A scale map displaying property ownership boundaries and showing the dimensions of each parcel with related identifiers, survey lines and easements.”

## SECTION A – LAWS AND REGULATIONS

Title 40-7-27 of the 1975 Code of Alabama requires the tax assessor to complete the assessments of property not later than the last Monday in February. For this schedule to be met, the following mapping and appraisal schedule must be complied with:

1. All mapping including name changes, splits, and new subdivisions must be maintained in a current up-to-date status.
2. Deeds and other vesting instruments, including wills and recorded subdivision plats, filed in the probate office should be completely mapped and ready for field review within 30 days after the date the instrument was filed in the probate office or made available to the tax assessors office.
3. Mapping for instruments executed between October 1 and September 30 will therefore be completed by October 30. The date of the instrument, that determines the tax year, is the date of signing and not the date it is filed in the Probate Office. In most cases inking can be done in conjunction with the mapping, but in the worst case not later than December 31.
4. The field review and appraisal should begin as soon as the mapping of each vesting instrument is completed. All fieldwork and appraisals should be completed by January 15 for mapping of vesting instruments through the previous September 30.
5. All items, materials and supplies and work products shall be the property of the county governing body. No item, material, data acquired or produced shall be used for any purpose other than fulfillment of mapping requirements unless authorized by the county governing body in writing.

## SECTION B – PARCEL OWNERSHIP

This section describes the method to be utilized for the determination of parcel ownership and boundaries.

### 1. RECORD RESEARCH

The mapper will obtain and use the following materials or documents as required in the maintenance and updating of the ownership maps:

- a. All recorded and unrecorded (when available) vesting instruments that sell, transfer or convey ownership of real property or ownership including wills and trusts.
- b. All newly recorded and unrecorded (when available) subdivisions or re-subdivisions of existing subdivisions and all local surveys.
- c. All right-of-way plans for new roads, railroads, and changes of existing right-of-ways for all federal, state, county and city streets. The mapper during the year should contact all the agencies involved to make sure all right of way changes and new right of way plans have been obtained.
- d. Plats, deeds or aerial photography should be used to map all new rights-of-ways or easements for major transmission lines (oil, gas or electric).
- e. New city annexation information should be obtained and mapped, as it becomes available for the appropriate tax year.

### 2. UNIFORM PARCEL NUMBERING SYSTEM

The parcel numbering system shall contain seven sets of numbers, each set designed to locate the parcel geographically as well as by ownership map sheet. The numbering system identifies the county, township, area, section, quarter section and/or block in which the parcel is located. The system is completely numerical rather than alphanumeric to facilitate data processing. It is also designed as a system for numbering the ownership map. The description of the seven sets of numbers is as follows:

- a. The County Number is to be the same as that assigned for automobile tags. For example, Autauga County would be 04, Montgomery County would be 03 and Pike County would be 55.
- b. The Township Number is to be the township normally consisting of 36 sections (01-36) in which the parcel is located. Each township within a county will be assigned a number; that is, each township shall be assigned a new number rather than their present reference to township and range. The townships shall be numbered sequentially from east to west and west to east in a serpentine manner within each tier so the easternmost township in the most northerly tier would be 01. If a township is less or larger than normal size, it is nevertheless numbered in its proper sequence.
- c. The Area Number is the four section area within each township that would comprise a 1" = 400' ownership map sheet. Each township will be broken down into four section areas, two sections high (north-south) by two sections wide (east-west). Normally, there would be nine areas to a

township. The areas will be numbered sequentially from east to west and west to east in a serpentine manner as the township above, grouped in four section blocks along tiers two sections high (north-south). The northeasterly group of four sections with a normal 36 section township would be numbered 01 and the southwesterly 09. If a township is less than normal in size or cut by a county boundary, the area will contain the same number that would be normally assigned to it in its location within a 36-section township.

- d. The Section Number is to be the land section in which the parcel is located. Section numbers below 10 should have a "0" in front of the Section number. For example, Section 4 would be shown as 04.
- e. The Quarter Section Number is to be the quarter section in which the parcel is located. These numbers run in a counter-clockwise manner with the northeast quarter being Number 1, northwest quarter Number 2, southwest quarter Number 3, and southeast quarter Number 4. Since there are no numbers in this set higher than four, it is not necessary to use "0" in front of the Quarter Section Number. Quarter Section numbers are to be used only on 1"= 100' and 1"= 50' maps.

In those instances where the Quarter Section Number is not used, the space in the Uniform Parcel Number System will contain one zero.

- f. Map Block: For convenience in numbering, each map sheet may be broken into blocks bounded by geographical features such as, roads, streams, railroads, etc.

The block number will be a three digit number. The first digit shall always remain "0" and block numbers may be assigned up to 099. The exception to this will be when the block number is used to identify improvements on leased property. See page 8

The procedure for blocking on the 1" to 50' maps are as follows. The perimeter of the 50' mapping should be bounded by geographical features as in other scales. There is no sub-blocking at this scale. Each map sheet at this scale will constitute a map block. For the 50' sheets within a quarter section, the first digit will be the number assigned to that quarter section. For an example the NE quarter of a section would be 1. As another example, the SE quarter would be 4. The second number would be 0. The third digit in any 50' block number would be the 1/4 - 1/4 section number. In any case, there should be no more than one quarter/quarter section shown on any 50' map sheet.

Regardless of the mapping scale, each map block will contain less than 1000 parcels. Map blocking will be required on all 200' and 100' scale maps.

Map block numbers, where used, become a part of the Uniform Parcel Number System. All 1" to 200' maps should have the block number in the Uniform Parcel Number. (See parcel-numbering example below) In those instances where map blocking is not used, the space in the Uniform Parcel Number System will contain three zeros.

<b>EXAMPLES:</b>	<b>SCALE</b>	<b>PARCEL NUMBER EXAMPLES</b>
	400'	43-01-02-10-0-000-001.000

200'	43-01-02-10-0-001-001.000
100'	43-01-02-10-2-000-001.000
50'	43-01-02-10-3-301-001.000

Whenever map blocks are not clear by the use of geographical features block limits should be used. A recommended method to identify map block limits is by the use of tick limits to outline map block. Another method of identifying map block limits is by the use of a dashed line. For examples and correct line weights to use see Drafting Specifications in Appendix C. Whichever method of identifying map block limits is used it must be identified in legend section of map.

- g. The Parcel Number is to be the number assigned to the particular parcel. This series identifies individual parcels within a block, quarter section map sheet, or section sheet. The parcel number will be a six-digit number for computer purposes. However, due to lack of space on maps only the digits necessary before the decimal and three digits behind the decimal will be shown on map.

<b>Examples:</b>	<b>Computer</b>	<b>Map</b>
	001.000	<u>1</u>
	001.001	<u>1.001</u>
	010.000	<u>10</u>
	010.001	<u>10.001</u>

The parcel number on a map should be underlined. See Appendix M for examples of uniform parcel numbers.

The following procedures will be used in establishing the parcel numbering system for "splits" or sell-offs:

Where the map has an established parcel number and the owner sells a part of the parcel to another person, the "split" will be assigned the original parcel number from which the land was sold plus the addition of a 3 digit decimal number to identify the split.

Example: Mr. A owns a tract of land and is identified on the ownership map as parcel no. 022.000. He sells ten acres of the parcel to Mr. B. The parcel number assigned to Mr. B to identify the split will be 022.001. The splits of an established mapping parcel will be in numerical sequence.

1. CONDOMINIUMS - The tract of land or lot on which a condominium is located will be assigned a basic parcel number. Each condominium owner will be assigned a decimal parcel number in the same manner as a split stated above.

Example: The parcel on which the land and condominium improvement is located will be assigned parcel no. 020.000. Each condominium owner will be assigned a parcel number indicating a split of the parcel. Mr. A, one of the owners of the condominium, will be assigned parcel 020.001 and Mr. B will be assigned parcel no. 020.002 and continued in numerical sequence as stated above.

2. IMPROVEMENTS ON LEASED LAND - For ease in identifying and locating improvements on

leased land the following system is suggested. The uniform parcel number may be modified to a unique system for each improvement located on a parcel. By using the parent parcel number and inserting a different 3 digit number in the 3 digit block space, such as 900, would indicate that this is a improvement on leased property. The 6 digit parcel number would also be changed the same as if the improvement were a split or sell-off. The PRC with the improvement could then be filed in the same numerical order. By using this type system those counties on computer systems would be able to have the computer print out a listing of improvements on leased property.

3. COUNTY LOCATOR - The county boundary map will be shown under the space designed for county locator. The map will show all townships within the county and the number of such township assigned under these specifications. The actual geographical townships and range numbers will be shown outside the perimeter of the county boundary map.
4. OWNERSHIP MAP NUMBERING SYSTEM - Map numbering system as follows: The map number will follow identical with the uniform parcel numbering system. For example, the map number for the area involving 1" = 400' mapping will be the County Number, the Township Number and the Area Number. The map number for the area covered at 1" = 200' will be the County Number, the Township Number, the Area Number and the Section Number. The map covering the area mapped at 1" = 100' will be numbered as the County Number, Township Number, Area Number, Section Number and Quarter Section Number. The map covering 1" = 50' will be numbered in the same manner involving the County Number, Township Number, Area Number, Section Number, Quarter Section Number and Block Number.

#### UNIFORM OWNERSHIP MAP NUMBER

	CO.#	TWP.#	AREA#	SEC.#	1/4SEC.#	BLK.#
1"=400'	43	- 01	-	02		
1"=200'	43	- 01	-	02	-	10
1"=100'	43	- 01	-	02	-	10
1"=50'	43	- 01	-	02	-	10 - 2 - 201

5. OWNERSHIP MAPPING – MINIMUM MAP INCLUSIONS As a minimum, the final ownership maps will depict only the major detail from the planimetric manuscript with at least the following detail shown:
  - a. Each established parcel and its boundaries
  - b. Township, Range and Section boundaries and numbers
  - c. U. S., state, county, municipal, private or non-public, etc., highway, roads, streets and name or number.
  - d. Subdivisions
  - e. County boundaries
  - f. Municipal boundaries
  - g. Government Lot Numbers

- h. Subdivision names, block and lot numbers, plat book and page numbers or other designations.
- i. Canals, rivers, creeks, etc.
- j. Railroad right-of-way (with track layout)
- k. Major utility lines as shown on planimetric manuscripts
- l. Churches, schools, cemeteries, airports, government lands, etc. are to be identified on the ownership map by name and appropriate symbol.

### **3. ENLARGEMENT OF ORIGINAL BASE MANUSCRIPTS/OWNERSHIP MAPS**

For the purpose of maintaining ownership maps, enlargements of original base manuscripts to i.e., 1:400 to 1:200 or 1:200 to 1:100 in order to properly portray subdivisions, small properties and/or areas with congested details is permissible providing that the enlargements of the manuscripts/ownership maps are done with extreme care.

Enlargements of manuscripts/ownership maps will be accomplished through photographic methods using precise processing cameras either by projecting negatives caused from the original manuscripts/ownership maps, or by contacting of negatives enlarged from the original pencil manuscripts. If intermediate copied negatives are used in the process of enlarging the pencil manuscripts, the negatives will be produced on film .004" or equivalent. The enlarged copy of the base manuscripts is to be printed on reproducible stable base polyester material, matte two sides, with a minimum thickness of .004" Cronaflex or equivalent.

In the enlargements of the pencil manuscripts, grids measured on the enlarged copy cannot vary more than .005" from their true dimensions and all grid lines must be uniformly at right angles. Checks made across the diagonals of the enlarged grid squares should not vary more than .005". To maintain parallelism of enlarged grids and perpendicularly enlargements of the base, manuscripts must be performed in small sections not to exceed the outside dimensions of an individual final map sheet.

Enlargements of the pencil manuscripts will be in accordance with the modular structure of the original map sheets; for example, the area covered by one 400' sheet can be enlarged and broken up into four 1" = 200' sheets, similarly, the area covered by one 1" = 200' sheets could be blown up to four 1" = 100'. In the event, that the area covered by one of the modular sheets straddles the tie between two manuscripts both shall be enlarged and no effort is to be made to join or otherwise splice the manuscripts either in the original form or in the enlarged negative stage, so as to avoid any deviations in scale caused by the splicing together of manuscripts or enlarged negatives.

## SECTION C – VESTING INSTRUMENTS

A deed is a written agreement, in proper legal form, that conveys title to or an interest in realty and when properly signed and delivered, gives evidence of the location, title or transfer of an interest in realty. The purpose of a deed is to describe by words the exact location, geometric shape and size of the land intended to be conveyed, and to identify the land for title purposes as a protection to the grantee.

### 1. PARTS OF A DEED

1. Names of Parties Grantor (giving), Grantee (receiving)
2. Consideration Value Exchange
3. Granting Clause A clause containing words of conveyance such as grants, transfer, or convey.
4. Habendum Clause A clause which recites “to have and to hold to said grantee, his heirs, successors, and assigns”.
5. Description Description of property being conveyed.
6. Testimony Clause The concluding clause beginning “In witness whereof”.
7. Signature Signature of granting party.
8. Witness Signature of those witnessing the signing.
9. Date Date of deliverance and acceptance.

### 2. GLOSSARY OF DEEDS

- Auctioneer’s Deed: Deed issued by a person authorized to auction property for unpaid debts. Auctioneer can only sell – not buy.
- Bargain and Sale Deed: Conveys all of the grantor’s interest in the property but usually does not contain warranties as to the title of the property conveyed; however, the grantor claims to have possession or an interest in the property conveyed. Trustees, executives and officers of the court often convey property under their control by way of a bargain and sale deed.
- Bond for Title: Agreement to make title in the future if all aspects of the contract are met.
- Condemnation Deed: Used to convey property taken by a judicial or administrative proceeding after the power of eminent domain (the power of government to take private property for public use) is exercised.

- Court Decree: When a court rules on ownership of property and rules you must give or get a deed for said property as in boundary dispute or agreement.
- Covenant of Further Assurance: Obligates the grantor to perform any acts necessary to perfect the title to the grantee. Used to force grantor to execute a correction deed if an error is found in the original.
- Covenant Against Encumbrances: Guarantee against all encumbrances not specifically accepted in the deed.
- Covenant of Quiet Enjoyment: Guarantee from grantor that grantee will have no acts or claims from third parties.
- Covenant of Seizing: Guarantee that the grantor owns the property and has the right to sell it.
- Covenant of Warranty Forever: Guarantee from grantor to bear the expense of defending the grantee's title to the property in the event that a third party asserts a rightful claim.
- Deed of Correction: Is used to correct errors in a prior deed, for example, changing the description of a parcel when the property is resurveyed and an error is discovered. A grantee can force a grantor to execute a deed of correction if the original deed contained a covenant of further assurance.
- Easement Deed: Conveys a property interest (short of an estate) that one person has in land owned by another, entitling the holder of the interest to limited use of the other's land.
- Eminent Domain Deed: Right of the government to take private property for public use with just compensation.
- Executor Deed or Administrative Deed: The legal proceeding by which the affairs of descendants are resolved and their estates distributed, including their real property. An executor is appointed by a testator to carry out the directions of a will. An administrator is appointed by a court to settle the estate of a person who has died intestate.
- Foreclosure Deed: Deed to shutout, destroy, bar an equity right of redemption. One year right of redemption.
- Grant Deed: Grantors warrant that they have not previously conveyed the estate being granted to another, that is not encumbered except as noted in the deed, and that the grantor will convey to the grantee any title to the property that he or she may later acquire.
- Installment Deed(Sales Contract): Provides for payment of the purchase price in installments and conveyance of title on completion of the payments.
- Leases: Agreements, written or unwritten, transferring the right to exclusive possession and use of real estate for a period of time. A valid lease must provide for reversion of the property

from the lessee back to the lessor. The lessor's interest is termed "leased fee simple" and the lessee's interest is "leasehold".

- Lien: Claim made by one person upon the property of another for nonpayment of a debt or obligation. Types of involuntary liens are: tax lien (statutory lien imposed against real property for payment of taxes), mechanics lien (a lien to secure payment for materials supplied and services rendered), and judgment lien (general lien on both real and personal property).
- Life Estate: Grantor retains right of use and all other rights except right to sell, destroy or alter for duration of his life. After death the property reverts to the grantee. Grantee may sell property – subject to the life estate already provided for.
- Mineral Deed: Conveys all or a portion of the mineral rights. It may be specific identifying only one mineral being conveyed; or general, conveying any and all minerals.
- Partition Deed: Persons possessing real property, either as joint tenants or as tenants in common, divide the property they hold in common among themselves, each taking a distinct part.
- Quitclaim Deed: Operates, in effect, as a release of whatever interest the grantor has in the property. Grantors of quitclaim deeds do not warrant title or possession; they only pass whatever interest they may have, if in fact any exists.
- Registrar Deed: Court decree for property has to have a deed issued by the Registrar to have binding title.
- Sheriff's Deed: Document giving right to another by sale by Sheriff to pay judgment against grantor.
- Special Warranty Deed: The grantor warrants or guarantees title only against defects arising during the period of his or her tenure and ownership of the property and not against defects existing before that time. A special warrant deed is often used by executors or trustees when conveying the property of their principal, as they usually have no authority to warrant against acts of their predecessors in title.
- Survivorship Deed: Deed whereby joint tenancy exists. Title passes to the survivor upon the death of one of the parties.
- Tax Deed: Document giving title to another person when grantor fails to pay property taxes, sold for at least amount of taxes. After three years redemption period, a tax deed is issued. After seven years a quiet title warranty deed is issued.
- Timber Deed: Conveys the right to harvest growing timber within a specified time and area.
- Trust Deed: Transfers legal title of property to a third party trustee as security for repayment of a loan or performance of other conditions.
- Vendor's Lien: Creation of equity, lien belonging to purchaser for unpaid price of land.

- Warranty Deed: The grantor warrants the title against defects arising before and during the time the grantor owned the land. The usual covenants of title contained in a warranty deed are.
- Wills: A vesting instrument that leaves real and personal property to certain individuals as a person desires after death. A will maybe changed and/or revoked until death. Examples: Verbal, Holographic, Joint, and Conditional.

## SECTION D – PLOTTING AND DRAFTING METHODS

### ANGLES

In order to accomplish plotting, a thorough understanding of angles is necessary. The basic idea in angles is that any line always has direction as well as length and the angles are used to show this direction.

Angles generally may be divided into three classes:

1. Bearings
2. Azimuths
3. Field Angles

The first two use a grid or a magnetic meridian, whereas the last relates back to the preceding course of the description or traverse.

#### BEARINGS:

Bearings are the most common method of designating the direction of lines. Bearings are angles measured from either north or south toward either the east or the west. Consequently, a bearing never exceeds 90 degrees and always indicates the quadrant in which it falls. For example, S 40 degrees W means that with the vertex at a point previously described, an angle must be turned from the south toward the west 40 degrees. Therefore, the pairs of letters, N-E, N-W, S-E, and S-W describe the quadrant in which the angle is measured. Furthermore, the angle is always measured from the first direction toward the second.

When a series of bearings is used, it would look like this:

Fig. 1

The description of the above parcel would read:

“Beginning at a point, said point being 700 feet north and 800 feet west of the southeast corner of the southwest quarter (SW ¼) of the northwest quarter (NW ¼), thence from said POB run N 0 degrees E 30’ to a point thence run N 50 degrees E 150’ to a concrete monument. Thence run N 75 degrees W 395’ to the easterly line of the Jones property thence S 40 degrees E 110’ to a fence corner along said easterly line of the Jones property thence run along the southerly line of the Jones property S 80 degrees W 150’ to a stake run thence S 57 degrees E 360.00’ along the north side of the county road to the said point of beginning.”

#### AZIMUTHS:

Azimuths are another method by which the direction of a line may be described. Azimuths are angles also, but, unlike bearings, they are measured from one point only and always in clockwise direction. Thus, these azimuths may be anywhere from 0 degrees to 360 degrees, and the point from which these angles are measured is usually north. However, some military maps use south as the reference point. Also, a “back azimuth” may be turned from the previous station in a clockwise direction – this is actually a field angle and is illustrated in that section.

#### **AZIMUTHS/BACK AZIMUTH**

Fig. 2

### Interior and Exterior

The interior angles are always on the inside of the property being described whereas the exterior angles lie on the outside.

#### FIELD ANGLES:

A field angle is one that refers back to the preceding course rather than to one reference point, such as north or south. In dealing with this kind of angle, it is important to know just which angle is being referred to. Some of the words used to describe the angles are: deflection, interior, exterior, clockwise, counter-clockwise, to the right, and to the left. In the diagrams, which follow, stations and traverse are designated as in the legend:

Station 1                                      Back sight                                      Station 2                                      Vertex

Arrows indicate direction of traverse

An angle to the right of 70 degree

An angle to the left of 70 degree

Fig. 3

A deflection angle to the right of 70 degree

Fig. 4

A deflection angle to the left of 70 degree

Fig. 5

## **CURVES**

In plotting out a description or a traverse, curves are frequently encountered, thus the problem arises - to be able to plot up to the curve, then along the curve to the next course. There are four basic ways to plot around a curve: (a) through the P.I. (point of intersection), (b) along the Ch. (long chord), (c) through the center, (d) along the curve itself. The discussion will follow this same order, as they are listed in their order of importance. Three basic things must be remembered:

1. Tangent distances (T) of a curve are **ALWAYS** equal.
2. Radii **ALWAYS** form a right angle with the tangents - thus, the curve is tangent to the P. C. and P. T. (see angles A, B, C, and D)
3. Radii of the same curve are **ALWAYS** equal.

TO PLOT THROUGH THE POINT OF INTERSECTION (P.I.):

1. Information needed:

- a. Tangent Distance. This may be given in the curve data as "T" or may be found in some cases by subtracting the P. C. station from the P. I. station = 1,200'
- b. Delta Angle

Fig. 6

2. To Plot:

The description will give a distance to the P. C., which is the beginning of the curve. From this point continue on the same course for the tangent distance and thus establish the P. I. At the P. I. turn a deflection angle in the proper direction that is equal to the delta angle; or if the bearing of the next tangent is given, turn this bearing. Thence continue in this direction distance to P. T., thence continue in a straight line to the next course. Use curve to draw in arc tangent at P. C. and P. T.

TO PLOT ALONG THE LONG CHORD (LC):

1. Information needed:

- a. Delta angle (or chord bearing) = 120
- b. Chord distance = 1,200

Fig. 7

2. To Plot:

The description will give a distance to P. C., which is the beginning of the circle. At this point turn a deflection angle in the proper direction, which is equal to  $1/2$  of the delta angle; or if chord bearing is given, turn this bearing. Continue along this for the chord distance to establish the P. T. At the P. T. turn a deflection angle in the same direction of the same size to establish the next course. Use curve to draw an arc tangent at P. C. and P. T.

TO PLOT THROUGH THE CENTER

1. Information needed

- a. Radius distance = 840'
- b. Delta angle or = 120
- c. Chord length = 1,435

Fig. 8

2. To Plot:

The description will bring you up to the P. C., which is the beginning of the circle. At this point turn a right angle in the same direction as the curve and measure the radius along this line to establish the center. Then measure the delta angle to establish the second radius and thus the P.T., at the P. T. turn a right angle to establish the tangent. The arc may then be put in with a compass or curves. In case the chord length is given instead of the delta angle, the arc must be drawn first with a compass and then the chord of the proper length drawn to intersect the arc, thus establishing the P. T. and a right angle turned to establish the tangent. One thing to remember here is that the accuracy of this method varies inversely with the length of the radii.

TO PLOT ALONG THE CURVE:

1. Information needed:

- a. Degree of curvature (D) = 5
- b. Length of arc or = 1,475'
- c. Length of chord = 1,390'

Fig. 9

2. To Plot:

In order to use the method of plotting, it is necessary to understand the workings of highway curves. These curves come in a set and are graduated by degrees at a scale of 1" = 100'. If a

person were working on a drawing scale of 1" = 100' and needed a 2 curve, he could easily find it. However, if the drawing were at a 1" = 200' the curve wanted would be a 4 curve, and at a 1" = 400' it would be an 8 curve, thus to find the proper curve it is necessary to use the following formula:

$$D \text{ (of curve at } 1" = 100') \times \frac{\text{(scale of map)}}{100} =$$

degree of highway curve. Once the P. C. has been established and the proper curve chosen, the arc can be drawn. Then either the arc distance or the chord distance may be sealed in to establish the P. T.

## DESCRIPTIONS

### 1. Subdivision

- a. When a parcel is described as a certain lot of a certain block in a certain subdivision, it is easy enough to trace the description. However, when a split occurs, it becomes more involved, and care and caution must be exercised.

#### Fig. 10

The description for the above could read "the North half of the Lots 1 and 2, all of Lots 11 and 12, less the North 75' of Lot 11." On a tax roll this would probably be abbreviated as "N 1/2 of Lt 1 & 2, all Lt 11 & 12, less N 75' Lt 11."

- b. Another possibility that occurs in subdivisions is where the lots are large or the blocks undivided and descriptions are run by courses with the block or lot.

Fig. 11

The description for figure 11 could read: "Begin at a point 50 feet south of the Northwest corner of Block B, thence run south 100 feet, east 50 feet, south 100 feet, east 165 feet, north 100 feet, west 75 feet, northwest 135 feet, west 50 feet to Point of Beginning." On a tax roll this description would probably be abbreviated as: Beg. 50' S of NW cor. Blk. B, S 100', E 50', S 100', E 165', N 100', W 75', NW 135', W 50' to POB. Even though this sounds like a metes and bounds description, it is a subdivision description as it lies within Block B of said subdivision.

c. A third possible way to treat the block in a way similar to a section thus calling for a quarter of half, etc., of the area (see section following on reading descriptions in sections).

## 2. Metes and Bounds

- a. Descriptions that refer to a section or parts of a section by area.

A                      B                      C                      D                      E

Fig. 12

Each of the above illustrated parcels, A, B, C, D, and E, will be described. In order to trace these descriptions, they should be read backwards, thus the reader starts at the largest division first and works backwards to the smallest division, which is the property described. The written description begins at the piece being described and works through the larger areas to the full section.

**Descriptions:**

Parcel A - Northeast quarter abbreviated as "NE 1/4."

Parcel B - The Southeast quarter of the Northwest Quarter. Abbreviated as "SE 1/4 of NW 1/4."

Parcel C - East half of the East half of the Southwest quarter. Abbreviated as "E 1/2 of E 1/2 of SW 1/4."

Parcel D - The South half of the Southwest quarter of the Southeast quarter. Abbreviated as "S 1/2 of SW 1/4 of SE 1/4."

Parcel E - The Southeast quarter less the South half of the Southwest quarter of the Southeast quarter. Abbreviated as "SE 1/4 less S 1/2 of SW 1/4 of SE 1/4."

b. Descriptions that refer to a traverse or a series of courses. In order to be able to trace these out, the following vital parts of a section must be understood and known.

Fig. 13

Also basic to understanding this type of description is the material covered previously under "Plotting." Three things that are necessary to a description of this type are:

1. Starting point
2. Point of beginning
3. That the description ends where it starts

Sample description:

Commence at the Northwest corner of the Northeast quarter of Section 3, Township 24S, Range 10 W, thence run South 660 feet to a point, thence East 575.5 feet to the point of beginning, thence East 500 feet, thence South 52 degrees 40 minutes East 802 feet to a point, thence South 30 degrees 30 minutes West 610 feet to the beginning of a curve, thence around the arc of said curve to the right having a central angle of 120 degrees and a chord length of 685 feet, thence North 30 degrees 30 minutes West 285 feet, thence North 770 feet to the point of beginning.

The above description might be abbreviated on a tax roll as: "Beg. 660' S & 575.5' E of NW Cor. of NE 1/4, th E 500', SE 802', SW 610', to P. C. around curve to rt, ch dist 685' to P.T., th NW 285', N 770' to POB. S3 T24S R10W".

NW Cor. of NE 1/4

Fig. 14

## GLOSSARY OF PLOTTING TERMINOLOGY

### Angles:

a. Interior Angle 119 degrees

Fig. 15

b. Deflection to the right 39 degrees - 40'

Fig. 16

c. Deflection angle to the left 39 degrees - 40'

Fig. 17

d. Exterior angle

Fig. 18

### Azimuth:

An angle usually measured from the north in a clockwise direction not exceeding 360 degrees.

Bearing:

An angle measured from north or south to east or west, not exceeding 90 degrees.

Block:

A tract or piece of land within a subdivision bounded by streets and/or the subdivision boundary. This is usually broken down into smaller units called lots.

Contour Interval:

The vertical distance between contour lines.

Contour Lines:

Connect together all points of the same elevation. They must always close back on themselves or run off the map. Also they never cross except where there is an overhanging cliff or cave.

Control:

Any point or line which can be used as a base from which other points and lines can be plotted.

Culvert:

A drainage structure, by which storm water is passed under a road, but is not a bridge.

Curves:

Parts of:

Fig. 19

- a. Delta: "  $\Delta$  " The angle made by the two radii from the center of the arc to the point of tangency and point of curvature. The angle made by either tangent and the long chord is equal to -

$$\Delta = 2 \quad 2$$

- b. Long Chord: "L" or "LC" the chord from the point of tangency to the point of curvature.

- c. Point of Compound Curve: "C" A point at which a curve of one radius changes to another of a different radius but in the same direction.
- d. Point of Curvature: "PC" The beginning of the curve..
- e. Point of Intersection: "PI" The point at which the two tangents meet. The deflection angle at this point is equal to delta.
- f. Point of Reverse Curvature: "PRC" A point at which a curve in one direction ends and another curve in the opposite direction begins.
- g. Point of Tangency: "PT" The point at which the curve ends.
- h. Radius: "R" The distance from the tangent to the center of curve or arc. *Note: Radii are always perpendicular to the tangents at the point of curvature and the point of tangency.*
- i. Tangent Distance: "T" The distance from the point of curvature to the point of intersection or from the point of intersection to the point of tangency which distances are always equal for any given curve.

Double Assessment: Any piece of land that is entered twice on the tax roll.

Easement: A property interest that entitles the holder to limited use of another's land. The more common types are easement by necessity (provides access to landlocked property), easement by gross (utility service), and negative easement (prevents owner of land from obstructing another's view).

Encroachment: Is the unauthorized placing of a fixture on another's property. It can be either a trespass (actually on another's land) or a nuisance (violation of air space).

Fractional Section: A section that does not have the full 640 acres due to the original survey that was made.

Highway Survey Stations: Indicated 125 + 70.5. The 125 indicates chaining pins or 100 foot marks so that this would equal 12,570.5 feet from the beginning of the survey.

Line: A series of points that has **BOTH** direction and length.

Lot: The smallest unit of a subdivision

Make-up: The cutting and arrangement of maps that are to be used in the field for the location of parcels and buildings.

Map: A drawing showing an area that includes more than one subdivision or acreage parcel.

Meander Lines: A traverse that generally follows the shore line of a lake or river. Usually this refers to the mean high water mark. This is not used as a boundary line for properties that butt on the water unless

the deeds specifically state that it shall be the boundary line or in the case of a government lot.

Meridian: A center line running north and south from which ranges are measured and numbered or a center line running east and west from which townships are measured and numbered.

Metes and Bounds: A legal description of a tract of land using distance, direction and land references except where reference is made to a plat.

Monument: Anything whether natural or artificial, which is used to designate a point of reference.

Parcel: Any piece of property, undivided and owned by one party, although the party may consist of more than one person. This may consist of a fractional lot or lots in a subdivision, or acreage.

Parceling: The act of plotting ownership boundaries on a map whether in subdivisions or metes and bounds.

Pavement Line: The line showing the edge of the pavement of a road but is not to be confused with a property line or right-of-way line.

Plat: A drawing showing boundaries with its respective rights-of-way, easements, blocks, lots, etc. (Also: see "Subdivisions")

Plot Plan: A drawing showing one parcel and location of the improvements on it.

Point of Beginning: "POB" The point at which the description of a parcel of land actually begins, not to be confused with the point of commencement. A description may read: "Starting (or commencing) at a point on the N side of State Rd. #20 - said point being N 720' and W 1,225' of the SE corner of Sec. 15, T25, R 3W - from said point run 300' due W to **POINT OF BEGINNING** from said point of beginning run thence.

Projections: The term used to refer to the various ways of showing the surface of a sphere on a flat surface. The most common one that we use is simply a grid in which all sides are equal and opposite sides are parallel.

Property Line: The line showing the boundary and enclosing all the property in question.

Public Utilities: A group of service companies, such as railroad, telegraph, electric, and natural piped gas and telephone.

Range: Six lineal miles running east and west from a given meridian, or from another parallel range line.

Right-of-Way (R/W) : Any tract of land that has been procured by a sale, lease or dedication for the passage of persons or vehicles other than the original owners, but may include them.

Riparian Boundaries: Where a non-navigable stream serves as a boundary line, it is common law that ownership extends to the center or thread of the stream. It is impossible in many situations to say whether a stream is to be regarded navigable or non-navigable. In addition, courts often differ somewhat in defining the term "thread of stream." It is sometimes defined as the line midway between shorelines,

but the more common interpretation defines it as the center of the main channel. Perhaps the best interpretation can be made through reference to the individual deed. Many deeds for tracts along shore lines of ponds, lakes, or streams will have the riparian rights of an owner defined. Through reliction (the gradual recession of a shoreline) or alluvium (the gradual deposition of soil so as to increase the area of contiguous land), the riparian owner has often suffered a loss or experienced a gain in acreage owned. Recent plats of subdivided areas with lakes or streams will indicate any riparian boundaries.

Many public land surveys in the United States will have traverses called meander lines, run roughly following the bank of a stream or lake where regular corners fall in the water. Riparian boundaries often stop at this meander line.

Section: One square mile = 640 acres. An arbitrary division of land containing 640 acres more or less. The boundaries run north and south and east and west more or less.

Subdivision: A tract of land that has been divided into blocks and lots with the necessary streets and for which a plat has been drawn to show them. In the case of a recorded subdivision, the plat takes the place of a metes and bounds description for parcels within the subdivision; i. e., Lot 2, Block C, as recorded in Plat Book 3, Page 147, instead of the East 100' of the North 200' of N 1/2 of the SE 1/4 of the SE 1/4 of the NW 1/4, Section 14, Township 2 N, Range 3 E.

To Plot: To lay out to scale a map, plat or plot plan.

Township: Either 36 square miles or when used in conjunction with ranges six lineal miles running north or south from a given meridian, or from another parallel township line.

Traverse: A series of lines, with their descriptions, that have been run in the field by a surveyor. This is sometimes encountered as a metes and bounds description of a piece of property.

## SECTION E – MAINTENANCE/UPDATING PROCEDURES

The mapper is responsible for obtaining copies of all vesting instruments, newly recorded subdivisions or re-subdivision of existing subdivisions, all local surveys, all new right-of-ways, acquisition plans and changes of right-of-ways for all federal, state, county and city roads and all new right-of-ways of major transmission lines, etc. during the updating period. When new photography becomes available, additional or new planimetric features should be added to maps along with checking for accuracy of lines.

The majority of the deeds recorded in the county probate office will be name changes only and may not require services of the county mapper or changes to the ownership map. It does require preparation of the property change form and entries being posted to the map register and changes to the property record cards, and assessments. This administrative work can be handled by the county map clerk, but the mapper will be held responsible for work performed.

### **3. 1. OWNERSHIP MAPS**

a. Documents: All vesting instruments, documents affecting owners or boundaries, new subdivisions, survey maps, etc. will be sorted by map numbers and marked as such. Each transfer will be logged on the Maintenance Mapping Register, RP Form 17, see Appendix D. A property Change Form RP 15 (in

duplicate) will be made and the transfer will be attached to the mapper's copy and will be filed in numerical order by township. One copy of the Property Change Form will go to the appraiser. Then each transfer or new survey map will be compared with the present ownership map to check the accuracy and completeness of the original mapping. The "card change" procedure will follow this phase of the updating procedure.

**NOTE:** On the property change form you should show whether the deed is a Joint Survivorship Deed, Quit Claim Deed, Correction Deed, Sales Contract, Deed In Error, etc. under type of deed heading. Some of the abbreviations can be found on pages 43 through 45.

b. Corrections & Updating: Splits, sell-offs and/or map corrections will be indicated on a paper copy of the ownership map. Red-colored pencil should be used for property line changes and dimensions and new parcels. The red pencil, on the paper print, makes the drafting or inking on the originals much easier and more identifiable. The tax assessor or like county official will record any report or information on Parcel Error Change Form, RP-16, which indicates an error in owner or owners or parcel boundaries for review and required corrections as necessary by county mapper. Maps requiring corrections to the original mapping will be done in the same manner as splits or sell-offs.

c. Numbering: Numbering of parcels will be done in accordance with Section B, Subsection 2.

d. Acreage and Dimensions: All maps will show deed or plat dimensions decimally on all parcels under five acres to the nearest tenth of a foot. All subdivision lots will, regardless of size, show dimensions. Acreage on all parcels under ten acres will be shown to the nearest one-tenth (1/10) acre, and all parcels over ten acres to the nearest acre. The acreage will be calculated on every parcel either by electronic or polar planimeter. On parcels under 5 acres deeded or calculated acreage will be stated only in the description. If a polar plaimeter is utilized for this purpose, the computation must be based on the average of three (3) separate readings.

In those cases where differentials exist in the boundary dimensions as stated in the deed of more than 3% the boundary will show both dimensions, designating deed dimensions with a small "d" and scale dimensions with a small "s" after the number. Where the differentials between deed and scale are less than 3% only deed dimensions will be shown. It will not be necessary in those cases for a small "d" to be shown. Where differentials exist in area as stated in the deed of 3% or more the parcel will show both deed and calculated acreage. Deed acreage designated by a small (d) in parenthesis will be directly under the parcel number and calculated acreage designated by a small (c) in parenthesis will be under deed acreage. Where the differentials are less than 3% only deed acreage will be shown and it will not be necessary that it be designated by a small (d). In cases where no acreage is defined in the vesting instrument or in cases where parcels must be split, calculated acreage only will be used and will be designated by a small (c) in parenthesis. The differentials in both dimensions and acreage will be shown on the property change form RP-15. When maps are put into a digital format, the parenthesis on scaled and deed dimensions will not be required.

e. Aerial Photo: Each split, sell-off, or map correction can be checked against the aerial photo covering the area.

f. Field Edit: In those instances wherein the property cannot be plotted from the vesting instrument, where conflicts and ambiguities exist, where the transfer is vague, not complete enough to be located, identified or mapped and where the grantor's name is not the same as currently mapped, the mapper will make a field edit. The field edit will be made on RP Form 15 (Property Change Form), see Appendix F. No field edit will be made by phone, except for questions concerning owner. It is not intended that the mapper go beyond a field interview(s) in an endeavor to interpret ownership or boundary disputes, nor is it intended that he will either settle or create any. If any exist, he will note it on the Property Change Form as instructed.

g. Drafting: Drafting changes on the original will be done in accordance with Drafting Specifications as shown in Appendix C-1 through C-6. This will insure uniformity of all maps. At the end of each update period, the initials of the mapper and the date through which the maps are updated will be inked on each map changed in the legend column. This date will let all persons using the map know its current status.

h. Right-of-Ways: The addition of new or changed right-of-ways for roads, railroads, utility lines, new streets, etc. will be added to the mylars, and the dimensions of each ROW's shown along with name and highway number will be shown.

i. Subdivision: New subdivisions or re-subdivisions will be mapped with each lot being considered as a separate parcel, even though there may be only one owner for the entire subdivision. As future transfers occur, they will be handled as sell-offs or splits.

j. Landhooks: Lots of any plat (sub-division plat) separated by a public thoroughfare are not considered to be contiguous. Lots so separated will be mapped and appraised separately regardless of common ownership. Landhooks can be used only where a parcel is split by a railroad or highway right-of-way to denote single ownership. The exception to this will be where parcels are split by interstate highways, lakes, rivers, or reservoirs. Landhooks will be acceptable to denote common ownership diagonally across common corners.

**Note:** Mappers are encouraged to add dashed landhooks on contiguous parcels on same map and adjoining sections.

k. Ditto Marks: Ditto marks used, when placing lot dimensions are acceptable but not required in subdivided property in urban areas under the following conditions: If the rear of the parcel is the exact same dimensions as the front, dittos may be used in the rear of the parcel. As to the dimensions for depth where all depths are exact dimensions, no dittos will be required to be shown on interior lot lines. You are referred to Appendix I-3 for sample map.

l. Contiguous Parcels: Contiguously owned parcels in two or more sections shall be mapped as separate parcels. Only contiguously owned parcels in the same section will be mapped as one parcel. However, parcels with a land area of two acres or less in the rural area, not subject to further subdivision, or a lot in a subdivision extending into an adjoining map area, can be included in the map which has the largest land area or facing a street or road, by indicating beyond the neat line of the map, dash lines showing the remaining part of the parcels. Dimensions will be shown. The portion of the parcel extended across the neat line will be shown by dash lines and not by solid lines. The map that carries the remaining portion

of the parcel will be referenced in the margin area. The map that has the land area not assigned the parcel number will have a reference note to which map, block and parcel number the land area is parceled. In summary, any land area will be shown by dash lines to show that it is considered and included in another map and the maps will be cross-referenced and all land area in every map must be accounted for.

m. Encroachments/Conflicts: In plotting property where a field edit and deed has determined an encroachment actually exists, the area of encroachment will be visibly marked by the use of hash lines on the map. The mapper is not responsible for settling differences between property owners.

n. Supplemental and Insert Maps: In the past, it has been acceptable to pull a congested area out of a section and enlarge it. This practice is now discouraged. It is now recommended, if the need occurs to enlarge an area of a section to a different scale, the entire section should be enlarged. Example; If a portion of a section on a 1=400' maps needs to be enlarged to 1=200', then the entire section will be mapped as 1=200'. The same applies for 1=200' to 1=100'.

o. Combining of Property: The combining of parcels should only be done upon the request of the owner, within a section on the same map.

p. Photo Number: When a mapper has made a change on an original map or has created additional map, he will ink the flight line and the exposure number of the enlargement that covers that map in the legend area below the sub-sheet index indicator. Whenever a county has new photography flown the re-flight date of photography should be shown in legend area under original date of photography.

#### **4. 2. PLACEMENT OF DRAFTING INFORMATION**

The mapper will ink all changes of ownership boundaries, ink all newly recorded subdivisions or re-subdivision of existing subdivisions, all changes of right-of-ways of public roads or newly created public roads and new municipal annexations. The mapper will show by the appropriate symbol all new major transmission lines, such as electric and gas lines.

1. Names of or street numbers and roads should be placed in the center of the travel path.
2. Original Sub. lot numbers should be placed in the rear of the lots in a slanted position at a 0° angle.
3. Original Sub. block numbers should be centered in its block located inside a dashed block.
4. Subdivision information showing Sub. name, Plat Book and page number should be shown on map. If computerized this information would always be shown within map boundary.
5. Two recommended ways of delineating Sub.'s on maps is by the use of tick limits or solid line. If list of subdivisions is shown in legend, tick limits should be referenced with corresponding number on legend.
6. Map Block numbers should be placed in the center of the block with double rings included with blocking limits indicated if necessary.

7. Parcel numbers should be placed in the middle of the parcel and underlined. When parcel number will not fit within parcel the use of a leader line or reduction in the size of the parcel number will be permitted.
8. Dimensions should be near the center portion of a property line.
9. Acreage should be placed under the parcel number and if both deed and calculated acreage are utilized, the deeded acreage (d) in parenthesis should be listed first with the calculated acreage (c) in parenthesis being listed below the deeded acreage.
10. All highway symbols should straddle the road right of way at a 0° angle. ROW lines should be hidden within ROW symbols.
11. Names and symbols, government property, churches, schools and cemetery should be placed nearer the middle of the parcels.
12. Insert information should reference information and where to be found in the center of the unmapped area. (This applies only to current manually mapped inserts) Final drafting shall be done in Pelican TN ink or approved equal. Drafting shall be accomplished to provide clear and legible lines, symbols and lettering are required. Lettering will be accomplished by use of mechanical lettering templates (Leroy or approved equal). For correct symbol, pen weights and template see Drafting Specifications in Appendix C-1 through C-6.

Final ownership maps shall be drafted on a matte finish, both sides, .004" polyester stabilized base Coronaflex, or equal. The overall sheet will be 31" X 40" and will contain a neat image area of 31 X 30 inches with a legend section of six inches along the right side of the map. For map size and format see Appendix A. The final maps will depict the following approximate areas:

- 1" = 400' mapping – 4 sections per map
- 1" = 200' mapping – 1 section per map
- 1" = 100' mapping – ¼ section per map
- 1" = 50' mapping – 1/16 section per map

All maps shall contain an index showing where it fits into the adjoining map sheets. A suitable legend list shall also be provided on each map. For sample legend showing minimum requirements and format see Appendix B-1 through B-3. The Alabama State Plain Coordinate System shall be depicted at 5" intervals by showing each intersecting point and values shown on west and south borders.

Unless otherwise instructed, all maps will show grid and true north and be constructed with north at the top of each sheet.

**NOTE:** Disclaimer Note-Located on the mylar as shown on the map format in Appendix A will be the following statement: **MAPS TO BE USED FOR TAX PURPOSES ONLY-NOT TO BE USED FOR CONVEYANCE**

**NOTE:** For examples, symbols, correct line and template sizes see Drafting

### **5. 3. OWNERSHIP INDEX SYSTEM**

To complete the working system or ownership indexing, the mapper will prepare a Property Change Form, RP Form 15, see Appendix F. A Property Change Form will be prepared for each parcel, split, sell-off, or where an error was found on the original mapping. The Property Change Form will contain at least the following information:

1. Owner's name and mailing address
2. Property address
3. Property description
4. Dimensions and acreage
5. Section, township and range
6. Uniform parcel number
7. Acquisition reference (book, page and date)
8. Plat book and page for subdivided property
9. Any notes explaining the plotting of or the ownership if different from the vesting instrument.

A computer printout, alpha and geo should be created annually and magnetic tape should be maintained for each year for historical records.

### **6. 4. PROPERTY CHANGE FORM**

a. Property Descriptions: A property description of the parcel mapped using a verbatim legal description from the vesting instrument in an abbreviated form and eliminating information not essential to the plotting of the parcel will be shown on the Property Change Form. This will be in accordance with the examples shown in Appendix J-2 through J-3. Abbreviations shown on pages 3-43 through 3-45.

Property descriptions utilizing fractional subdivisions of sections of land such as A, B, C, and etc., contained in deeds are not acceptable. Land that can be described in the conventional manner such as,

quarter-quarter section, half section, full section, etc. will be described this way.

The section, township and range will be shown. If the property is located within an urban area the name of the city will also be shown.

The property description for subdivided property will be in the following manner: lot, block, subdivision, city or town. If the subdivided property is located in the rural area, the description should be lot, block, section, township and range. When a verbatim description in the vesting instrument cannot be used and a parcel must be described by metes and bounds, the following procedures will be utilized in writing the metes and bounds property description: the description will have a definite and existing point to start from on the ownership map; such as, 1/4 1/4 section corner, an intersection of two (2) roads, an intersection of a road right-of-way and a section, 1/2 section or 1/4 1/4 section line, etc. Once the point has been determined then the distance and direction to a POB of the parcel will be stated. Such POB of the parcels will be used to describe the actual boundaries of the parcel. From the Point of Beginning the description will then continue around the boundaries of the parcel giving the direction and distances until the description closes back to the point of beginning. The deed dimensions and if required the scale dimensions and deed acreage and/or calculated acreage will be stated in the description. After closing at the Point of Beginning (POB) the description will have a summary stating that the parcel is located in NE 1/4 or 1/4 1/4 section, section 6, township 12 or range 4, etc. If the parcel is located within an incorporated area, the name of the city, town or community should be stated. See Code 40-7-16- How real estate may be described.

b. Ownership: Full names of all parties in tenancy will be shown. Full interest of all owners will be determined by vesting instrument and/or field edit. If tenants own fractional interest, such interest will be indicated by each name on the Property Change Form. This also includes estate property or trust.

c. Property Address: Where the property is located on a street, road or boulevard, the property address will give the house number, name or number of the road, street, or boulevard and city, town or community, if located in the rural area not having an address similar to that in the urban or suburban area above, show the following as an address:

1. Property adjoining federal, state or county highway, the name or number of the highway will be acceptable as an address. If the property is located on a creek, river, railroad or any other identifiable point, the property address will show such identifiable point.
2. Property not located on or adjacent to the above; property not located on road, street, highway, creek, river or other identifiable point, but can be identified by property located north, south, etc., of a highway, river, creek or railroad will show the address that the property lies north or south or so forth of such physical feature. The location point shown in the address must be located within the section in which the parcel is located.
3. Parcels which are split by the above will reflect north and south, etc., of highway # and/or creeks, railroads, rivers and streets.
4. Parcels of land less than 1/4 1/4 section which cannot be given a property address in the above manner will show in the property address section of Property Change Form the 1/4 1/4 section in which the parcel is located.

## 7. 5. STORAGE

a. Storage of Mapping Material: All materials used in the updating and the maintenance of ownership maps; such as, Property Change Forms with deeds, subdivision plats and surveys, ROW plans, etc., will be filed by the mapper in a manner prescribed by the assessing official, available for ready reference.

SECTION F:

**TERMS AND ABBREVIATIONS FOR  
WRITING DESCRIPTIONS IN BRIEF FORM**

<u><b>TERM</b></u>	<u><b>ABBREVIATION</b></u>
Acre	Ac.
Addition	Add.
Angle	Ang.
Assessors	Ass'ors.
Beginning	Beg.
Between	Bet.
Bound	Bd.
Boundary, Boundaries	Bdy., Bdrs.
Block	Blk.
Center	Cen.
Center Line	C.L.
Chain	Ch.
Commerce	Com.
Commencing	Com.
Continue	Cont.
Continuing	Contn.
Continued	Contd.
Corner, Corners	Cor., Cors.
Correction	Corr.
Correction Deed	Corr D
Dedication	Ded.
Deed in Error	D.I.E.
Description	Desc.
Degree	Deg.
Distance	Dis.
District	Dist.
East	E.
Easement	Esmt.
Except	Exc.
Foot or Feet	Ft. or ‘
Fourth	1/4
Fraction	Fr.
Fractional	Frl.
General Land Office Survey	G.L.O.
Government Lot	Gov't Lot

Half	1/2
Highway	Hwy.
Incorporated	Inc.
Inch, Inches	in.
Intersection	Int.
Joint Survivorship Deed	JSD
Left	Lt.
Liber	L.
Link, Links	Lk., Lks.
Meridian	Mer.
Mile	Mi.
Minutes	M.
More or Less	M. or L. or M/L
Miscellaneous	Misc.
North	N.
Northeast	NE.
Northwest	NW.
Northeasterly	NE'y
Northwesterly	NW'y
Number	No. or #
Original	Orig.
Page	P.
Parallel	Par.
Point	Pt.
Point of Beginning	P.O.B.
Quarter	Qtr. or 1/4
Quit Claim Deed	QCD
Radius	Rad.
Railroad	R.R.
Railway	Rwy.
Range, Ranges	R., or Rng.
Reserve	Res.
Right	Rt.

Right-of-way	R/W or R.O.W.
Rods	Rds.
Running	Rng.
Sales Contract	SC
Seconds	S.
Second, Sections	Sec., Secs.
Square	Sq.
South	S.
Southeast	SE.
Southwest	SW.
Southeasterly	SE'ly
Southwesterly	SW'ly
Street	St.
Streets	Sts.
Subdivision	Sub.
Supervisor, Supervisors	Super., Supers.
Thence	Th.
Town	T.
Township, Townships	Twps., Twps.
Unincorporated	Uninc.
Undivided	Und.
Variation	Var.
Village	Vill.
West	W.
Westerly	W'ly

### SECTION 3

THIS SECTION, INVITATION FOR BIDS MUST BE USED WHEN A COUNTY DETERMINES THAT NEW PHOTOGRAPHY NEEDS TO BE OBTAINED. NO CHANGE IN THE SPECIFICATIONS WILL BE ALLOWED UNLESS PRIOR APPROVAL FROM THE AD VALOREM TAX DIVISION, STATE DEPARTMENT OF REVENUE IS OBTAINED PRIOR TO LETTING OF BIDS. THE DEPARTMENT OF REVENUE RESERVES THE RIGHT TO INSPECT ALL MATERIAL OBTAINED PRIOR TO FINAL PAYMENT. ORTHO PHOTOGRAPHY, DIGITAL PHOTOGRAPHY, AND DIGITAL RECTIFIED PHOTOGRAPHY MUST BE APPROVED IN ADVANCE BY THE DEPARTMENT OF REVENUE. GENERIC SPECIFICATIONS MAY BE OBTAINED FROM THE DEPARTMENT OF REVENUE UPON REQUEST.

(Bid No.)

**INVITATION FOR BIDS**

In accordance with General Act No. 217, Special Session 1967, notice is hereby given that the \_\_\_ County Commission, \_\_\_\_\_, Alabama will receive competitive bids on the following:

**AERIAL PHOTOGRAPHY AND PHOTOGRAPHIC REPRODUCTIONS OF  
\_\_\_\_\_ COUNTY\***

\*This is to include all flying, contract prints, screened halftones, paper enlargements, and locator index.

You are invited to submit on the items listed above. Please indicate your price, and other information if requested in the spaces provided. Make a copy for your records.

TOTAL BID PRICE      TOTAL BID PRICE (Written in characters not in numbers)

\$

Completion date for project:

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative: \_\_\_\_\_

Vendor's Name: \_\_\_\_\_

Vendor's Address: \_\_\_\_\_

Telephone No.: \_\_\_\_\_

PREFACE

It is the intent of the \_\_\_\_\_ County Tax Assessor/Revenue Commissioner, \_\_\_\_\_ County, Alabama to obtain aerial photography which will support tax mapping activities of the county. \_\_\_\_\_, County, Alabama is requesting bids from organizations experienced in aerial surveying and photogrammetric reproductions at the scales outlined in the attached specifications.

A separate technical narrative describing procedures and equipment to be employed by the contractor and an estimated duration for completion of the project is also required.

\_\_\_\_\_ County, Alabama must be photographed before April 1, \_\_\_\_\_, weather permitting. If photography has not been obtained by that date, the county shall be flown on the very next suitable date for aerial photography the following year. The amount bid will remain the same for the next suitable date.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

TECHNICAL SPECIFICATIONS FOR  
AERIAL PHOTOGRAPHY & PHOTOGRAPHIC REPRODUCTIONS

CONTENTS

- 1.00 Definitions & statement of work
  - 1.01 Definitions
  - 1.02 State of work
  
- 2.00 Aerial Photography
  - 2.01 Project Area
  - 2.02 Conditions during photography
  - 2.03 Scale of aerial photography negatives
  - 2.04 Flight plan
  - 2.05 Re-Flights
  - 2.06 Spacing of photographs
  - 2.07 Endlap
  - 2.08 Sidelap
  - 2.09 Crab
  - 2.10 Tilt
  - 2.11 Aircraft
  - 2.12 Aerial camera
  - 2.13 Aerial film
  - 2.14 Disposition of aerial film
  - 2.15 Roll film container
  
- 3.00 Photo laboratory procedures
  - 3.01 Image quality
  - 3.02 Film labeling
  - 3.03 Contact prints of aerial photography
  - 3.04 Screened halftone reproductions
  - 3.05 Paper enlargements
  - 3.06 Locator index
  
- 4.00 Contractor requirements
  - 4.01 Certified engineer

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

TECHNICAL SPECIFICATIONS FOR  
AERIAL PHOTOGRAPHY & PHOTOGRAPHIC REPRODUCTIONS

1. STATEMENT OF WORK & DEFINITIONS

1.01 DEFINITIONS:

A. The contracting officer, as referred to herein, shall be the officially designated representative of the \_\_\_\_\_ County Tax Assessor's/Revenue Commissioner's office and responsibilities shall be as prescribed.

B. The contractor, as referred to herein, shall be that firm, company or organization to which the photogrammetric service has been let. References to the contractor in these specifications shall also apply in full to any subcontractor working for the named contractor. All subcontractors shall be approved in advance by the contracting officer.

C. The terms, County of \_\_\_\_\_, local public agency, and owner, are interchangeable.

1.02 WORK STATEMENT

The purpose of the contract to be awarded through this procurement is to produce aerial photography and photographic reproductions. The contractor shall furnish all materials, superintendence, labor, equipment, and transportation. The contractor shall execute and complete all of the work required by the contract in conformance with these specifications. Any contractual modifications to these specifications and/or any deviation from these specifications (unless specifically authorized in writing by the contracting officer or an authorized representative thereof) shall be sufficient cause for rejection of any part or all of the work performed.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized representative

2. AERIAL PHOTOGRAPHY

2.01 PROJECT AREA

The location, size and boundaries of the area to be photographed will be outlined on a county map at an approximate scale of:

1 inch = 1 mile and further subdivided and designated in a way to show the scales of the final aerial photographs to be obtained. The areas to be photographed shall extend only to the boundary lines as indicated. This \_\_\_\_\_ County area map shall be entitled the "County Area Map" and may be viewed at the tax assessor's/revenue commissioner's office of \_\_\_\_\_ County. The flight plan proposed by the contractor shall be drawn on a similar county area map and submitted to the contracting officer for approval.

2.02 CONDITIONS DURING PHOTOGRAPHY

Vertical aerial photography will be accomplished during the period when deciduous trees are barren and when the sun angle is not less than 30 degrees. Photography will not be undertaken when the ground is obscured by snow, haze, fog, or dust; when streams are not within their normal banks; or when the clouds or cloud shadows will appear in any one photograph. The photography shall not contain objectionable shadows caused by relief or low solar altitude.

2.03 SCALE OR AERIAL PHOTOGRAPH NEGATIVES

The altitude above average ground elevation for either aerial photography proposed shall be such that the negatives will be at the scales specified in the following schedule:

MAP SCALE

NEGATIVE SCALE

1" = 400'    1" = 2,000'  
1" = 200'    1" = 1,000'  
1" = 100'    1" = 500'  
1" = 50'    1" = 250'

Negatives deviating from the indicated scales by more than 5% may be rejected.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

2.04 FLIGHT PLAN

The contractor shall prepare a proposed flight plan on a copy of the County Area Map showing the flight lines to be flown. Flight lines will be drawn to coincide with the centerline of each section to match existing map sheets. Each flight line will be flown continuously across the project area. The principal points of the first two and the last two exposures of each flight strip shall fall outside the boundaries of the area to be updated. This flight plan shall be submitted to the contracting officer for approval prior to the flying of any aerial photography.

2.05 RE-FLIGHTS

Unacceptable aerial photography shall be corrected by the contractor at no additional cost to the county, with re-flight coverage overlapping the accepted photography by a sufficient amount to provide for continuous stereoscopic coverage.

2.06 SPACING OF PHOTOGRAPHS

Overlapping photographs in each flight line shall provide full stereoscopic coverage of the area to be updated.

2.07 ENDLAP

Photographs used as stereoscopic pairs shall have endlap of between 55% and 65% in the respective frames. Consecutive photographs in each flight line shall have an endlap of approximately 80% to insure that one photograph will cover each existing map sheet.

2.08 SIDELAP

Sidelap shall average thirty (30) percent.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

#### 2.09 CRAB

Crab in excess of three (3) degrees may be cause for rejection of a flight line or any portion thereof in which the excess crab occurs.

#### 2.10 TILT

Tilt of the camera from verticality at the instant of exposure shall not exceed 3 degrees nor shall it exceed 5 degrees between successive exposure stations. Average tilt over the entire project shall not exceed one (1) degree.

#### 2.11 AIRCRAFT

The aircraft to be used shall be equipped with all essential navigational and photographic instruments and be operated by a well-trained and experienced crew. Performance of the aircraft shall be adequate to complete the proposed project in accordance with the technical specifications. All operations shall be in conformity with the applicable official regulations and ordinances.

#### 2.12 AERIAL CAMERA

The aerial camera shall be a precision aerial mapping camera of equivalent or better quality than a Zeiss RMK-A 15/23, equipped with a low distortion, high resolution lens. The calibrated focal length of the lens shall be 153 millimeters + 3 millimeters (6" focal length). The camera shall expose a 9" X 9" size negative and produce a minimum of eight fiducial marks in each negative. It shall be equipped with adequate means of flattening the film in the focal plan to + .005" at the instant of exposure. No glass will be permitted between the lens and the film. An approximate anti-vignetting filter will be used. Camera characteristics must be such that the aerial photographs taken can be satisfactorily used in the stereo-plotting instruments.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

A USGS camera calibration report, no more than three years old, shall be submitted to the contracting officer for each aerial camera to be used to assure that the camera, lens, focal length, and its device for holding the film flat at the time of exposure are all photographically adequate and within acceptable accuracies. Maximum shutter speed and aperture setting shall be used to minimize image motion.

2.13 AERIAL FILM

The black and white aerial film shall be a fine grain high speed photographic emulsion on a dimensionally stable base. The film must have been stored and handled in accordance with the manufacturer's instructions. Only one type of film shall be used for the entire project. Outdated film shall not be used.

2.14 DISPOSITION OF AERIAL FILM

The aerial film is the property of the \_\_\_\_\_ County Tax Assessor's/Revenue Commissioner's office and shall be delivered to the contracting officer as outlined in the Schedule of Deliverable Items. All aerial film will be stored under the direction and supervision of the \_\_\_\_\_ County Tax Assessor's Office or such other agency designated for this purpose.

2.15 ROLL FILM CONTAINER

The container for each roll of aerial film shall be made of plastic and shall be the property of the \_\_\_\_ County Tax Assessor's/Revenue Commissioner's office. It shall be clearly labelled with the name of the county, name of the contractor, date of photography, flight and exposure numbers (sequential numbers of the first and last exposure), type and serial number of the camera, the type, serial number and calibrated focal length in millimeter of the camera lens, film roll number and the approximate scale for the negative.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

3. PHOTO LABORATORY PROCEDURES

3.01 IMAGE QUALITY

Images on the aerial negatives shall be clear and sharp in detail and free from light streaks, static, marks, scratches, and other blemishes. Special care shall be exercised to insure proper development and thorough fixing and washing of all film, and to avoid rolling film on drums or in any way distorting it during processing or drying. Film shall be exposed and processed with a target density range of 1.0 + 0.2, as measured in the neat image areas of each roll of film. Minimum density, as measured with a densitometer with a scale range of 0 to 3.0 should not be less than 0.3 and the maximum density not greater than 1.5. All fiducial mark images shall be clear and sharp.

3.02 FILM LABELLING

Each exposure shall be clearly labelled by mechanical means in ink (or foil transfer if using a film titler) at the edge of the negative just inside the image area and on the north edge for North-South flights. the labelling shall include the following information as a minimum:

DATE OF	SCALE OF	COUNTY	FLIGHT	EXPOSURE
PHOTOGRAPHY	PHOTOGRAPHY	NAME	STRIP	NUMBER

The "Scale of Photography" shall be given in inches, e.g., 1" = 24,000", etc. "Flight Strip" numbers are not to be repeated anywhere within the photographic coverage of the contract, but will be numbered consecutively, starting with "Strip No. 1" and continued sequentially over all flight lines and scales. "Exposure Numbers" for any flight strip will be numbered consecutively from "Exposure No. 1", and continuing to the end of that flight line.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

3.03 CONTACT PRINTS OF AERIAL PHOTOGRAPHY(OPTIONAL)

One (1) set of contact prints of the original aerial negatives matching the existing tax maps will be prepared on double-weight, semi-matte paper or equivalent weight resin-coated paper. All prints will be clear and free from chemicals, stains, blemished, fog, streaks, or any defects which would render them unusable. One set of contact prints will be delivered to the contracting officer for a quality control inspection as soon as they can be made available and prior to any reproductions.

3.04 SCREENED HALFTONE REPRODUCTIONS

Halftones shall be screened on a matte finish, polyester film, thickness being 4 mills. Sheet size shall be 30" x 30" to match existing tax map sheets. The enlargement factor will be that which matches each map sheet for each scale. Within the lower right hand corner, the corresponding tax map number will be in 1/2" high numbers in order to match the halftone with the map sheet. The county will provide the map sheets for the contractor to use while making the enlargements.

3.05 PAPER ENLARGEMENTS(OPTIONAL)

Paper enlargements shall be of a high quality, black & white, semi-matte finish and on medium weight paper. Sheet size shall be 30" x 30" to match existing tax map sheets. The enlargement factor will be that which matches each tax map sheet for each scale. Within the lower right hand corner, the corresponding tax map number shall be in 1/2" numbers to match the corresponding map sheet. The edges of each paper enlargement shall be bound with tear proof tape.

3.06 LOCATOR INDEX

An inked locator index shall be furnished by the contractor to assist county personnel in identifying the photograph from which the enlargements are made. One (1) index for each scale shall include flight line

and exposure number of each photograph used for easy referral to map sheets.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

4. CONTRACTOR REQUIREMENTS

4.01 CERTIFIED ENGINEER

The contractor must have on staff a certified photogrammetric engineer.

SPECIAL INSTRUCTIONS TO BIDDERS:

1. A Bid Bond in the amount of 5% of bid shall be included with bid.
2. A Performance Bond in the amount of 10% of the total bid price will be required upon awarding of bid.
3. Please note that brand names have been specified. This is in no way an attempt to restrict bidding but is merely an attempt to assure that items purchased will be of equal quality or better.
4. The contractor shall indemnify and save harmless \_\_\_\_\_ County, \_\_\_\_\_ County Commission, the officers and employees from all suits, actions, or claims of any character brought because of any injuries or damages received or sustained by any person, persons, or property on account of the said contractor, or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect or misconduct of said contractor; or because of any claims or amounts arising or recovered under "Workman's Compensation Act" or any other law, ordinance, order or decree.
5. By signing and submitting of this bid, the vendor certifies that he/she is an equal opportunity employer.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative

6. The successful bidder, for the before specified items, will be expected to furnish to the \_\_\_ County Commission, those items awarded at the stated bid price herein for the period beginning and going through \_\_\_\_\_.

7. Bids may be submitted either by mail or in person, however, \_\_\_\_\_ county will not be responsible for the security of mailed bids.

8. Bidders are required to use this "Invitation For Bids". The Unit Cost for each item shall be filled in the appropriate spaces. Where discrepancies occur in the Unit Cost, the written amount will be used.

9. Bidders shall sign all sheets in the "Invitation For Bids" in the required spaces. Failure to do so will be cause for rejection of bid.

10. All work under this contract is subject to inspection and approval by the Alabama Department of Revenue, Ad Valorem Tax Division.

11. No deviation from these specifications will be allowed unless approved by the Alabama Department of Revenue, Ad Valorem Tax Division in writing.

F.O.B. \_\_\_\_\_ DATE OF DELIVERY \_\_\_\_\_ TERMS

You are invited to bid on the above specifications. Any substitutes offered must be submitted in detail. The right to reject any items or materials not of quality or under any provisions of this act is reserved.

Bids will be opened \_\_\_\_\_ at \_\_\_\_\_.

Each individual bid must be submitted in a sealed envelope with the word "BID" and name of item marked on outside of envelope. The

\_\_\_\_\_ County Commission reserves the right to accept and/or reject and and/or all bids.

VENDOR'S RESPONSE:

I hereby agree to furnish the above named items on or by the dates requested and hereby certify that all specifications as set above will be met.

Authorized Representative \_\_\_\_\_ County Commission

THE FOLLOWING SECTION PAGES 58 THROUGH 78 CONTAINS INFORMATION ON MINIMUM CAPABILITIES OF COMPUTER SOFTWARE AND OTHER INFORMATION. SOME INFORMATION IN THIS SECTION MAY BE RELATIVE TO COMPUTER MAPPING SOFTWARE THAT USES LAYER OR LEVELS ONLY.

## Introduction:

The Assessor's/Revenue Commissioner's office has become the focal point of successful Geographic Information System (GIS) projects in local government because this office has the information (database) essential for the retrieval and analysis of geographic information. This office collects and maintains information on all property. The records of the assessment office have always been an important public resource. These records become invaluable when they are part of a (GIS).

It is the Assessor/Revenue Commissioner who leads the effort to establish a GIS-not merely to update ownership maps faster, but to process assessment information geographically in new ways that improve the efficiency and effectiveness of the assessment office. A GIS interfaced with a computer assisted mass appraisal (CAMA) system is a powerful tool. A GIS-CAMA system can manage the rich data of the assessment office to provide cost-saving benefits to many branches of government.

The development of a GIS entails a number of complex decisions. If these are not fully considered, the resulting GIS, no matter what its size, will perform below expectations.

## COMPUTER ASSISTED MAPPING

As a minimum, the computer must have the capability to identify and distinguish the following:

- a. each established parcel(parcel number) and its boundaries
- b. township, range and section boundaries and their numbers
- c. federal, state, county, municipal, private or non public, etc., highways, roads, streets and name or number with travel paths included and the determination of and the showing of ROW's
- d. political boundaries (i.e. beat, commission, fire district, council, etc.)
- e. county boundaries and the naming of adjoining counties
- f. municipal boundaries

- g. government lot numbers
- h. subdivision names, limit ticks, lot and block numbers or other designations
- i. canals, rivers, water features, drainage, etc., by name
- j. railroad by name and showing of ROW's
- k. major utility by type
- l. churches, schools, cemeteries, airports, government lands, etc., are to be identified by name on map
- m. dimensions and/or acreage of each established parcel
- n. any other feature as required by an individual county
- o. land classes as established by the Agricultural Stabilization and Conservation Service
- p. the Alabama State Plane Coordinate system shall be depicted at 5" intervals by showing each intersecting point and values of points being shown on the West and South borders of the map

#### MINIMUM SOFTWARE CAPABILITIES

1. The software will be capable of showing each layer by itself or in any multiple as directed.
2. The software will be capable of digitizing each map or reducing each map or designated area of each map. When an area is enlarged or reduced, the software will adjust the line weight and lettering to the size and weight specified in the mapping specifications.
3. The software will be capable of digitizing each map as it now exist in the county. See accuracy standards on page 66.
4. The software will be capable of compiling the correct legend with all information it requires from entering the map number, public land survey section, township and range.
5. The software will be capable of drafting the features using the pen weight and template size for the various scales as indicated in the Drafting Specifications in Appendix C-1 through C-6.
6. The software will be capable of showing the features required to be shown in the various

colors as indicated in the Layer/Level Assignment Table on pages 69 through 71.

7. The software will be capable of running a plotter of sufficient size to print the ownership maps with required features at a speed determined by the county.
8. The software will be capable of placing the required information for each parcel, i.e., parcel number, dimension, acreage, original lot numbers, etc., as indicated in another section of these instructions.
9. The software will be capable of calculating the area of each parcel in both feet and acreage or metric equivalent (see Appendix O1-03) and placing this information in the appropriate location within the parcel as directed in another section of these instructions.
10. The software will be capable of bringing up on display screen the correct map by entering either the map number or the public land survey section, township, range, or the recorded subdivision, lot and/or block.
11. The software will be capable of bringing up on display screen the correct parcel by entering either the Uniform Parcel Number(UPN), street address, the subdivision lot and/or block, or the recorded deed book and page.
12. The software will be capable of plotting parcels from a meets and bounds description or from a recorded subdivision lot and/or block.
13. The software will be capable of writing a meets and bounds description and interfacing with county mainframe computer so that description only needs entering into system one time for all stations.
14. The software will be capable of reading from magnetic tape or CD ROM and plotting such information as topo, land class, etc.
15. The software should have a rigid standardized address format established that should be used throughout the system.
16. The software will be capable of printing the following from only the Uniform Parcel Number(UPN) being entered: description of property, owners name and address, improvements on property and value of each, assessment and taxes due, in either one or all of the above. This should also include showing of all or part of the above without printing.
17. The software should have the ability to plot legal descriptions of the following types: (a) azimuth, (b) bearing, (c) deflection angle, (d) interior angle, and (e) State Plane Grid Coordinate.
18. The software should have the ability to plot any combination of the above.
19. The software should have the ability to plot curves and to incorporate the plotting of curves in the plotting of legal descriptions.

20. The software should have the ability to plot curves given any of the following combinations: (a) radius and curve, (b) radius and arc, (c) cord bearing, cord distance radius, and (d) tangent bearing in and tangent bearing out of a curve and radius. When necessary, the software should allow the user to specify if the curve is to the right or to the left.
21. The software should allow a variety of units of linear measure for plotting legal descriptions such as: (a) feet, (b) yards, (c) rods, (d) chains, (e) links, and (f) will be capable of conversion to metric system.
22. The software should be designed so that the plotting part should not be a separate program, and should operate by simple user commands and should plot each segment of the description on command.
23. The software should allow the change form to be done and entered in the system from mapping stations. Appraiser should then fill in his part of change form on computer. Deeds need not be attached to change form, but filed in deed book order or have the capability to be on line with the probate records.
24. The software should allow the user to digitize the center line of a right-of-way or travel path, and then define the distance between segments. The graphic elements will then be copied parallel and remain tangent with the center line. No graphic editing should be necessary.
25. The software should run from a customized table menu.
26. The software will be capable of calculating the area in either feet and acreage or metric equivalent of the total parcel when a parcel is parceled on one map, but a small segment goes over the map boundary into another map. On the adjoining map the software will also be capable of excluding that part of the parcel that extends across from the adjoining map. The same will be true when part of the parcel extends across the section line on a 400' scale map.
27. The software will be capable (if maps are scanned) to convert raster images into identifiable vector images.
28. The software should have user definable polygons.

#### GENERAL INFORMATION

1. No county shall contract for the scanning of maps without the submission of sample scanned map and the prior approval of the Department of Revenue.
2. The Department of Revenue reserves the right to require certain numbers of maps to be checked for accuracy. See Digitizing Standards on pages 66-67.
3. After each update period each county on GIS mapping will run two magnetic tapes and have

one stored in a secure and fire-proof area and submit one copy to the Department of Revenue.

4. The Department of Revenue will establish a list of qualified firms or counties that may contract to digitize maps for other counties. Any firm or county wishing to digitize maps should submit at least the following information: Type of equipment, number of parcels by day or week they can digitize, list of past work, and samples of past work performed.

5. Each county will have at least one plotter and one laser printer capable of printing maps in full size, one-half size, or one-quarter size or portions of any map as directed. For maps that are used by appraisers in the field, one printer must be high speed and in the legend area of the map may carry only the map number and date map was printed.

6. All training of county personnel must be done in conjunction with the delivery of newly digitized maps as set out in the delivery schedule of the contract, if the digitizing is not done in house.

#### Placement of Drafted Information

1. Names of or street numbers and roads should be placed in the center of the travel path.

2. Original S/D lot numbers should be placed in the rear of the lots in a slanted position at a 0° angle.

3. Original S/D block numbers should be centered in its block located inside a dashed block.

4. Subdivision information showing S/D name, Plat Book and page number should be shown on map. If computerized this information would always be shown within map boundary.

5. A couple of recommended ways of delineating S/Ds on maps is by the use of tick limits or solid line. If list of subdivisions is shown in legend, tick limits should be referenced with corresponding number on legend.

6. Map Block numbers should be placed in the center of the block with double rings included with blocking limits indicated if necessary.

7. Parcel numbers should be placed in the middle of the parcel and underlined. When parcel number will not fit within parcel the use of a leader line or reduction in the size of parcel number will be permitted.

8. Dimensions should be near the center portion of a property line.

9. Acreage should be placed under the parcel number and if both deed and calculated acreage are utilized, the deed acreage (d) in parenthesis should be listed first with the calculated acreage (c) in parenthesis being listed below the deed acreage.

10. All highway symbols should straddle the road right of way at a 0° angle. ROW lines should be hidden within ROW symbols.

11. Names and symbols of government property, churches, schools and cemetery should be placed nearer the middle of the parcels.

Note: For a more detailed list and examples of correct drafting techniques see Drafting Specifications in Appendix C-1 through C-6.

## DATA STANDARDS

Data coding standards are necessary to promote data sharing. Many automated computer files and databases may allow for different queries, yet are not tied directly to a ownership parcel. With the adoption of data standards, data can be implicitly tied to geographic locations. Some of the elements most commonly standardized are mailing addresses, property addresses, subdivisions descriptions, names, use codes, dates, etc. Below is a section stressing the importance of probably the most important element that should be standardized and that is of addresses.

(1) Address Standards - Because addresses are the most common geographic key, used at the local level, it is particularly important that address standards be adopted and enforced as part of the database design. With address standards, address-based data can be effectively shared with parcel level appraisal information, but only if each parcel has an assigned address. To minimize redundancy and to maximize sharing, all addresses need to be standardized and captured accurately whenever they are entered into a computer system. Street names, whether they appear on a map or computer record, should be spelled only one way, county road numbers and other commonly used names should be managed as well. This allows many users to access and update the information, thus minimizing the number of duplicate address files. Below is a sample of a standardized address format.

### Converting Parcel Map Into Digital Format

Converting parcel maps (mylars) into digital form may occur in several different ways depending on the resources available and the accuracies needed. Accuracy of the maps are based upon the accuracy of the source materials. Below are several methods of conversion.

1. Coordinate Geometry(COGO)-This process of converting parcel maps into digital form is by the use of a mathematical process using existing plat and deed information. This process can be fairly expensive depending on the accuracy of the existing deeds and plats. COGO uses the distances and bearings recorded on the plats and deeds to recreate the tax maps.
2. Digitizing Existing Maps-This process would likely be one of the least expensive methods of converting parcel maps into a digital format. This process involves placing a map on a digitizing board, registering the map to a digital database and then tracing the lines on the map with a puck or cursor. This process captures maps and drawings as vector data. The main problem with digitizing is one of accuracy both in property lines and with edge matching. Depending on the accuracy that a county desires this may be the most feasible way to convert maps into a digital form.
3. Scanning-This process of converting maps into a digital format would also be one of the least expensive methods of conversion. But again the problem of accuracy arises. Scanning as it applies to mapping involves the placement of an original map (mylar) on a drum and then the drum is rotated beneath an optical input device which transverses the map as the drum rotates. This image leads to a raster image of the map. For mapping purposes these raster images must be vectorized and identified in order to have a working mapping system and to be linked to a database. Again, depending on the accuracy needed this may be the method of conversion that a county chooses.
4. Creating a Map Manuscript-This method is a combination of COGO and digitization of the existing maps. Basically, the mapper would redraft the existing ownership map onto an orthophoto

basemap, making obvious corrections as he goes. For problem areas the mapper would refer back to source materials, such as plats and deeds. Once the manuscript is completed, it may then be digitized.

## DIGITIZING

1.SETUP - Each map to be digitized in the county should have been created using the Alabama State Plane Coordinate System. All four corner points of the map will be used to scale or tie the map to the surface of the earth through the use of the coordinate system.

2.DIGITIZING ACCURACY - Digitizing accuracy refers to the results of comparing a check plot of a digitized line to the same line on the source map. This is accomplished by making a check plot of the digitized data at the same scale as the source map. The resulting plot is laid on the original source map, and the two are placed on a light table. If any light can be seen between the digitized line and the source map line, the line must be redigitized. The digitizing must be accomplished so that lines on the check plot are represented within a one-hundredth inch (0.010) line width of the locations on the original source document. The lines on the check plot of the digital data must overlay and not extend beyond the width of the original lines on the source map. Line smoothness and consistency shall be evaluated when reviewing line accuracy. If the county chooses to contract the digitizing then the contractor will conduct quality control measures and prepare reports in order to compare the newly digitized calculated acreage versus the calculated or deed acreage being used for assessment. Should there exist a discrepancy of greater than five percent (05%) in the resultant calculated acreage verses the current calculated or deed acreage, the mapping or digitizing discrepancy in an errata list will be delivered to the county and state. This report should not contain more than one percent (1%) of the total parcels county wide. The county will be responsible for correcting their mapping errors and the contractor will be responsible for correcting the digitizing errors.

Note: The same accuracy standards applies to maps that have been scanned. Mylar maps should be scanned at the minimum of 300 dots per inch. Raster images must be vectorized and lines identified according to layer/level assignments on pages 69 through 71.

3.PROJECT PROCEDURES - If county chooses to contract out the digitizing the contractor shall digitize the information from the source maps and will then complete the necessary edits and produce a check plot on a stable transparent material. The check plot will be prepared at the deliverable scale and shall contain all information that will be required in the final deliverable product. The legend section may be excluded from the check plot; however, each check plot must include the map number and county name. The county will review check plots and associated material for line placement, line quality, labeling accuracy, correct symbols, pen weights, and template sizes. All lines will be examined for accuracy against the source maps as described above in digitizing accuracy. All maps that have line

accuracy problems, etc. will be returned to and corrected by the contractor. All maps that have been returned to the contractor for editing must, after correction, be resubmitted to the county for review. Note: This procedure also applies to scanned maps.

4. DELIVERY SCHEDULE - If a county contracts the digitizing the contractor shall develop a delivery schedule, for all deliverable products of the project, hardware and software (if applicable), check plots, etc. A copy of this delivery schedule will be submitted to the Department of Revenue.

### EDGE MATCHING

No edge match tolerance will be allowed in digital mapping. Before digitizing, the contractor shall examine all source maps for edge match problems. It is anticipated that during the digitizing process, that as the map sheets are being digitally edge matched, and fitted into digital coordinates that minor discrepancy in the digital edge matching may occur. When this occurs, the contractor or county will be required to fit that map sheet into the coordinate system so that the sheet facet will be contiguous throughout the county. The contractor will not be responsible for edge matching between adjoining counties.

Note: The same standards for edge matching applies to scanned maps also.

### CONVERSION OF INSERT MAPS

Insert Maps should be eliminated at the time maps are converted to a digital format.

Contract Requirements  
GIS/Computerized Mapping System

When contracting a computerized mapping system the contract will include but not be limited to the following:

1. Dollar amount broken down into different phases
2. Services to be furnished (Cost of service by item)
3. Equipment to be furnished (Hardware and Software)
4. Cost of equipment by item (Hardware and Software)
5. Responsibility of installing and testing equipment
6. Training time and cost
7. Update of maps to certain period of time
8. Schedule of delivery (Equipment and Maps)
9. Users Manual
10. Monthly progress reports
11. Schedule of payments (Invoices, Retainage)
12. No subcontracting without prior approval
13. Performance Bond-Required or not

14. Termination for Cause
15. Ownership of work
16. Changes in contract without prior approval
17. How many locators-how long to keep
18. Unless specifically agreed to in advance, all hardware provided must be new equipment. Refurbished, reconditioned, or floor models will not be acceptable.
19. Statement of penalty amount per day for late delivery of product or non performance.

Geographic Information  
System  
Map Layers/Levels Assignments

In order to promote uniformity throughout the State of Alabama on geographic information systems (GIS) the following Layer/Level report will be adhered to:

DESCRIPTION	LAYER	LEROY OR LEVEL	WEIGHT	COLOR
State Plane Coor Line (specify scale)		01	00	White
State Plane Tick		01	00	White
State Plane Value Text (specify scale)		01	00	White
Section Lines		02	3	Red
Township & Range Lines	02	4		Red
Section Text (specify scales)	03	1		Red
Township & Range Text (specify scale)	03	1		Red
Quarter Section Line	04	2		White
Edge Match Map Number (specify scale)	05	0		White
Off Map Parcel Line	06	1		Green
Parcel Line		06	1	Green
Parcel ID (specify scale)	07	2		Green
Parcel Acreage (specify scale)	08	0		White
Parcel Dim. (specify scale)	08	00		White
Parcel Hook		08	0	White
Parcel Line (Next Yr)(optional)	09	1		Green
Parcel Centroid (Next Yr)(optional)		10		Green
Parcel Hook (Next Yr)(optional)	10	0		Green
Parcel ID (Next Yr)(specify scale)(optional)	10	2		Green

Parcel Acreage (Next Yr)(specify scale)(optional)	11	0	Green
Parcel Dim. (Next Yr)(specify scale)(optional)	11	00	Green
Map Block Lines (specify scales)	12	2	Red
Map Block Text (specify scale)	12	2	Red
City ROW Line		13	1 Orange
Dirt County ROW Line	13	1	Brown
Interstate ROW Line	13	1	Yellow
Paved County ROW Line	13	1	LtBlue
Railroad Right-of-Way	13	1	White
US/State Row Line	13	1	Purple
City Text in (specify scale)	14	1	Orange
County Highway Symbol (specify scale)	14	1	LtBlue
Dirt County Text in (specify scale)		14	1 Brown
Interstate Shield (specify scale)	14	1	Yellow
Interstate Text in (specify scale)	14	1	Yellow
Paved County Text in (specify scale)		14	1 LtBlue
Railroad Text in (specify scale)	14	1	White
US Highway Shield (specify scale)		14	1 Purple
US/State Highway Symbol (specify scale)	14	1	Purple
US State Text In (specify scale)	14	1	Purple
City Travel Portion	15	00	Orange
Dirt County Travel Portion	15	00	Brown
Interstate Travel Portion	15	00	Yellow
Paved County Travel Portion	15	00	LtBlue
RR Traveled Portion (specify scale)		15	00 White

DESCRIPTION	LAYER	LEROY	OR LEVEL	WEIGHT	COLOR
US/State Travel Portion	15	00			Green
City Text Out (specify scale)(Optional)	16	1			Orange
Dirt County Text Out (specify scale)(Optional)		16	1		Brown
Interstate Text Out (specify scale)(Optional)	16	1			Yellow
Paved County Text Out (specify scale)(Optional)		16	1		LtBlue
Railroad Text Out (specify scale)(Optional)	16	1			White
State Text Out (specify scale)(Optional)	16	1			Purple
Private Road Text In (specify scale)		17	00		Red
Private Road Traveled Portion	18	00			Red
Subdiv Border		19	2		Yellow
Subdiv Lot Line		20	00		Yellow
Subdiv Text (specify scale)	21	1			Yellow
Stream Text (specify scale)	22	00			Blue
Waterway Text (specify scale)	22	0			Blue
Marsh Cell (specify scale)	23	00			Blue
Water Cell (specify scale)	23	00			Blue
Waterline - Not a Boundary Line	23	00			Blue
Cemetery Text and Cell (specify scale)	24	0			Yellow
Church Text and Cell (specify scale)	24	0			Yellow

Governmental Property Text (specify scale)	24	0	Yellow	
IDB Property Text	24	0	Yellow	
School Text and Cell (specify scale)	24	0	Yellow	
Corporate Limits (City)(specify scale)	25	3	Purple	
Corporate Limits Text (specify scale)	26	1	Purple	
Indian Reservation Boundary	27	2	Blue	
Non Tax District Border (specify scale)	27	2	Blue	
Special District Line	27	2	Blue	
Tax District Border (specify scale)	27	2	Blue	
Indian Reservation Text	28	1	Blue	
Non Taxable District Text (specify scale)	28	2	Blue	
Special District Text	28	00	Blue	
Tax District Text (specify scale)	28	1	Blue	
Water-Property Line is Boundary	29	1	Green	
Sym (Gas Planometric)(specify scale)	30	00	Yellow	
Easement Text (Gas)(specify scale)	31	00	Yellow	
Subdiv Block Text (specify scale)	32	0	Yellow	
Subdiv Lot ID (specify scale)	32	00	Yellow	
Sym (Power Planometric)(specify scale)	33	00	Yellow	
Easement Text (Power) (specify scale)	34	00	Yellow	
Hidden Boundary Line	35	1		
Sym (Water Planometric)(specify scale)	36	00	Yellow	
Easement Text (Water)(specify scale)	37	00	Yellow	
Trails, Misc Planometrics & Mountain Ranges		38	00	Red
Driveways	39	00	Orange	
Bldg Setback Line	40	00	Green	
Easement D/U ROE		40	00	Green
Easement D/U Text (specify scale)		40	00	Green
Bldg Setback Text (specify scale)	41	00	Green	
Address Text & Symbol (specify scale)	42	00	Yellow	
Commercial Centroid (Optional)	43	2	Orange	
Miscellaneous Centroid (Optional)	43	2	Orange	
Multiplex Centroid (Optional)	43	2	Red	
Residential Centroid (Optional)	43	2	Orange	
Commercial Building (Optional)	44	00	White	

DESCRIPTION	LAYER	OR LEVEL	WEIGHT	COLOR
Miscellaneous Building (Optional)	44	00	White	
Miscellaneous Improvements (Optional)	44	00	White	
Miscellaneous Text (specify scale)(Optional)		44	00	White
Multiplex Matrix (Optional)	44	00	White	
Multiplex Text (specify scale) (Optional)	44	00	White	
Residential Building (Optional)	44	00	White	
Subdiv Border (Next) Broken (Optional)	45	2	Green	
Subdiv Border (Next) (Optional)	45	2	Green	
Subdiv Block Text (Next) (specify scale)(Optional)		46	0	Green

Subdiv Lot ID (Next) (Specify scale)(Optional)	46	00	Green
Subdiv Lot Line (Next)(Optional)	46	00	Green
Subdiv Text (Next)(specify scale)(Optional)	47	1	Green
Bldg Setback Text (Next)(specify scale)(Optional)	48	00	Green
Bldg Setback Line (Next)(Optional)	49	00	Green
Esmt D/U ROE (Next)(Optional)	49	00	Green
Esmt D/U Text (Next)(specify scale)(Optional)	49	00	Green
Off Map Parcel Line	50	1	Green
Off Map ROW Line	50	1	Orange
Off Map Subdiv Border	50	2	Yellow
Off Map Subdiv Border	50	2	Yellow
Off Map Travel Portion	50	00	Orange
Zoning lines	51	3	Orange
Zoning Text	52	3	Orange
Conflict Text	53	0	White
County Boundary Line (specify scale)	54	3	Yellow
State Boundary Line (specify scale)	54	3	Yellow
Co. and St. Boundary Line Text (specify scale)	55	2	Yellow
Legend Information	56		White
Fire Hydrant (specify scale)	57	0	Yellow
Parcel Centroid	58	3	Green
Section Processing	59		
Errata Text	60		Red
Secondary Parcel No.	61	1	Red
Displaced Parcel No.	62	1	Blue
Merge Monument	63	00	White
Scratch	63	0	White

The levels or layers identified as optional may be used for other data or attributes in lieu of the ones stated. When the optional layers or levels are used for other data or attributes, a level or layer report must be submitted to the Department of Revenue for approval.

## COMPUTER MAPPING GLOSSARY

Base Map Data-Base map data are coordinates referenced to the geographic control for planimetric features that can be seen from an airplane. For example, rivers, lakes, streams, travel paths, and railroad tracks may be included.

Bridge-Device that connects two networks of the same type together.

Byte-Common unit of computer storage, made up of eight binary digits (bits). A byte holds the equivalent of a single character.

Cadastral Data-Cadastral data are the graphic information describing parcels. These data include property corners, boundaries, and parcels of land.

Central Processing Unit(CPU)-Computing part of the computer. Also called the processor. A personal computer CPU is contained on a single microprocessor. A minicomputer CPU is contained on one or several printed circuit boards. A mainframe CPU is contained on many printed circuit boards.

Chip-Integrated circuit. Chips are approximately 1/16th to 1/2 inch square and about 1/30th of an inch thick. They hold from a few dozen to several million electronic components.

Client/Server-In a communications network, the client is the requesting machine and the server is the supplying machine. It implies that software is specialized at each end. For example, in a network-ready database system, the user interface would reside in the workstation, and storage and retrieval functions would reside in the server.

Compact Disc Read Only Memory(CD ROM)-Compact disc format used to hold text, graphics and hi-fi stereo sound. It's like a music CD, but uses a different track format for data. A CD ROM player connects to a controller card, which is plugged into one of the computer's expansion slots.

Computer Assisted Mass Appraisal(CAMA)-A computerized system of appraising property that incorporates statistical analysis to assist the appraiser in estimating value. (See Department of Revenue CAMA Specifications dated October 1, 1993.

Computer-Aided Design and Drafting(CADD)-CAD systems with additional features for drafting, such as dimensioning and text entry.

Computer-Aided Design(CAD)-Using computers to design products. CAD systems are high-speed workstations or personal computers using CAD software and input devices such as graphic tablets and scanners.

Coordinate Geometry(COGO)-Mathematical process that can be used to recreate the tax maps from existing plat and deed information. Basically, COGO uses the distances and bearings recorded on the plat to create the tax map.

Contour Map-A topographic map which portrays relief by means of contour lines.

Data Conversion-This is the process of changing manual maps into computerized maps.

Database Management System (DMS)-Software that controls the organization, storage, retrieval, security and integrity of data in a database. It accepts requests for data from the application program and instructs the operating system to transfer the appropriate data.

Database-Set of interrelated files that is created and managed by a database management system. Any electronically-stored collection of data.

Datum-A datum is any quantity that may serve as a reference basis for calculation of other quantities. There are two widely accepted horizontal datums in the United States. The North American Datum of 1927 (NAD 27), and the North American Datum of 1983 (NAD 83), which is a more recent model of the earth.

Digital-Traditionally, the use of numbers and comes from digit. Today, digital is synonymous with computer.

Digital Orthophotography-This is the process of converting orthophotographs into a computer readable image through the use of a digitizing scanner. Once captured by the computer, planimetric line maps can be viewed at the same time with the orthophotograph image.

Digitizing-The most common form of digitizing is manual, or trace, digitizing. This process involves placing a map on a digitizing board, registering the map to a digital database and then tracing the lines on the map with a puck or cursor. Trace digitizing captures maps and drawings as vector data.

Disk Operating System(DOS)-Single user operating system for the PC, PS/1 and PS/2 series from IBM.

Dots per Inch(DPI)-A measure of printer resolution. A 300 dpi printer means 90,000 dots are printable in one square inch (300x300).

Download-To transmit data from a central computer to a remote computer or from a file server to a workstation. It implies transmitting an entire file.

Entities-Things our computerized data relate to. Ownership parcels, for example, have a graphic representation as a polygon in the computerized mapping system, and have related information in other databases such as tax rolls, appraisal, and ownership databases.

File Server-A high speed computer in a local area network that stores the programs and data files shared by users on the network.

Geographic Information System(GIS)-Digital mapping system used for exploration, demographics, dispatching and tracking.

Global Positioning System(GPS)-Satellite based measurement system that allows technicians to survey virtually any terrain, day or night with accuracy.

Hardware-Term given to the computers and other devices that are used in computer systems.

Inkjet-Printer Printer that sprays one or more colors of ink onto paper and produces high-quality printing like that of a laser printer.

Interface-Connection and interaction between hardware, software and the user. Hardware interfaces are the plugs, sockets and wires that carry electrical signals in a prescribed order. Software interfaces are the languages, codes and messages that programs use to communicate with each other, such as between an application program and the operating system. User interfaces are the keyboards, mice, dialogues, command languages and menus used for communication between the user and the computer.

Laser Printer-Printer that uses the electrophotographic method used in copy machines. A laser paints the dots of light onto a photographic drum or belt. The toner is applied to the drum or belt and then is transferred onto the paper.

Layer/Levels-Can be defined as all data relating to a particular theme. Thus, one layer or level may contain road right of ways and another may contain subdivision lot lines. A layer/level may be thought of as one of several maps that go into a final map product.

Mainframe-Cabinet that holds the central processing unit. Although mainframe still means main housing, it usually refers to a large computer system and all the associated expertise that goes with it.

Megabyte-One million bytes

Megahertz(Mhz)-One million cycles per second. References a computer's clock rate, which is a raw measure of its internal speed.

Modem-A device that adapts a terminal or computer to a telephone line. The modem handles the dialing and answering of the call and controls the transmission speed.

Monuments-Tangible landmarks indicating boundaries.

Orthophotography-Orthophotographs remove distortions resulting from terrain variations(hill and valleys), which produces an image with true and constant scale.

Pixel(Picture Elements)-Each scanned element is represented by a matrix of pixels each having an X and Y value. The density of this matrix is determined by the resolution of the scanner and is expressed in dots per inch(dpi).

Planimetric Maps-Type of base data. They can be created from aerial photography or survey. The result is a line map of physical features with the distortion removed.

Polygon-In computer graphics, a multi-sided object that can be filled with color, area calculated or moved around as a single entity.

Query-To interrogate a database (count, sum, list selected records).

Random Access Memory(RAM)-Computer's primary workspace. Although true of most memory chips, "random" means that the contents of each byte can be directly accessed without regard to the bytes before or after it. RAM chips require power to maintain their content.

Raster Graphics-In computer graphics, a technique for representing a picture image as a matrix of dots. It is the digital counterpart of the analog method used in TV.

Read Only Memory(ROM)-Memory chip that permanently stores instructions and data. Its contents are created at the time of manufacture and cannot be altered.

Rectified Photography-This type of photography is one in which only the distortions caused by the tilt of the airplane have been removed.

Relational Database-Method for organizing files together in a database that prohibits linking files together. In a relational database, relationships between files are created by comparing data, such as account numbers and names. A relational system can take any two or more files and generate a new file from the records that meet the matching criteria.

Scanner-A device that reads text and images. Text scanners recognize printed fonts and convert them into digital code. Graphic scanners convert a printed image into a video image.

Scanning-Scanning as it applies to mapping involves the placement of a map original (mylars) on a drum and then the drum is rotated beneath an optical input device which traverses the map as the drum rotates. The optical eyepiece of the scanner simply recognizes the black and white value of each pixel location on the map. This pixel location is determined across the map and leads to a raster image of the map. For computer mapping purposes the pixels must be converted from the raster image into a vector data structure.

Software-Software describes the programs, or instructions, executed by the hardware.

Spatial Analysis-Process whereby both spatial and nonspatial data are operated on to produce information. When one map layer is overlaid on another, the nonspatial attributes for the resulting smaller areas can be determined.

State Plane Coordinate System-The plane-rectangular coordinate system established by the U.S. Coastal and Geodetic Survey, one for each State in the Union, for use in defining positions of geodetic stations in terms of plane-rectangular (X and Y) coordinates. Each state is covered by one or more zones, over each of which is placed a grid upon a conformal map projection. The relationship between the grid and the map, projection is established by mathematical analysis.

Topographic Map-A map which represents the horizontal and vertical positions of the features represented; distinguished from a planimetric map by the addition of relief in measurable form. A topographic map uses contours or comparable symbols to show mountains, valleys, and plains, and, in the case of hydrographic charts, symbols and numbers to depth in bodies of water.

Translation-Process is which data or graphic images are taken from one software package, formatted into another structure, and input into another software package.

Triangulation-The digital imagery is put through the aerotriangulation process. ImageStation Digital Mensuration is used to point transfer and measure pass, tie, and control points directly on the digital imagery with the assistance of image matching techniques. High accuracy and consistency is provided with no need to physically point mark the diapositive, since the digital pug mark maintained by the system can be used in the subsequent digital mapping steps.

Upload-To transmit data from a personal computer or workstation to a central computer or file server. It implies transmitting a block of data rather than an interactive session.

Vector Graphics-In computer graphics, a technique for representing a picture as points, lines and other geometric entities.

Workstation-(1)High performance, single user microcomputer or minicomputer that has been specialized for graphics, CAD, CAE or scientific applications. (2)In Local Area Network, a personal computer that serves a single user in contrast with a file server that serves all users in the network. (3)Any terminal or personal computer.

**APPENDIXES**

DESCRIPTIONS IN BRIEF FORM FOR PARCELS ON APPENDIX I-1

Parcel No. 2

Beg. NW cor. of the NE 1/4 of Sec. 1, th E 1320', S 660', E 1320', S 760', NW alg. N R/W of Railroad 2950', N 240' to POB. Containing 29 Acres. S1 T16N R15W

Parcel No. 3

Beg. NE cor. of the NW 1/4, th S 240', NW alg. N R/W of R/R 540', E 520' to POB. Containing 1.9 Acres. S1 T16N R15W

Parcel No. 4

Beg. SE cor. of the NE 1/4 of NW 1/4, th N 900', NW 730', SW 291.3', S 950', E 740' to POB. Containing 18.1 Acres. S1 T16N R15W

Parcel No. 5

Beg. SW cor. of the NE 1/4 of NW 1/4, th E 590', N 950', W 563.84', S 950' to POB. Containing 12.9 Acres. S1 T16N R15W

Parcel No. 6

Beg. NW cor. of the NE 1/4 of NW 1/4, th E 413.4', SE 220', SW 291.3', W 563.84' to POB. Containing 5.1 Acres. S1 T16N R15W

Parcel No. 7

Beg. NW cor. of Sec. 1, th E 1350', S 350', W 1350', N 350' to POB. Containing 10.8 Acres. S1 T16N R15W

Parcel No. 8

W 1/2 of W 1/2 of Sec. 1, less the No. 350', and SE 1/4 of NW 1/4. Containing 192 Acres. S1 T16N R15W

Parcel No. 9

E 1/2 of SW 1/4. Containing 80 Acres. S1 T16N R15W

Parcel No. 10

Beg. NW cor. of the SW 1/4 of NE 1/4, th E 1300', S 33', W 300', S 1286.5', W 1000', N 1320' to POB. Containing 29.4 Acres. S1 T16N R15W

Parcel No. 11

Com. SE cor. of SW 1/4 of NE 1/4, th W 150' to POB, th W 150', N 1286.5', E 150', S 1286.5' to POB. Containing 4.4 Acres. S1 T16N R15W

Parcel No. 12

Beg. SE Cor. of SW 1/4 of NE 1/4, th W 150', N 1286.5', E 150', S 1286.5' to POB. Containing 4.4 Acres. S1 T16N R15W

Parcel No. 13

All of E 1/2 of Sec. lying So. of R/R and Hwy. R/W less the SW 1/4 of NE 1/4. Containing 212 Acres. S1 T16N R15W

**MEASUREMENTS  
U. S. EQUIVALENT AND  
METRIC EQUIVALENT**

**LENGTH**

U.S. CUSTOMARY UNIT

U.S. EQUIVALENTS

METRIC EQUIVALENTS

inch	0.083 foot	2,540 centimeters
foot	1/3 yard, 12 inches	0.305 meter
yard	3 feet, 36 inches	0.914 meter
rod	5 1/2 yards, 16 1/2 feet	5.029 meters
mile (statute, land)	1,760 yards, 5,280 feet	1.609 kilometers
mile (nautical, international)	1.151 statute miles	1.852 kilometers

## AREA

U.S. CUSTOMARY UNIT	U.S. EQUIVALENTS	METRIC EQUIVALENTS
square inch	0.007 square foot	6,452 square centimeters
square foot	144 square inches	929,030 square centimeters
square yard	1,296 square inches, 9 square feet	0.836 sq meters
acre	43,560 square feet, 4,840 square yards	4,047 sq meters
square mile	640 acres	2,590 square kilometers

## APPENDIX O-1

MEASUREMENTS  
 U. S. EQUIVALENT AND  
 METRIC EQUIVALENT

LENGTH

Unit	Approximate	
	Number of Meters	U. S. Equivalent
myriameter	10,000	6.214 miles
kilometer	1,000	0.621 mile
hectometer	100	109.361 yards
decameter	10	32.808 feet
meter	1	39.370 inches
decimeter	0.1	3.937 inches
centimeter	0.01	0.394 inch
millimeter	0.001	0.039 inch

AREA

Unit	Approximate	
	Number of Square Meters	U. S. Equivalent
square kilometer	1,000,000	0.386 square mile
hectare	10,000	2.477 acres
are	100	119.599 square yards
deciare	10	11.960 square yards
centare	1	10.764 square feet
square centimeter	0.0001	0.155 square inch

APPENDIX O-2

MEASUREMENTS  
U. S. EQUIVALENT AND  
METRIC EQUIVALENT

WHEN YOU KNOW                      MULTIPLY BY                      TO FIND

Length

millimeters	0.04	inches
centimeters	0.39	inches
meters	3.28	feet
meters	1.09	yards
kilometers	0.62	miles
inches	25.40	millimeters
inches	2.54	centimeters
feet	30.48	centimeters
yards	0.91	meters
miles	1.61	kilometers

Area

square centimeters	0.16	square inches
square meters	1.20	square yards
square kilometers	0.39	square miles
hectares (10,000m <sup>2</sup> )	2.47	acres
square inches	6.45	square centimeters
square feet	0.09	square meters
square yards	0.84	square meters
square miles	2.60	square kilometers
acres	0.40	hectares

APPENDIX O-3

TABLE OF CONTENTS

Digital Orthophoto Specifications:	Page
1.1 General.....	1-1
1.2 Definitions.....	1-1
1.3 Collection.....	1-2
1.4 Processing.....	1-2
1.5 Datums and Coordinates.....	1-3
1.6 Accuracy.....	1-3
1.7 Image Radiometry.....	1-3

1.8 Image Mosaicking.....	1-3
1.9 Archive and Distribution Format.....	1-3
1.10 Quality Control.....	1-4
1.10.1 Radiometric Verification.....	1-4
1.10.2 Accuracy Verification.....	1-4
1.11 Digital Rectified Imagery (Optional).....	1-4

## APPENDIX P-1

### **SPECIFICATIONS FOR DIGITAL ORTHOPHOTOS**

#### 1.1 GENERAL

Orthophotos combine the image characteristics of a photograph with the geometric qualities of a map. They serve a variety of purposes, from interim maps to field references for earth science investigations and analysis. The digital orthophoto is useful as a layer of a geographic information system and as a tool for revision of digital line graphs and topographic maps. A digital orthophoto, as described in these standards, can be produced from any scale of photography.

The digital orthophoto is created by scanning an aerial photograph diapositive transparency with a precision image scanner. The scanned data file is then digitally rectified to an orthographic projection by

processing each image pixel through photogrammetric space resection equations. This process requires, as input, ground control points acquired from ground surveys or developed in aerotriangulation, camera orientation parameters, and a digital elevation model (DEM).

The photography is scanned at an aperture which can be adjusted between 7.5 to 60 micrometers (microns). An aperture of approximately 22 to 30 microns yields a reasonable compromise between file size and adequate image resolution to support the present digital orthophoto program requirements. A 240-by-240-millimeter (9-inch by 9-inch) black and white aerial photograph scanned with an aperture of 22 microns yields approximately 125 megabytes of raw data.

## 1.2 DEFINITIONS

Band - A continuous sequence of homogenous data.

Band Interleaved - The ordered mixing of lines or pixels of one or more bands with corresponding lines or pixels of other bands, for the purpose of forming a single image file.

Band Sequential - A sequence of one image band followed by another image band. A band sequential file may be formed by appending of bands in sequence within a single file.

Bilinear - The mathematical computation for an unknown value based on the linear interpolation along two axes. The axis are defined by use of a coordinate transformation algorithm to locate the quadrilateral of the four nearest profile points surrounding the unknown point.

The interpolation computes the unknown value based on the average, by use of weights and distances, of the four nearest known values.

## APPENDIX P-2

Brightness Value (dn) - A number representing a discrete gray level in an image. The brightness value, also referred to as an image density, is related to the amount of radiant energy in watts per square unit striking the collection media of the sensor.

Contrast Stretch - An image transformation technique that increases the local contrast of imagery. Input digital values are assigned new output brightness values by a transformation function that changes their digital range, mean, and standard deviation values.

Cubic Convolution - A mathematical computation for the interpolation of an unknown value based on a third degree polynomial equation passed through the known values.

Dodging - Manipulation of the intensity of a portion of a photograph by

selectively shading or masking.

Histogram - A graphic representation of frequency distribution. For imaged data, the histograms indicate pixel brightness values, typically along the x-axis, and the corresponding number of pixels occurring at each brightness value, typically along the y-axis.

Nearest Neighbor - The mathematical computation for an unknown value based solely on (set equal to) the value of the nearest known value.

Read Device - Any of a number of computer devices (disks, tapes, memory) which may be read from: usually assigned a node and a logical address within a computer system by which other devices within that system may access (read from) stored data.

### 1.3 COLLECTION:

Digital orthophotos scanned from hardcopy imagery (diapositives) shall employ a scanning resolution between 7.5 and 60 microns. The scanning resolution must be equal to or finer than the resultant pixel resolution of the product. Interpolation of pixel resolution to a coarser resolution is allowed; conversely, interpolation to a finer resolution than the source resolution is not allowed.

### 1.4 PROCESSING:

Digital orthophotos require several types of inputs to produce an orthogonally rectified image from the original perspective image captured by the sensor.

Chief among these are: 1) the unrectified raster image file acquired from the scanning of the hardcopy image or directly from the sensor, 2) a digital elevation model with the same area of coverage as the digital orthophoto, 3) the photoidentifiable image and ground coordinates of ground control positions (a minimum of four) acquired from ground surveys or aerotriangulations, and 4) calibration information about the sensor collector device. These four inputs are used collectively to register the raw image file mathematically to the scanner and/or to the sensor platform, to determine the orientation and location of the sensor platform with respect to the ground, and to remove the relief displacement from the image file.

## APPENDIX P-3

### 1.5 DATUMS AND COORDINATES:

Digital orthophoto quarter-quadrangles shall be cast on Alabama State Plane Coordinates.

### 1.6 ACCURACY:

Digital orthophoto quadrangles and quarter-quadrangles must meet horizontal National Map Accuracy Standards (NMAS). The NMAS specify that 90 percent of the well-defined points tested must fall within 1/50 inch at map scale. All remaining inputs and processes (i.e. aerotriangulation control and methodology, scanner calibration, and sensor calibration) used in digital orthophoto production must be sufficiently accurate to ensure that the final product meets NMAS.

### 1.7 IMAGE RADIOMETRY:

Image brightness values shall be represented by 256 gray levels and represented by a number in a range

of 0-255. A value of 0 shall represent the color black and a value of 255 the color white; all intermediate values are shades of gray varying uniformly from black to white. Areas where the rectification process is incomplete due to incomplete data (i.e., lack of elevation data, gaps), shall be represented with a numeric value of 0.

#### 1.8 IMAGE MOSAICKING:

Image mosaicking will be permitted if the software has the capability of accessing the base that corresponds with the ownership map.

#### 1.9 ARCHIVES AND DISTRIBUTION FORMAT:

Standard distribution and archival media shall depend upon media standardization and acceptance by the user community.

#### 1.10 QUALITY CONTROL:

##### 1.10.1 Radiometric Verification

During photographic reproduction of the image a limited amount of analog dodging is customarily performed to improve the image quality. The image brightness values are collected as represented on the source imagery with minimal image quality manipulation. Image brightness values may deviate from the brightness values of the original imagery due to image value interpolation during the scanning and rectification processes. Radiometric accuracy shall be verified by visual inspection of the digital orthophoto with the original unrectified image to determine if the digital orthophoto has the same or better image quality as the original unrectified input image(s). When unrectified image scan lines are not parallel to the DEM elevation profiles, a systematic occurrence of artifacts (a moire pattern) may be introduced into the processed orthophoto image. The occurrence of artifacts is particularly evident when nearest-neighbor processing is used, producing a geometric pattern of wavy lines in the digital orthophoto. This pattern is related to the manner in which the image lines are alternately reinforced or diminished when the DEM profiles cross or align with the image lines. If the area of interest is more extensive than nearest-neighbor processing can resolve (generally more than 3 pixels wide), the neighboring pixel values can be averaged using either bilinear or cubic convolution image processing (bilinear is

#### APPENDIX P-4

normally the default algorithm used for digital orthophoto production). The advantage of nearest-neighbor processing is that the original scanned brightness values for each pixel are preserved exactly, while with bilinear or cubic convolution processing, each pixel is a weighted average composed of neighboring pixel brightness values. To minimize artifacts when the nearest neighbor algorithm is used, the scan diapositive shall be restated, when mounted on the scanner, parallel to the orthophoto DEM profiles.

##### 1.10.2 Accuracy Verification

Visual verification shall be performed for image completeness, to ensure that no gaps exist in either the image area or the overedge coverage. The accuracy of the file shall be verified by comparing image line and sample geometric coordinates to coordinates derived from higher order accuracies for the same points.

1.11 DIGITAL RECTIFIED IMAGERY (Optional):

The digital image shall be rectified (warped), using a minimum of 9 points, common to the raster image and a source (vector data, other raster image, USGS quadrangle map, etc), where the 9 points have known coordinate values. These 9 points must meet National Map Accuracy Standards.

APPENDIX P-5

**STATE OF ALABAMA**

**DEPARTMENT OF REVENUE**

**MONTGOMERY, ALABAMA 36132**

**AD VALOREM TAX DIVISION**

**SPECIFICATIONS FOR  
PROPERTY OWNERSHIP MAPS  
AERIAL PHOTOGRAPHY  
AND  
COMPUTER ASSISTED MAPPING**

**May 1, 1994**

**ADV-25**