

**ALDOT DESIGN BUREAU**

**Location Section**

MANUAL ON

SURVEY

REQUIREMENTS

**Revision Date: 07/13/2021**

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**(NOTE: THESE SURVEY REQUIREMENTS HAVE BEEN UPDATED AS OF 07-13-2021)**

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**LOCATION SURVEYS**

**I. GENERAL**

Location surveys shall be performed for the purpose of gathering data necessary for use in the location, design and construction of proposed highway projects. The location survey shall measure the position of existing features on the ground and provide the position of basic horizontal and vertical control points to be used during construction of proposed project. All surveying shall be performed in accordance with the Federal Highway Administration “Surveying and Mapping Manual” dated November 1985, except as noted herein. All surveying shall be performed in accordance with current ALDOT Guidelines for operations and other applicable ALDOT policies and guidelines.

All location survey work shall be performed under the direct supervision of a registered land surveyor and sealed by a registered land surveyor in the State of Alabama. Surveyors and Contractors shall verify all data supplied by the State Department of Transportation, hereinafter referred to as the “STATE” or “ALDOT”, and/or any other sources, and shall be fully responsible for the accuracy of work developed from such data.

..The term “The Surveyor” shall mean either the State, Consultant, or Contractor survey personnel.

**II. BASIC CONTROL SURVEY**

1. The SURVEYOR shall mobilize on said project a three, four or five-man survey party as directed by the STATE with all necessary equipment and vehicles in order to complete each phase of work.
2. The Surveyor shall determine and contact all adjacent property owners throughout the length of said project prior to beginning any survey work. Every effort shall be made to contact each property owner in person; however, in some circumstances telephone contact shall be acceptable in the event said property owners do not reside on affected properties. The Surveyor shall use the attached Property Owner Contact form and a completed copy for each property owner shall be provided to the STATE.
3. See Appendix “A” for sample letter to Property Owner.
4. Unless controls are provided by the STATE, a basic horizontal and vertical control survey shall be performed by the Surveyor to locate and identify horizontal and vertical control points which shall be the basis for all subsequent surveys. The basic control survey shall consist of a random traverse with distance and angles measured. The control survey shall coincide with the proposed project construction centerline if available.
5. All basic control surveys shall originate and close on first order, or better, Global Positioning System (GPS) monuments tied to the National Spatial Reference System (NSRS) unless otherwise specified by the STATE. The Surveyor shall establish the necessary monuments using GPS Relative Positioning Techniques as specified in the "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques”, Version 5.0, and dated May, 1988, published by the Federal Geodetic Control Committee or the latest version thereof.
6. All horizontal survey control points shall be established to meet Federal Geodetic Control Subcommittee Standards for Order C 2-I accuracy. If closure requirements are not met, sufficient additional surveying shall be performed by the SURVEYOR to meet specification requirements.
7. Ground horizontal control traverses shall be second order, Class II accuracy or better. Spur and offset points, as well as secondary traverse loops, shall adhere to the same accuracy. Ground control traverses are to be closed, corrected, and balanced on GPS control monuments at no more than two (2) mile intervals or as approved by the STATE. Control points with coordinates and elevations shall be established at no more than 1320 foot intervals along the project. Semi-permanent monuments shall be used (reinforcing bars with metal caps or better) and shall be of suitable and durable character to ensure long-term use. Refer to FGCC "Standards and Specifications for Geodetic Control Networks- 1984" Chapter 2.1 Horizontal Control for closures, and Chapter 3.3 for Traverse procedures.
8. Unless otherwise specified by the STATE, the SURVEYOR shall use NAD83 (2011) datum for horizontal control and NAVD88 (based upon latest Geoid) for vertical control. Since these surveys originate and terminate at points with datum adjusted Alabama State Plane Coordinates, all computed coordinates shall be datum adjusted NAD83(2011) Alabama State Plane Coordinates, U.S. Survey Foot, East or West Zone. No further datum adjustment is required.
9. Bench marks shall be set and check levels run before they are used for development of the DTM. Third order accuracy shall be obtained before adjustments are made. Check level calculations shall be shown in the notes of the field book or files. Leveling shall consist of conventional loops beginning and ending on Second Order, Class II benchmarks or better unless otherwise specified by the STATE. Bench Marks shall be set at least every 1,000 FT along the survey and near all major structure sites and major intersections. All Bench Marks shall be permanent in nature and are to be fully described.
10. Assumed datum or the use of GPS to establish vertical control shall be used ONLY when authorized by the STATE.
11. Horizontal Control Points and Benchmarks shall be included and annotated in the final digital survey files along with separate text file listings for each.
12. The SURVEYOR shall furnish the STATE field notes, sketches, and adequate descriptions of the control traverses or control points in the form of a control report. The control report shall be submitted with the digital files to the STATE for review. Unless otherwise specified by the STATE, no other field work shall commence until the project control has been reviewed and accepted by the STATE. The report shall include but not be limited to control schematics, control descriptions, computer closure printouts and how to reach descriptions. Computer closure printouts shall include raw, unadjusted angular and linear closures. A printout showing closure results of balanced angles and distances shall also be submitted. All reports, sketches and descriptions shall be delivered as hard copy andin Microsoft Word Document files.
13. Any horizontal and vertical provided to the SURVEYOR shall be checked before any other survey data is collected. If discrepancies or any other issues are found on any of the control marks, the SURVEYOR shall immediately notify the STATE for instructions. In the event the SURVEYOR is authorized to establish horizontal and vertical control, all work shall be performed in accordance with the Location Control Requirements. The SURVEYOR shall submit all required control data to the STATE for review and approval. Unless otherwise specified by the STATE, no other field work shall commence until the STATE has approved the control data.

**III. PROJECT ALIGNMENT AND PROFILE**

1. When requested, the SURVEYOR shall establish, by ground survey, the proposed project centerline stationing and stake all curves. Ground profiles for project centerline shall be obtained at intervals not to exceed 100’ and at all significant breaks in the ground-line.
2. Stationing established by the SURVEYOR on highways shall be stationed at 100’ intervals and shall be shown in the direction of increasing log mile. If log miles are not available, stationing shall be shown from South to North on odd numbered routes and from West to East on even numbered routes. Routes tied to the survey on which no mile posts are available shall be stationed from left to right in relation to the main centerline of the survey.
3. Stationing shall always begin with a station large enough to avoid any minus stations if the survey is backed up for additional information. Cross roads shall be stationed left to right looking forward along the alignment, or as specified by the STATE.
4. Iron pins, spikes, nails or other materials that can be located with a metal detector shall be used for all P.I’s, P.C’s, P.T.’s, P.O.T.’s, P.O.C.’s, and any other critical alignment point. All alignment points in cultivated fields shall be buried below the depth of cultivation and all points in yards or pastures shall be driven flush with the ground. All critical alignment points set shall be referenced by the SURVEYOR. All reference points shall be recorded and provided in the final Field Map. Angle ties from curves shall be made tangent to curve and not to sub-tangents.

**IV. FIELD SURVEYS AND DATA COLLECTION**

1. All survey data shall be collected in 3D (X Y Z) format in such a manner that automatically connects all individual lines and automates labeling. To conserve space and time during field operations, certain approved standard abbreviations are acceptable and shall be observed by the survey party unless long hand spelling is preferred. Attached hereto and made a part hereof are the following guides:
2. Location Survey Point Codes contained within the ALDOT.xin provided.
3. Survey Levels, Line types, Text Style, Dimension Styles, and cell libraries are contained in ALCAD and the ALDOT Cad\_Resources provided.
4. Approved Standard Abbreviations
5. Standard & Symbol Chart
6. Standard ALDOT Template Points and Feature Names
7. Information shall be gathered by the SURVEYOR on all paved crossroads and railroads to a minimum distance of 1000’ each way from project centerline unless otherwise instructed by the STATE. Unpaved county roads shall be gathered a minimum distance of 500’ each way from project centerline unless otherwise instructed by the STATE.
8. Sufficient data shall be collected to produce a 3-dimensional Digital Terrain Model (DTM) of the project area. The DTM accuracy shall meet the requirements necessary to support the design of the project. Pavement elevations, bridge elevations, railroad rails, and drainage structures shall be collected to the nearest hundredth of a foot (0.01’). Ground elevations and trivial TOPO features shall be collected to the nearest tenth of a foot (0.1’) unless otherwise specified by the STATE.
9. DTM shots shall be obtained by the SURVEYOR at intervals not to exceed 100’ and at all significant ground line breakpoints with supplemental shots and break lines to define highs, lows, and breaks
10. DTM shots shall be extended a minimum of 50’ beyond proposed right-of-way and/or approximately 100’ beyond proposed construction limits in heavy cut or fill areas and shall be extended to include or cover the entire area of proposed interchanges or intersections.
11. For projects with digital aerial mapping, minimum 2’ contour vertical accuracy, field survey shall be acquired in obscured areas and where the accuracy of the mapping does not meet project specifications. All hard surfaces and drainage features must be field surveyed. Mapping requires test sections, review, and evaluation prior to supplementing field survey.
12. Any and all break lines for the purpose of creating a more accurate DTM shall be collected as 3D in addition to the usual planimetrics that are also break lines.
13. Topographic data (TOPO) shall be obtained by the SURVEYOR by means of measuring X, Y, and Z coordinates of each point necessary to define topography, cover, and culture. The project control shall be used for all data collection along the project. The SURVEYOR shall provide a completed field map and file set for review by the STATE.

**V. CONSTRUCTION SURVEY (TRADITIONAL)**

The SURVEYOR shall thoroughly follow these steps when performing Traditional Construction Surveys:

1. Locate survey control, stake construction alignment(s), and set necessary control points (P.C.’s, P.T.’s, etc.). This assignment shall conform to the specifications in Part 1, Section 2, Article E, Sub-Article 1.5 of the State of Alabama Department of Transportation Construction Manual. The Construction Manual is available on the internet at http://www.dot.state.al.us/conweb/Construction%20Manual.htm. Any resurveying required due to changes in the original plans shall conform to Section I-A of the General Instructions for Compiling Data Required for Highway Surveys.
2. Locate project bench marks, field check, and set necessary temporary bench marks. This assignment shall conform to Part 1, Section 2, Article E, Sub-Article 1.7 of the Alabama Department of Transportation Construction Manual. Any levels required due to changes in the original plans shall conform to Section II-A of the General Instructions for Compiling Data Required for Highway Surveys.
3. Staking out right-of-way lines. This assignment shall conform to Part 1, Section 2, Article E, Sub-Article 1.9 of the Alabama Department of Transportation Construction Manual. Any re-staking required due to changes in the original plans shall conform to Section I-A of the General Instructions for Compiling Data Required for Highway Surveys.
4. Taking cross-sections. This assignment shall conform to Part 1, Section 2, Article E, Sub-Article 1.10 of the Alabama Department of Transportation Construction Manual.
5. Staking out of small drainage structures. The survey party shall be required to furnish sufficient alignment and flowline data (i.e., structure station, length, skew and flowline data) to the STATE for design of small drainage structures.
6. Marking clearing limits. Survey party shall mark clearing limits using plan cross-sections and measuring distance from centerline or right-of-way line.
7. Final excavation cross-sections. This assignment shall conform to Part 1, Section 2, Article E, Sub-Article 1.17 of the Alabama Department of Transportation Construction Manual.
8. Staking out bridges. The survey party shall be required to furnish the STATE a minimum of two horizontal control points and one vertical control point for each bridge site.
9. Reporting and documenting quantities for estimates. The survey party shall be required to measure quantities used by contractor and/or subcontractors, for payment on estimates. Any quantity, to be measured and submitted to the STATE by the survey party, shall be documented in accordance with Part 1, Section 3, Part 1, Section B of the Alabama Department of Transportation Construction Manual. The estimate data, submitted by survey party, shall be complete enough to allow any subsequent complete check of estimated quantities by competent personnel.
10. All data submitted by survey party to the STATE shall conform to format outlined in Section II of the Alabama Department of Transportation Location Survey Guidelines and shall be recorded in standard hardback Engineer’s Field and Level Books.
11. A Survey party or survey party members cannot be employed by the contractor on any project of which he or they is/are also employed by the Alabama Department of Transportation.
12. In such case where measured quantities are not acceptable to contractor and the STATE any re-measuring shall be paid by the STATE if measurements by the survey party prove accurate.
13. All time charges by survey parties shall be on *project0* with no allowance for travel, etc.

**VI. CONSTRUCTION SURVEY (ELECTRONIC)**

With the advent of newer technologies and in order to comply with the FHWA 3-D Modeling Program, ALDOT Construction surveying will begin utilizing electronic data collection techniques to verify and record Construction Surveys. This topic is discussed later in this manual.

**VII. UTILITIES**

1. The SURVEYOR shall thoroughly identify existing utilities throughout the project limits. The utilities are to be field surveyed and included in the electronic field map with the appropriate symbology. All affected utility company names, address, phone number, and contact person(s) shall be included on the field map. Any electronic and/or hard copy information collected from the utility companies shall be included in the deliverables.

**VIII. PROPERTY**

1. The SURVEYOR shall field survey all property adjacent to survey limits. Each individual property shall be located in its entirety to a minimum depth of the second ¼ section line past the proposed Right-of-Way. The closest ¼ section line may only be 50 feet past the proposed Right-of-Way and this would be too close to provide accurate information as to the land use and/or improvements. All effort is to be given to replicate existing property lines as accurately as possible. Items to be shown on field map are but not limited to: lot lines, subdivision lines & names, source deed book and page, existing row markers & lines, easements, township & range lines, section lines, monumentation such as iron pins, and existing ROW lines.
2. Right-of-Way Bureau Plans Manual, Preliminary Guidelines and Procedures (Pages 49-54).
3. Location Survey Property Manual for Right-of-Way
4. ALDOT TEMPLATE AND FEATURE NAMNG SCHEMES.

**IX. HYDRAULICS/DRAINAGE STRUCTURES**

1. STRUCTURES SMALLER THAN 36” DIAMETER (7.1 SQ.FT. OPENING) AND/OR SMALL DEPRESSIONS
   1. Traverse the stream a minimum distance of 250 feet left and right, perpendicular from the designated centerline and exceed construction limits.
2. STRUCTURES 36” AND LARGER DIAMETER AND/OR EXISTING DRAINS
   1. Traverse streams a minimum distance of 500 feet left and right, perpendicular from the designated centerline. Rivers and large creeks, where the drainage structure is a bridge or a multiple barrel culvert (bridge culvert), shall extend to a minimum distance of 1000 feet. The initial half of the total distance shall consist of full TOPO to a shot past the bank with the flow line carried the full distance specified.
3. CHANNELS PARALLELING THE ROADWAY/ALIGNMENT
   1. Traverse streams a minimum distance of 500 feet left and right, perpendicular from centerline. Rivers and large creeks require a minimum distance of 1000 feet from centerline crossing.
4. BRIDGE STRUCTURES
   1. Acquire all data as listed in Item 2 above.
   2. Sufficient DTM shall be gathered to generate a three line profile along proposed roadway (bridge) centerline and natural ground left and right of said centerline.
   3. All existing Bridge data shall be processed as a separate Bridge Terrain and DTM from the rest of the existing surface Terrain and DTM. Abutment data shall be placed in both the existing and bridge terrains and DTMs.
   4. Obtain the BIN from the Bridge Bureau of all existing bridges and bridge culverts within the limits of the survey. The BIN shall be included in the in-place bridge information displayed in the field map.
5. EXISTING DRAINAGE STRUCTURES
   1. Show location, skew, inlet flow line elevation, outlet flow line elevation, length, size, type, and flow direction arrows for all structures exceeding survey limits.
   2. Review proposed design scope to ensure limits are adequate.
   3. Obtain the BIN from the Bridge Bureau of all bridge culverts within the limits of the survey. The BIN shall be included in the in-place bridge culvert information displayed in the field map.
6. RESURFACING PROJECTS
   1. Collect channel DTM to right of way and a minimum 100’ past existing structure.
   2. Review proposed design scope to ensure limits are adequate.

**Note:** The State Hydraulics Engineer should be consulted if you have any questions or need additional clarification.

**X. ELECTRONIC DATA COLLECTION AND DRAFTING**

Field information necessary for development of construction contract plans shall be collected electronically by total station equipment or by combination of total station, GPS equipment, digital aerial mapping, and/or by scanning processes **LiDAR**. It is the intent of these guidelines to provide procedures in which the Alabama Department of Transportation’s electronic field data shall be interpreted and easily utilized by all Region and Area offices, the ALDOT Central Office, Surveyors, and Contractors. It is essential uniform formats be utilized for the purpose of exchange of information which can be done easily with little or no translation. For this reason, the Surveyor shall ensure all work and files submitted are in compliance with the current ALDOT version of MicroStation and InRoads, and the automated Cadd Standards delivered in ALCAD. The automated ALDOT Cadd Standards ensures that by using the delivered workspace, the data can be processed through normal workflows utilizing the current ALDOT XIN and ALCAD delivered with the workspace, shall result in all submittal files shall be in compliance with these ALDOT Cadd Standards. This guideline covers data transfer and storage on and to the STATE’S CADD system. It is the intent of these guidelines that all field survey data is processed to completion prior to transfer to the STATE’S CADD system.

1. All survey data and survey related drawings shall be presented in completion using the current ALDOT version of MicroStation and InRoads, and by the ALDOT CADD Standards provided in ALCAD. All data files including DGNs, DTMs, ALGs, and other files be delivered in the correct formats as using the current ALDOT version of MicroStation and InRoads. No translation of files shall be done by ALDOT. It is the responsibility of the Surveyor to deliver these files in the format mentioned. Consultants may submit DTM and ALG data in LANDXML format, insuring that the LANDXML files are compatible with using the current ALDOT version of MicroStation and InRoads. ALDOT Surveyors are expected to use the current ALDOT version of MicroStation and InRoads when collecting, developing, and delivering survey data. Any and all files not meeting these formatted guidelines shall be rejected by the State.
2. Data must be collected electronically by means of a total station, approved photogramatic means, or approved scanned data techniques. Data collection equipment must use methods and procedures used for collection, in order to produce an ASCII XYZ of the surveyed data. Data collection shall include collection of surveyed data to follow the requirements of automatic line connection and labeling.
3. All instrument raw data files are to include date, starting and finishing time, instrument type, and serial number.
4. All points collected in the field shall be assigned an ALDOT defined point code, as contained in the ALDOT XIN provided, for identification and upload of the surveyed features. Files must operate properly and in a uniform manner. The current ALDOT XIN file is delivered with the Cadd Resources to Surveyors and Contractors, and tied to by ALDOT surveyors.

**XI. UPLOADING AND EDITING OF SURVEY FIELD INFORMATION**

1. Original raw data files are downloaded from the instrument and archived to a safe location. This data shall remain unmodified and be submitted separately when the project survey is complete.
2. Copies of raw data are edited and processed. The final edited files shall be saved to a folder for submittal.
3. All binary format survey data shall be processed and saved to individual ASCII format text files for submittal.

**XII. ALDOT SURVEY SUBMITTAL FOR REVIEW POLICY**

1. The SURVEYOR shall furnish a PRELIMINARY submittal for review. The submittal must be approved for content and format prior to submittal of Final files. All requested information shall be included. If minor items are observed during the review, comments and/or questions shall be returned to the SURVEYOR for correction. If multiple or major procedural problems exist, the submittal shall be rejected, the SURVEYOR shall be notified, and, for Consultants, all payments shall be stopped.

**XIII. FINAL SURVEY SUBMITTAL**

After approval of survey content and format, The SURVEYOR shall furnish a FINAL submittal of all survey information.

1. The following shall be provided:
   1. Any files generated must be submitted using the current ALDOT version of MicroStation and InRoads and the ALDOT Cadd Standards ALDOT CADD system for archival.
   2. Any files related or pertaining to collection and/or reduction of field survey data shall be compressed to ZIP files
   3. Electronic property information, tax maps, deeds, ROW maps, etc.
   4. Files received from other Surveyors or designers pertaining to preliminary construction limits, alignments, etc.
   5. Any photographs and/or GIS data received from a county or municipal government.
   6. Any special files used on projects, but do not fall in above categories.

**XIV. NOTE KEEPINGS**

1. Survey field notes and all calculations performed which are necessary to determine X, Y and Z coordinates of all points shall be reduced. The STATE shall be furnished all original field note books used in surveys or printouts. Electronically recorded notes shall be submitted on CD as an ASCII listing of point numbers, point codes, X Y Z coordinates, and descriptors. Any graphic files submitted shall be in a format compatible with ALDOT CADD Software. All data shall be submitted electronically and or by CD.
2. All Field Books, Level Books and other data used in location surveys shall be labeled, pages numbered, titled, and indexed. Any and all hardcopy items shall be scanned and provided in electronic format.
3. The cover of said book shall be labeled in ink and indicate the following information:
   1. Name of firm or ALDOT Bureau/Division performing survey.
   2. (Project Number) Example: FR-275(6), CPMS # Example: 1000048915
   3. (Project Description) Example: ”On AL Hwy. 75 from U.S. Hwy. 431to Marshall-DeKalb County Line,(County) Example: Marshall”
   4. (General Description of Contents)
   5. (Book Number) Example: Book 1 of 3
   6. Pages shall be numbered consecutively 1 through “?”, page 1 being the first ruled page on the right (left hand pages shall not be numbered).
   7. Page 1 shall contain the information as listed on said cover (See 3 above).
   8. Pages 2, 3, and 4 shall be the index.
   9. Page 5 shall contain General Notes; i.e., any notes pertinent to said project.
   10. Survey notes shall begin on Page 6.
   11. Description of each survey shall be noted at the top of the page, at the beginning of each book and/or survey.
   12. Blank pages shall be noted as Blank in said index.
   13. Firm or Division Office address and telephone number shall be on the first page inside said cover, i.e.:
   14. Property of: Alabama Department of Transportation
   15. Address: Third Division, P.O. Box 2745, Birmingham, AL 35202
   16. Telephone: 205-328-5820
4. The following items shall be placed in upper right-hand corner of the appropriate page for each day’s work:
5. Date, time of day (a.m. or p.m.), starting and finishing time
6. Weather
7. The names and duties of all party members
8. Instrument type and serial number
9. Signature of Party Chief
10. Brief description of work
11. Point number range used for each set-up
12. Any notes about data collection; to include any “office” modifications
13. There shall be no erasures in recorded data. A single line shall be drawn through an incorrect entry in order that it is legible, and correct value placed above it. Void an entire page by drawing diagonal lines to corners of the page. The person making said corrections shall initial all changes.
14. Notes shall be entered with a 3H or harder pencil. Books shall be prepared to withstand damp weather in the field while maintaining its legibility.
15. Notes shall be neat, legible and explicit.

**ALDOT PROJECT CONTROLS PROCEDURES**

**I. GENERAL**

1. Survey control consists of azimuth pairs spaced at approximately every 10,500 foot intervals throughout the project, with inter-visible traverse points at approximately 1,320 foot intervals between the azimuth pairs. The traverse sections use the azimuths between the azimuth pairs as the beginning and ending azimuths for the traverse closure and the GPS positions as the beginning and ending positions for the position closure. The elevations are run with a precise digital level beginning and ending on a 1st or 2nd Order NGS Benchmark, or sometimes as a loop from the beginning, through the project and back through to the beginning 1st or 2nd Order NGS Benchmark.
2. The control points are 5/8” rebar, 18” long with a stamped aluminum cap, and are driven 4” to 6” underground for protection from mowers and other surface operations. This provides additional protection since it can be several years until construction begins. For control points set by State forces, the azimuth pairs are stamped with a county number, a letter designation and the year placed. Consultants setting azimuth pairs shall use their own unique designation of the azimuth pairs, separate from the State nomenclature. The traverse point designations generally begin with the number **500** and the year of each project. GPS point numbers are to have unique identifiers and are not to be repeated on other projects, but traverse points usually have the same numbers on every project unless the projects are connected.
3. Azimuth pairs are observed using a minimum of 4 receivers in the static mode for 1 hour and 15 minutes on each session. The first static GPS session shall commence with a receiver on each of two (2) First Order marks (not both points of a single pair of First Order marks) and a receiver on each of the first pair of azimuth pairs on the project. The second session shall keep the receivers on the first pair of Azimuth pairs on the project and the two (2) receivers that were on the First Order Marks move to the second pair of Azimuth pairs on the project. This shall continue with two (2) receivers set up on points until the GPS observations are completed or ended for the day. After 3 - 4 pairs (six miles +/-) of Azimuth pairs are observed, another tie to First Order Marks is made and a tie is made to other First Order Marks at the end of the project, even if there is only 1 pair of Azimuth pairs on the project. The computations are made with applicable surveying processing software.
4. In rare instances, control points tied to the National CORS Network, can be established with prior permission from the ALDOT Location Section. If this method is allowed, please contact the ALDOT Location Section for the standard procedures. Unless otherwise permitted, all control points shall be established using the superseded NAD 83/11 values from the data sheet. Care should be taken to search the area and verify if there are anyexisting projects which may need to be tied and computed in the datum/epoch of the previous project.
5. Traverse observations are completed using 5 sets of angles and observing only horizontal angles, vertical angles, and slope distances. All traverse observations are made from tripods, both the instrument and the targets, without moving the tripods between observations. When it is necessary to end observations on a traverse station, the last point is re-observed the next day so that the same H.I.s are used on the forward and back vertical angles and distances. Horizontal angles stand alone, but a distance measurement consists of a forward vertical angle, a forward distance, a back vertical angle, and a back distance. The forward and back distances are averaged, paying attention to the difference between them. The forward and back vertical angles are added and half the difference from 180˚ is applied to the forward vertical angle with the proper sign. A horizontal angle closure is computed and the angles are closed before computing the position closure. The final adjustment uses the uncorrected horizontal angles, corrected forward vertical angles, and the average of the forward and back distances.

**II. RESEARCH AND RECONNAISSANCE OF KNOWN HORIZONTAL CONTROL POINTS AND KNOWN BENCH MARKS**

1. Search the NGS Database for First Order or better horizontal marks and Second Order or better vertical marks near the project.
2. Locate the marks and make sure they have not been disturbed
3. Use marks that are within reasonable distance to the survey
4. Use horizontal control points that have a clear horizon.
5. If possible, run level loops between known 1st and 2nd Order benchmarks to ensure that the elevations are in fact correct, and/or incorporate more than one benchmark into the loop through the control points, to ensure that there is a check other than just closing a loop back to one benchmark. If only one or no benchmarks are within reasonable distance of the project, contact the ALDOT Location Section for further guidance.

**III. MARK SETTING FOR CONTROL POINTS**

1. Must be clear line of sight between points.
2. Points need to be set below ground surface to minimize disturbance issues.
3. Points should be set near structures (ex. End of guardrails, near a drop inlet, near the corner of a flume etc.) to give some protection and also to have an easy reference mark to measure from, in order to locate the point at a later date.
4. AZIMUTH PAIRS: The pair points should be set about 1320’ or ¼ mile apart with a clear line of sight and with a clear horizon. Azimuth pairs should be set as close to 2 miles apart through the project, as reasonably possible. This may not always be achievable as there may be adverse factors that don’t allow the static pairs to be set at such intervals.
5. All points shall be an 18” rebar with a stamped cap noting point number and year the point was set.
6. Point numbers should be unique. The ALDOT system uses the county number and a unique letter or set of letters to distinguish points (i.e. for a point set in Mobile County, the county number is 49, thus the numbering system would place the first static point as 49-A, second static point would be 49-B and so on.) Once the letters have reached Z, then the lettering system would use two letters instead of one, (i.e. 49-AA, 49-A, etc.) The main point is, for statewide work, it helps to have a unique numbering system for control points in order to prevent point numbers from becoming redundant. A good rule of thumb is to allow the points to increment up going from the South to the North, and from the West to the East, such that it shall be an easily understandable control network.

NOTE: The numbering system referenced above is unique to statewide GPS surveys and should not be duplicated by consultants.

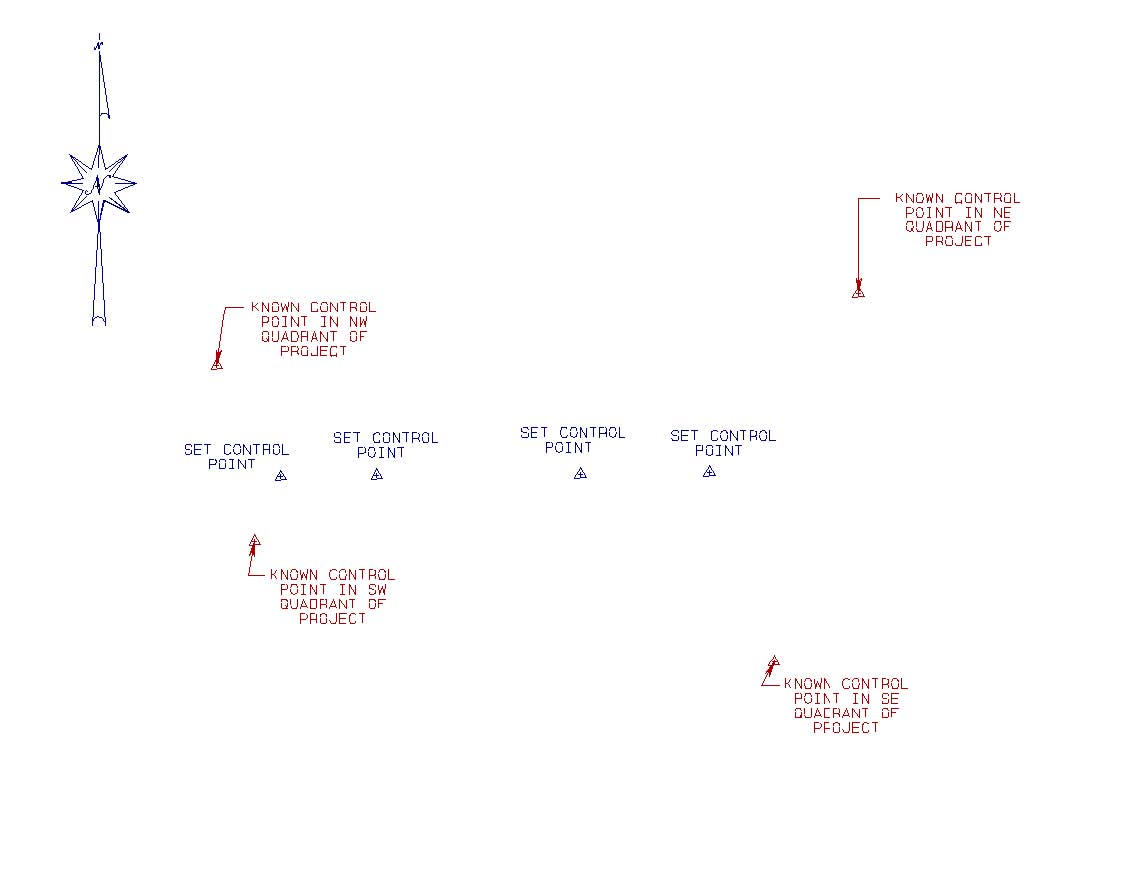
1. The letters “O” and “I” should not be used because often times the letter “O” can be mistaken for the number “0”, and likewise the letter “I” can be mistaken for the number “1”.
2. **Traverse Points**: Traverse points should be set at or near 1320’ or ¼ mile apart between the Static pairs. If line of sight becomes an issue it is always better to have an extra point instead of trying to force the traverse points to meet the desired distance. Like the static points, the traverse points need a clear line of sight between the points. However, they do not need a clear horizon because Static GPS shall not be performed on these points. Traverse points shall be an 18” rebar with a stamped aluminum cap noting the point number and year the point was set. The numbering system for the traverse points can vary from the system on what is used to number the static pairs. Most traverse points numbering starting at 500 and increasing in secession.

NOTE: The above referenced numbering system is not intended to be replicated by consultants, but merely an example to go by.

**IV. STATIC SESSIONS**

1. Static sessions are run on the static pairs with multiple GPS receivers operating simultaneously on different points for a period of 1 hour and 15 minutes per session. To help the integrity of the static network, known controls are located at each quadrant of the limits of the job. I.e. at the northwest quadrant of the job, the nearest usable known first order horizontal control point is used. The same is true for the southwest quadrant of the job, the southeast quadrant of the job, and the northeast quadrant of the job.

**V. EXAMPLE OF THE CONTROL NETWORK**



**VI. PROCESS FOR STATIC SESSIONS**

1. Using the above control network as an example. For the first session, one receiver would be on the known control point in the Northwest quadrant of the project, one receiver would be on the known control point in the Southwest quadrant of the project, and the other two receivers would be on the azimuth pair (SET CONTROL POINTS) at the West end of the project.
2. For the second session the two receivers that are on the West azimuth pair would remain at the same points while the two receivers that are on the known control points would move to the second azimuth pair (SET CONTROL POINTS) at the east end of the job or the next azimuth pair, if multiple azimuth pairs are set and continue in a leap frog method until last azimuth pair is reached. For the last session, the receivers that are on the last azimuth pair shall remain in place, while the receivers that had occupied the next to last azimuth pairwould move; one to the known control point at the Northeast quadrant of the project, and the other would move to the known control point at the Southeast quadrant of the project for the final session.

**NOTE:** Most of the known controls are not going to be right around the job and require some research to determine the best points to use for the particular job being performed. This is a simple example used to show the procedure in an instructional way, and may not reflect the process of how every static network that is done.

**VII. LEVELING**

Project levels are run with a precise digital level beginning and ending on an NGS First or Second Order Benchmark when possible. Leveling shall primarily be run along the alignment corridor with one continuous run for the entire length. All field procedures shall be Third Order in accordance with the current Federal Geodetic Control Subcommittee (FGCS) “Specifications and Procedures to Incorporate Electronic Digital/Bar-Code Leveling Systems”.

1. Reconnaissance for existing benchmarks usually takes place at the same time horizontal marks are being recovered. Prior to going on site, the NGS database should be searched to determine which marks are in close proximity to the project. Print outs of the datasheets are recommended to provide a convenient way of having description information with you while searching for marks, especially in remote areas. If you find a mark listed as not found in the latest recovery note, take the description for a search anyway. The USGS is infamous for not performing an adequate search so you should disregard any recovery notes from that agency. There may be other groups or individuals that have submitted recovery notes that do not have experience with reconnaissance. A good example would be the recent popularity of geo-caching. The average person may not perform a diligent search yet submit a recovery note anyway. Because of this, NGS shall not remove a mark from the database unless the disk is recovered and submitted to them as proof that it was damaged or disturbed.
2. When recovering marks in the field, any GPS device should get you in the vicinity. Each benchmark has a rough latitude and longitude provided on the datasheet. The stated accuracy of 6 seconds +/- gives a search radius of 600 feet so more attention should be given to the written description. Notes about the mileages, references, and heights above the road can usually put you close to the mark’s position, if there are any references remaining. If the mark was noted as flush with the ground, taping from two or more references and intersecting the tapes, should locate the point. A probe should be used since there are no ferrous metals in benchmarks unless it is a newer stainless steel rod.
3. If you find a mark, check the description and update it if needed. When you get back to the office, be sure to go on the NGS web site to submit a mark recovery and updated description. A benchmark that is not properly described and cannot be found is of little value to anyone. If you were not able to do a thorough search and could not find the mark, DO NOT submit a recovery note indicating “Mark Not Found”. This may discourage others from looking.
4. The objective is to recover a pair of marks at each end of the project. Since benchmarks are scarce in some parts of the state, this may not be possible on every project. The only way to verify a height on a benchmark is to compare the leveled heights vs. the published heights to see if it falls within the order class requirements of the project. If the height differences do not agree, a third mark should be tied to determine which elevation to hold. When recovering marks, more confidence can be placed in those with an A or B stability rating such as a mark in a bridge end, rock outcrop, or a deep rod mark. Marks set in culverts shall have a stability rating of D (poor) because culverts tend to settle in the soft wet soil of the drain. A standard concrete post shall have a stability rating of C. Marks with a C or D rating set in areas with expansive soils (black belt region) tend to move over time.
5. Leveling to current FGCS Third Order specifications shall be adhered to when possible. Exceptions to this may be made under unique circumstances with prior approval from the ALDOT Location Section. All leveling shall be performed with a digital level capable of recording rod readings, point designations, front and back shot distances at a minimum.
6. **Planning:** In an ideal situation, there should be published benchmarks at or near each end of the project. There may be projects where this is not be possible. When planning the level line, the following guidelines should be adhered to:
7. The main level line should be run directly between the known 1st or 2nd Order benchmarks to ensure there is an adequate two mark tie for the project. Ties to a single benchmark are discouraged, but unfortunately there are times when that is all that is available. In those situations, the leveling should be compared to GPS heights as a rough check of the height of the benchmark.
8. If the main level line runs through the project, all control shall be included in the run to ensure the new control points are balanced with the main line.
9. If the known benchmarks are not on the project, a two mark tie shall be made (if reasonable) and a main line shall be run into the project.
10. All leveling shall be double run. The forward run shall go through each control point along the project. The return run shall re-trace those ties.
11. Any spur lines shall begin and end on the same control point or benchmark from the main level line.
12. When leveling work along a line has been interrupted for more than two days, or if the stability of the beginning monument is questionable, a two mark tie shall be required when work resumes, ensuring the monument has not moved. If the leveled heights do not agree with the previous height differences, the leveling shall continue to “back-up” in the line until two stable monuments are found.
13. Level lines should be planned so that the main leveling route is a logical route between the two published benchmarks, including ties with all other known benchmarks and control points along the route. This initial main line shall be used to evaluate the leveled height differences and published height differences between the published benchmarks. If the difference falls within the order and class of leveling, then the line is balanced between these marks. The balanced elevations on the new marks are then used for any subsequent spur lines. If the leveled height differences do not match the published height differences, additional leveling shall be required to ensure there is an adequate two mark tie. In these types of situations where the project is enclosed by good benchmarks, single run leveling through the project shall be accepted.

**VIII. GENERAL LEVELING NOTES**

1. In addition to the current FGCS specifications, the following are other requirements about the digital leveling process:
2. The level should be handled delicately and calibrated when necessary. Collimation checks should be taken at the beginning of the work week and at the beginning of each new job at a minimum.
3. When starting work for the day, open the instrument case and allow the level to acclimate to the temperature and humidity before commencing work.
4. Rods should be handled carefully to avoid damage to the bottom of the rod. The rodman should develop the habit of resting the rod on top of their foot instead of on the ground.
5. Avoid touching the face or scale of the rod since the acid in skin oil can wear at the surface over time.
6. Fixed leg tripods are preferred since this eliminates the possibility of the instrument shifting during a setup.
7. Avoid setting “turtles” or turn points on asphalt unless there is no other choice.
8. Roads should be crossed at 90 degree angles to keep the sight over the pavement to a minimum. Avoid long sights across asphalt.
9. Due to the scarcity of benchmarks, there may be projects that do not have benchmarks along or at both ends of a project.
10. Published values are held unless the leveled height differences do not agree within the limits of the order and class of leveling.
11. Close attention should be paid to balancing the length of front sights and the back sights so that there is little accumulation of excess of either. The level line closure and the final adjustment are done with the appropriate leveling software.
12. This method shall not usually produce all the points needed on a route survey, but additional remote points should not be more than 1 or 2 set ups from the control line and should maintain desired project accuracy. The exceptions shall be side road and stream traverses and they, too, should be within desired project accuracies. This method should produce a very accurate project survey and most of the control points shall be available to the construction survey crews after the project is let to construction.
13. All leveling is performed in accordance with all applicable provisions of Third Order procedures as specified by current NGS standards. The following specifications from those procedures shall be adhered to. Close attention to fore and back sight distance imbalances, total section imbalances, minimum and maximum rod height readings, and closure requirements shall greatly reduce errors in the leveling. All lines shall be double run and separated into sections consisting of a double run between two control points along the project corridor. Height differences between the fore and back runs shall be averaged and used for preliminary heights through the line. Once the line has been closed on each end of the project and it meets the accuracy requirements, the line shall be balanced spreading the missed closure difference along the line proportionately. Spurs from the main line shall be observed in the same manner using the new balanced height on the spur point to calculate elevations.
14. Benchmark monuments shall typically be the same capped irons set for horizontal control along the project. In areas of highly expansive or loose soils, a search for existing stable monuments is required. Examples of this are bridge ends and substantial concrete structures. Culvert headwalls can be used if it is an older structure and it appears any settling has stopped.

IX. **FINAL FILES**

1. All pertinent files, notes, sketches shall be delivered for archive. This includes raw files, interim working files, and final control files.
2. The following is required on all control projects.
3. **GPS** 
   1. All raw static files
   2. Processing summaries
   3. Final coordinates
   4. Datasheets of published control used
4. **Traverse** 
   1. All raw instrument files
   2. Processing summaries
   3. Final coordinates
   4. Closure sketch showing all final mean horizontal angles and final horizontal distances, angle error and error of closure prior to final adjustment and after angle error is distributed. Sketches do not need to be to scale, but should show a general layout of the traverse line with all point numbers.
   5. **Leveling**
   6. All raw instrument files
   7. Processing summaries
5. **Working Files**
   1. Point Description and how to reach document (Word Format)
   2. Final coordinate listing (Word and ASCII) to include any additional benchmarks set that may have a “hand-held GPS” position.
   3. Letter of Transmittal
   4. A WORD or EXCEL file with the control point names, Northing, Easting, Elevation, Point Type (BM, NGS VERT, etc.), and Survey Code Style Name.

**Final Survey Terrain and DTM Creation Requirements**

1. Once all raw data and other pertinent information of the survey has been processed, final preparation of the Terrain(s) features must be completed prior to creation of the InRoads DTM(s) and associated files. The following is an outline of these procedures that can help serve as a check list for completion of the Terrain file and creation of the DTM.
   * + 1. Ensure all terrain features that are to continuous have been connected for the entire length that they appear in the project.
       2. Change the name of major continuous features within the terrain. These features include centerlines, edges of pavement, paved shoulders, graded shoulders, ditches and flumes, etc. The feature name should represent clearly what the feature is and to distinguish it from other similar features.
2. Access the feature name through the feature properties option when selecting the feature.
3. In the “NAME: input, change the name, which is probably named from the numeric or alpha code used, to the desired feature name. For example, if a feature name is “200\_12”, it can be changed to read “excl SR-25”, or some other appropriate name.
4. Repeat this for all major breakline features.
5. Ensure that bridges are created from survey data as their own terrain. EACH bridge must be created as a separate terrain and eventually as a separate DTM. In the final project terrain model file (ex: 32476\_TER.dgn), all bridge terrains should be attached so they can be included within the final TER DGN.
6. Ensure that the terrain features intended to be included in triangulation do triangulate properly. Conversely, ensure the terrain features intended NOT to be included in triangulation do not triangulate as intended.
7. Ensure that the maximum triangle length is defined in the terrain properties. Excess triangles should be deleted once all final terrain processing is completed. The final exterior terrain boundary will represent this editing of excess triangles.
8. Once all final terrain checking and processing have been completed, create the InRoads DTM by selecting from the terrain tools, “Export to InRoads DTM”. All terrain model files for individual terrains should be included in the final submittal of the survey. DO NOT INCLUDE any model files used to test raw files or any temporary files that were eventually merged to generate the final terrain model. Those types of working files should be archived in the appropriate “SURVEY” folder. They may be useful if additional survey is added or a connecting project is created at a later date.
9. Ensure in the letter of transmittal all terrain models and InRoads DTMs are clearly listed to notify the receiving party of their existence.
10. Follow the procedure for final survey model check submittal and final Location Submittal of Survey Requirements.

**Location Submittal of Survey Requirements**

**NOTE: ALL information requested and/or acquired by ALDOT shall be submitted and archived. The following folder structure and files are required for full survey. Smaller projects require submittal of raw data and information to be forwarded per request.**

**I. SUBMITTAL STRUCTURE**

**The deliverables shall be labeled with the following information:**

1. ALDOT – Location Section
2. Project No. CADD No.
3. County Party Chief
4. Brief Description Date
5. **Note the type of submittal (preliminary, final, additional, supplemental, or revised)**
6. All pertinent design files, control point files, and the submittal letter should be under a folder named “**SURVEY**”; a sub-folder of the Location CADD number. All additional information relative to the project shall be in sub-folders of “SURVEY”.

Ex: /8802/SURVEY

**NOTE:** Submittal letters and LANDXML’s, AutoCAD, MicroStation, and MicroStation survey files shall be named with date to reduce conflict between submittals. Dates shall change only if the file changes.

1. Ensure to use date format (MMDDYY) to reduce later confusion.
2. The following are submittal type abbreviations:
   1. PREL -------------- Preliminary
   2. FINAL------------- Final
   3. REV---------------- Revised Final
   4. ADD----------------Information added to original survey
   5. SUPP--------------- Supplemental information acquired & submitted separately
   6. Examples: CADD#\_submittal type\_date.doc
   7. 8802\_PREL\_101207.doc
   8. 8802\_FINAL\_101207.doc
   9. 8802\_REV\_101207.doc
   10. 8802\_ADD\_101207.doc
   11. 8802\_SUPP\_101207.doc

**II. FILE NAMES FOR “SURVEY” DIRECTORY:**

**NOTE: Do not create any zip files for this folder.**

1. 8802CONTROL.ASC - ASCII file of horizontal control points
2. 8802BM.ASC - ASCII file of vertical controls
3. 8802\_DESC.DOC - Word document of control point descriptions
4. 8802\_POINTS.DOC - Word document of control point coordinates
5. 8802BM\_DESC.DOC - Word document of benchmark descriptions
6. 8802\_CLOSURE.PDF - PDF file of closure with precision noted
7. 8802LEVELS.DOC - Word document of check levels
8. 8802REFPTS.DOC - Word document of reference point sketches
9. 8802REV\_101207.DOC - Revised Final submittal letter ***(see note)***

**Note**: All previous submittal letters should be included if the project is a final submittal.

**All MicroStation or InRoads Project files should be in a sub-directory called DGN.**

1. Ex: /8802/SURVEY/DGN

**III. FILE NAMES FOR “DGN” DIRECTORY:**

**NOTE: Do not create any zip files for this folder**

1. 8802\_101207.PRO MicroStation Field-Property-Utility Map
2. 8802DTM\_101207.PRO MicroStation file of InRoads DTM features with contours.
3. 8802XSECS\_101207.PRO MicroStation file of cross-sections along project centerline and major Terrain/DTM features
4. 8802DTM\_101207.TER MicroStation file of Existing Terrains (Includes Existing Bridge Terrains)
5. 8802\_101207.KLZ – Google Earth image project file with all existing terrains displayed.
6. 8802\_101207.DTM. – InRoads dtm surface file created from the existing terrain.
7. 8802\_101207\_BRIDGE.DTM. – InRoads dtm surface file created from the existing bridge terrain(s)
8. 8802\_101207.ALG. – InRoads alg file created from any preliminary alignments. Also contains all Project Control points stored as InRoads COGO points.
9. 8802\_101207\_IPD.DGN. – MicroStation file created from the existing terrain drainage features.
10. 8802\_101207\_IPU.DGN. – MicroStation file created from the existing terrain utility features.
11. 8802\_101207\_PRP.DGN. – MicroStation file created from the existing property, ROW, and section lines.
12. 8802\_101207\_2DFLD.DGN. – MicroStation 2D file created from the composite of all existing terrain features, property, ROW, utilities, drainage, section lines, etc.
13. 8802\_101207\_2DALG.DGN – MicroStation 2D file created from any preliminary alignments.
14. 8802\_101207\_CTRL.DGN – MicroStation file created from All Project Control points, Benchmarks, and other pertinent survey points. Also contains each point’s information and points list charts.
15. Any files related or pertaining to collection and/or reduction of field survey data should be compressed to ZIP files and placed into sub-directory “**FIELD”.** WinZip files should be named where the contents are easily recognized. Additionally, acquired data may be submitted in a new additional ZIP file containing the date.
16. Ex: /8802/SURVEY/FIELD\_022316

a. 8802asc.zip

b. 8802raw.zip

c. 8802raw\_101207.zip

1. Electronic property information, tax maps, deeds, ROW maps, etc. should be placed into a sub-directory called “**DEEDPICS”**. See: PROPERTY SUBMITTAL AND FOLDER STRUCTURE of this manual for folder structure and file naming of property information.
2. Files received from consultants or designers pertaining to preliminary construction limits, alignments, etc. should be placed in a sub-directory called “**PREL\_DESIGN”.** These files should retain the original file names as received.
3. Any photographs and/or GIS data received from a county or municipal government should be placed in a sub-directory called **GIS.** These files should retain the original file names as received.

**IV. Any special files used on projects, but do not fall in above categories, should be put into additional sub-directories under “SURVEY”.**

1. Ex: /8802/SURVEY/GIS
2. /8802/SURVEY/MAPPING
3. Aerial Mapping Files (LIDAR)
4. /8802/SURVEY/ORTHOS
5. Aerial Photo Images
6. /8802/SURVEY/QUADS - 7.5 minute Quadrangle Images

**V. Hardcopy Items: Submitted at FINAL SUBMITTAL**

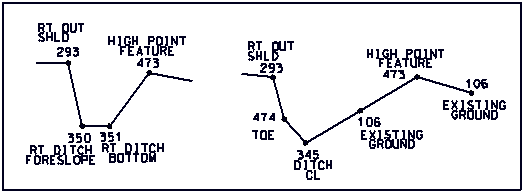
1. Tax Maps; Subdivision Plats (Inventoried)
2. Deeds
3. Level Books (Inventoried) or printouts of ASCII level file
4. Field Books (Inventoried) or printouts of ASCII control and reference points
5. Misc. Maps (Inventoried) ex: Utility Plats, As-Built Drawings, etc.
6. Submittal Letter (Listing contents with descriptions)

**HYDRAULICS & DRAINAGE COLLECTION**

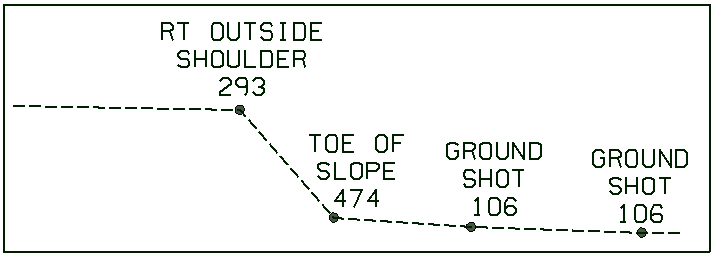
1. **DEFINITIONS**
2. **Ditch Foreslope Feature** - The slope emanating from the roadway shoulder to the ditch bottom when a trapezoidal ditch is encountered. The ditch foreslope feature can also be used to differentiate a feature from a paired ditch bottom, for example, when a cross drain ditch is encountered. The ditch foreslope feature is generally the ditch bottom point closest to the roadway when shooting a roadside ditch. Styles are provided for left and right sides of roadways or other associated objects.
3. **Ditch Bottom Feature** – The Ditch Bottom Feature is used as the second ditch point in a trapezoidal ditch paired with a ditch foreslope. It is generally where the ditch backslope originates from the roadside ditch. The ditch bottom feature can also be used to differentiate a feature from a paired ditch foreslope, for example, when a cross drain ditch is encountered. The ditch bottom feature is generally the ditch bottom point farthest from the roadway when shooting a roadside ditch. Styles are provided for left and right sides of roadways or other associated objects.
4. **Side Drain Condition** – A side drain condition is when a mainline roadside drain passes under a road intersection, driveway, or other object connecting to the mainline. Side drains usually pass under the object through pipes, box culverts, or are terminated at an inlet. Side drain pipes vary in material types and shall be identified when shot. Side drain pipes are often equipped with a side pipe end treatment, headwall, or stubbed end of the pipe. If equipped with an end treatment or headwall, these features should be collected in the survey.
5. **Pipe End Treatment** – Usually a slope paved or flared end concrete structure that is affixed to a pipe at the foreslope of a roadway, driveway, or other object. Some slope paved pipe end treatment follow a slope all the way to the ditch bottom, where others such as cross drain pipe end treatments may have a vertical drop part of the way down the slope. Each case should be shot thoroughly to represent the type of end treatment in-place and any slope warping caused by the end treatment.
6. **Headwall** – Pipes and box culverts may have headwalls affixed to them at the ends of the structure. Headwalls differ from end treatments because there are usually wing walls attached to a headwall at the structures end. It is critical to detail headwalls as they define a warping of slopes at the headwall location. For large structures, particularly box culverts, this represents a significant interruption of the normal fill or cut slope along the roadway.
7. **Pipe Underdrain Outlet** – In some roadway shoulders, pipe edge drains are constructed to assist in capturing water within the shoulder area. The water is captured by the edge drain and transferred to pipe outlets usually by means of various types of PVC pipe. Where the water is designed to be discharged, sections of PVC pipe run perpendicular to the edge drains and discharge the water where the pipe penetrates the front or foreslope of the roadway. The end of the pipe is protected by means of a small concrete pipe end treatment known as a pipe underdrain outlet. The locations of these existing edge drain outlets are necessary for analysis of the existing flow conditions on the project.
8. **Cross Drain** – A pipe or box culvert that crosses a roadway mainline. Cross drains convey the water at drains which cross the roadway or from median inlets. Cross drain pipes generally have an end treatment, headwall, or stubbed end of the pipe at either end.

# Collection of Roadway Ditches

1. Many roadway ditches have no easily definable ditch area. Those that have a definable bank, toe, flow line, etc. and would have the same appearance as a stream or creek and will be addressed later.
2. Roadway drains with no definable characteristics often begin at the road shoulder and continue down the slope to the toe. At this point, there will be a bottom area and/or toe rising upward to a bank or sloping to higher ground.
3. The target rod should be placed at the shoulder and then ground shots should be shown down the slope at grade changes or required intervals. At the bottom, a toe shot would be shown and then a flow line shot where the slope begins its rise. Two ditch shots are required when a trapezoidal ditch is encountered. A “V” bottom ditch will only require the existing ditch centerline to define the bottom of the ditch. Additional shots shall be taken going up each ditch slope to accurately depict the in-place foreslope and backslope. If the slopes are very short, ground shots may not be necessary. The bank would always be shown as a high point, ditch bank, shoulder, or other relevant feature encountered.
4. The following are illustrations of this procedure.

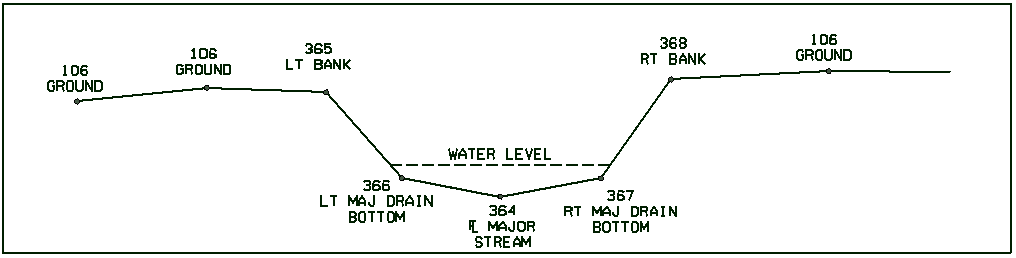


1. Some roadway runoffs are simply the ground sloping down from the shoulder to the toe, then leveling out. The target rod would be placed at the shoulder and then ground shots again at required intervals down the slope. The toe would be shown and some ground shots to show the leveled out area past the toe.
2. The following is an illustration of this procedure.

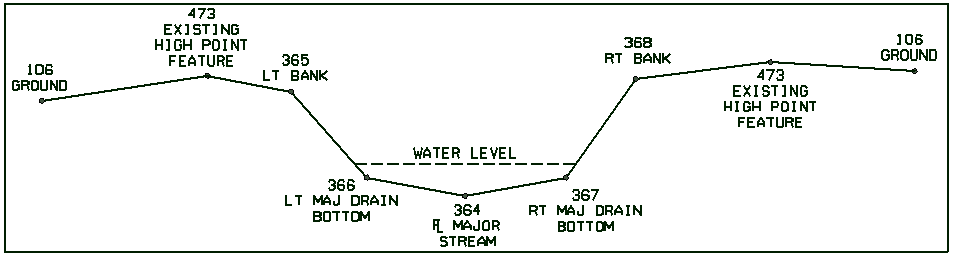


If the toe eventually runs into a drainage structure or stream, it should be shown reasonably close to the structure or stream so the data editor can tie into the structure or stream.

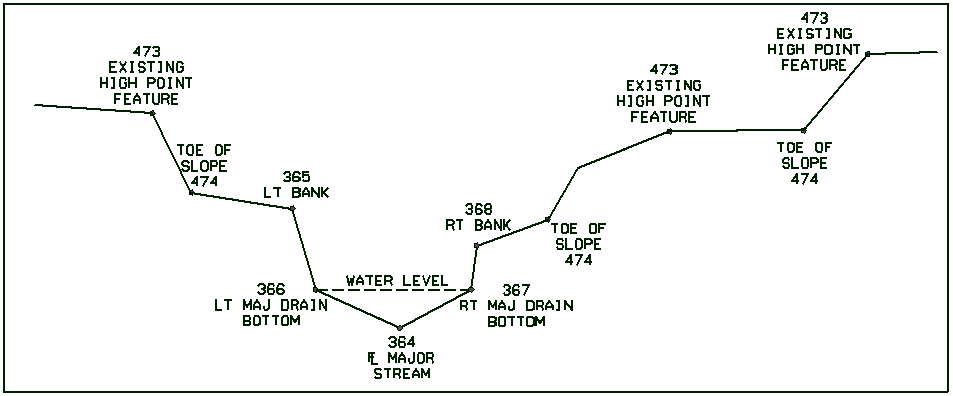
1. **Collection of Streams, Creeks, Rivers, etc.**
   1. First, determine how far to carry the topo of the stream. If the drainage structure size is less than 36 inches, the stream should be traversed a distance of 250 feet minimum from centerline in both directions.
   2. If the structure size is 36 inches or greater, the stream topo should be taken a distance of 500 feet minimum from centerline in both directions. For rivers and large creeks where the drainage structure is a bridge or a multiple barrel culvert (bridge culvert), you would likely extend the distance to 1000 feet from centerline in both directions.
   3. Generally on the 500 feet distance, it would be full topo for the first 250 feet, then just the flow lines to the tops of the banks. On the 1000 foot distance, it would be full topo for the first 500 feet, then just the flow lines to the tops of the banks.
   4. On surveys paralleling the roadway, the distance to the roadway must be taken into consideration and extended accordingly. An example would be: if the roadway is 50 feet to the left or right of centerline then the 250 feet distance would be 300 feet to that side. The 500 foot distance would be 550 feet to that side, etc.
   5. At any stream crossing of cross country surveys, you should carry the topo a distance of 500 feet minimum in both directions from the Centerline of Survey. With rivers and large creeks, it is common to extend the distance to 1000 feet from Centerline of Survey in both directions. Small depressions would be traversed to just past the construction limits.
   6. Some situations may require extending the distance to be traversed to a more appropriate distance. Some examples of this would be:
2. The stream is paralleling the road.
3. The stream is meandering very crookedly.
4. The stream or drainage structure is on a severe skew.
5. The fill may be so great that the construction limits may need to be widened.
6. An appropriate distance would be extending it beyond the minimum required, generally determined by the Chief of Party.
   1. Target rod placements may begin with ground shots in the area approaching the bank. A bank shot would be obtained placing the rod where the ground begins its sharp downward break. If the slope is long or has grade changes, ground placements may be needed on the slope. If the break is sharp and steep, proceed to a toe shot with the rod placed at the leveling off point (not the top of water).
   2. Obtain a flow line shot by placing the rod in the deepest spot in the stream bed. Next, would be a second toe placement at the point where the ground begins its accent. If it is a wide stream, additional ground shot placements or flow lines will be made. A second bank shot would be obtained, placing the rod at the point of upward break. The slope would be shown as described previously. The area out from the second bank would be shown with ground placements or break lines.
   3. If in a large valley area, the high or flood banks and corresponding toes would be shown placing the rod in the same manner.
   4. The following are some illustrations of these procedures.



# Large Stream Illustration A



# Large Stream Illustration B

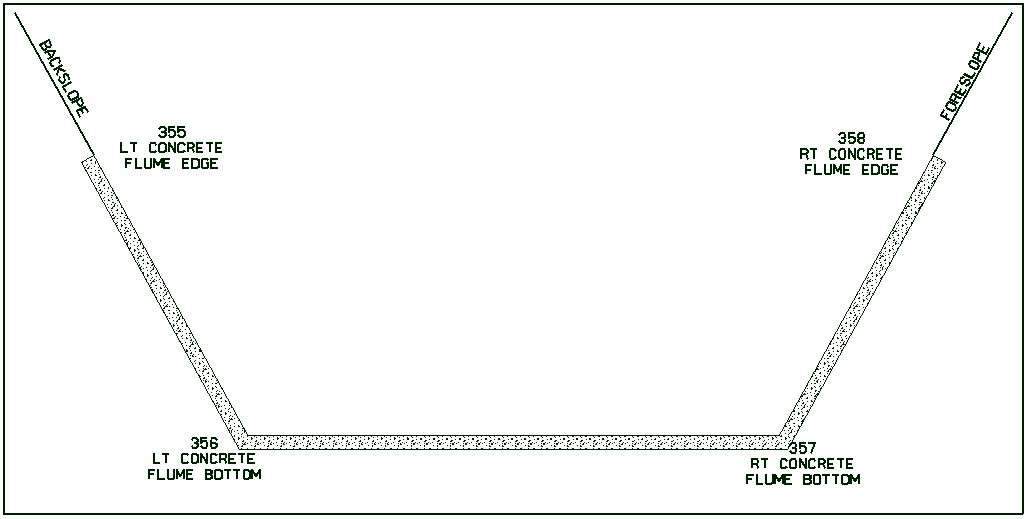


# Large Valley Area Illustration

* 1. After collecting the initial bank, toe, etc., a designation of a decimal point and the next increasing number can be assigned to the following banks, toes, etc. Target rod heights frequently will have to be altered during this process. The break lines should be collected near the drainage structure such that the Data Editor can connect them and if needed, uniquely name left and right duplicate coded features.
  2. The depth of the water in some streams will be too great to wade and will require the use of a boat. On these streams, the grounds, banks, and toes would be shown in the manner previously described.
  3. For the flow lines or other placements deemed necessary in the deeper water, maneuver the boat to the desired spot and use whichever of the following methods is appropriate. If the target rod is tall enough, place it on the stream bed at the desired placement.
  4. If the conditions such as depth are too great, or current too swift, etc., measure the depth of the water. The depth of the water may be obtained by attaching a suitable object such as a, rock, hub, spike, or similar to a tape and lowering it to the stream bed. Place the target rod at the water level and add the depth measured to attain the rod height of the shot. Take great care in relaying this height to the instrument operator. An example would be 18.5’ measured depth plus 8.5’ target rod = 27.0’ target rod height.
  5. On very large streams, usually rivers, the depth and current are too great for any of our procedures. Hydraulics personnel with their boats of appropriate size and depth finding equipment are called on to assist in the data collection.
  6. A target rod is placed on the boat and an instrument is positioned to track. The target rod will be placed at a location on the boat where its elevation is relative to the depth finder and the target can be acquired.
  7. A shot will be taken on the target rod and the depth finder will calculate the distance down to the river bed. The rod height and the reading from the depth finder will be combined to obtain the elevation of the river bed. Multiple shots are acquired as the boat traverses up and down or across the river necessary to obtain an accurate representation of the river bed. Generally, a top of water elevation along with the time and date will also be noted.

***The use of life jackets and all boating and water procedures should be observed.***

## Collection of Concrete Flumes

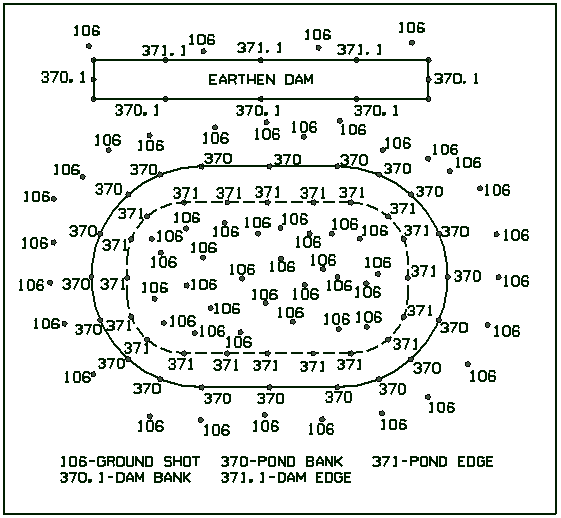
* 1. There are basically two types of concrete flumes, flat bottom and rounded bottom. The objective is to show a representative picture.
  2. On a flat bottom flume, the target rod would be placed on the top of the flume, then a flow line of flume placement where the side reaches the bottom. Next, another flow line of flume placement would be shown where the bottom rises up the other side. Then you would place the target rod on the other top of the flume.
  3. The following is an illustration of this procedure. 

**CONCRETE FLUME ILLISTRATION**

* 1. The procedure would be the same for a rounded bottom flume. Additional flow line shots may be necessary depending on the width and shape.
  2. It is important not to get the tops and flow lines “crisscrossed.” This would be particularly important where two flumes intersect. When advancing up the flume, keep the tops and flow lines running smoothly and correctly.
  3. When a flume connects with a drainage structure, show the flume placements near the structure so the Data Editor can do the needed connections.

## Collection of Ponds, Lakes, and Sink Holes

1. Show an accurate depiction of a ponds’ bank, toe, and bottom. A dam or spillway will also be shown. The bank is the edge of the high ground just before it breaks to natural ground. The toe is where the slope changes grade toward the bottom of the pond.
2. Place the target rod on the break for a bank shot and continue around the perimeter of the pond, where the bank is curving, give the rod placements at proper intervals to accurately show the curvature of the pond bank. Use a solid line type for the pond bank. This same procedure is used to show the toe of the pond. Be careful to show bank and toe placements adjacent to each other in these curving areas so that bank lines and toe lines do not cross each other. Ground shots and/or break lines will be shown in the pond bottom at rod placements giving an accurate depiction.
3. Most ponds and lakes will require the use of a boat. The shots on the bottom will be acquired from the boat using the same procedure previously described in the *collection of larger streams.* If you are collecting on a very large or deep lake, for example, Lake Guntersville, you would need the assistance of the hydraulics personnel and their equipment. The same procedure would be used as previously described.
4. Ground shots and/or break lines would be shown in the area surrounding the pond. If there is an earthen dam, another line of bank placements with a solid line type shall be shown along the outer bank of the dam. Should there be a concrete dam, stop the bank placements where they meet the dam and show a line of target rod placements on each top edge of the concrete dam. The outer toe of either type of dam would be shown with a line of rod placements.
5. Some lakes or ponds will have runoff spillways. Show spillways with the same procedures as dams.
6. The following is an illustrations of the procedures described.



If edges of the water shots (Code 451) are need, place the target rod at the top of the water level of the pond or lake. Record the time and date of acquisition.

1. A sink hole will have the same appearance and characteristics as a pond with no dam. It may or may not have water in it. A sink hole would be shown in the same manner as a pond.

**Collection of Pipes, Culverts, and Drop Inlets**

## Pipes

1. There are various types of pipes used in roadway drainage, all easily recognizable. Plastic, Corrugated Metal, Bituminous Coated Corrugated, and Reinforced Concrete are the most common types. New materials are always being employed on pipes and pipe culvert systems. Make sure descriptors for these newer types of pipe materials identifies what material the pipe is made of.
2. After recognizing the type of pipe, the size must be obtained. This is done by measuring the diameter of the pipe and recording it in inches. After the length of the pipe is measured in feet, the size is labeled.

An example would be: 100’ – 36” RCP.

1. There will also be span and rise pipes. Measure the pipe at its greatest span or width. Span is recorded and noted first. Next, measure the rise or vertical height of the pipe. An example of this data would be: 100’–24”S X18”R RCP.
2. The skew of the pipe is determined from the topographical data. A pipe that is perpendicular to the roadway would be a 0° skew. The skew is the angle off of 90°; recorded to the nearest + 00° 20’ 00”. The direction is noted by the downstream direction of the water and centerline; left or right of centerline and ahead or back of 90°.

Examples of this recording would be: 0° Skew right or 15° 40’ right ahead.

1. To collect the data on the pipe, place the target rod in the flow line of the pipe and then the size of the pipe in the code descriptor. (‘9 300+18”RCP’ is the point code for the FL of an existing concrete pipe, and ‘+18”RCP’ is the descriptor for the pipe.) The flow line of the other end of the pipe will be acquired with the same code but without a repeat of the descriptor.
2. Most pipes will have headwalls, headwall & wing wall combinations, or a sloped paved headwalls. For just a headwall, place the target rod at each of the back top corners and front ground elevations using a 106 point code. Ground elevations should be the main focus. Any accompanying wing walls should be included with the headwall to aid the Data Editor. Ground shots will be acquired with the wing wall also. Headwalls are likely to be destroyed if the pipe is extended, but must be included in the existing drainage terrain and model.
3. Sloped headwalls, also known as Pipe End Treatments, require at least 4 shots for the headwall corners, plus a dual coded point at the junction of the flowline of the pipe and flowline of the ditch or flume. Place the target rod at the lower and upper corners of a sloped headwall. The pipe end is at the outer most tip of the cut. Show the inside top for pipe size verification.
4. At the junction of the headwall with flowline of the pipe and flowline of the ditch or flume, a triple coding of all three features shall be placed at the junction point. This adds the point to all three features without requiring three separate point shots.
5. Some wing walled, headwall structures will have a concrete catch basin with a baffle from one wing wall end to the other. This may be noted to the Data Editor or collect two concrete shots at the end.

## Box Culverts

1. A concrete culvert is often required for large drainage areas. If the width of the culvert is 20 feet or greater along centerline or parallel to the centerline of the roadway, it is called a bridge culvert. A culvert may have one barrel or multiple barrels. For Bridge Culverts, the BIN number should be obtained and noted on the field map.
2. Measure the width from inside the barrel wall perpendicular to the other inside barrel wall. If the end is skewed, be careful to measure accurately and not along the skew. The width measurement is noted first. Next, measure the height from the flow line of culvert to the inside top of the structure. The height measurement is noted second.
3. The number of barrels will be counted and noted. Length is measured from end to end and recorded as length – barrels & span-rise. An example of the recorded data would be: 120’–CD 1210. The following are the correct barrel abbreviations:
4. Single barrel – CS
5. Double barrel – CD
6. Triple barrel – CT
7. Quadruple barrel – CQ
8. More than four – #BBL, i.e. 5BBL, 6BBL, etc.
9. The skew of the culvert and the correct recording of it will be attained in the same manner as previously described in the section on pipes.
10. To collect the data on a culvert, place the target rod in the flow line of the culvert at each corner of each barrel end. *Be careful not to crisscross the sides.* Include a single inside top shot for each barrel. Wing wall, headwall, catch basin and baffle would be shown by target rod placements previously described in the section on pipes.
11. It is critical to the composite surface and terrain that the headwalls and wing walls are thoroughly shot since slope warping occurs at these structures. Design extensions of these structures also require a great amount of detail involving the headwalls and wing walls so this data is critical.
12. Stream bed configuration at box culverts not only have design impact, but environmental implications as well. The stream bed flowline and stream geometry are essential in the pre-construction as well as the post construction analysis that are required at these structures.

## Drop Inlets

1. There are several types of drop inlets. A drop inlet with a metal grate top would be shown by placing the target rod at each top corner. The bottom or flow line of the drop inlet may be shown with a single shot. The pipe(s) in the drop inlet would be shown as previously described in the section on pipes.
2. A drop inlet with a concrete top cover with openings for the water to run in under the concrete top would be shown by placing the target rod at each top corner. Next, place the target rod on the corners where the water would run in under the concrete top.
3. If the concrete top cannot be removed, measure down to the bottom with a tape and adjust the target rod height accordingly, giving the placement. Show the pipe(s) by any method possible.
4. Some inlets have concrete aprons associated with them. These shall be shot in such a manner as to depict the apron as well as any tie-ins to flumes or ditches. Descriptors should be used on at least one apron shot describing the feature as a concrete apron.
5. Along roadways with curb and gutter, you will encounter single wing and double wing drop ‘S’ type inlets. A single wing drop inlet is one where the curb face will open up along the gutter from one direction and the water drains into it. A double wing inlet is one where this takes place from two directions. Place the target rod on the top corners of the drop inlet and in the gutter where the water drains into the drop inlet. The tops of these can virtually never be removed. To collect the data on the pipe and catch basin, use the measuring procedure described earlier or any means possible.

## Storm Manholes

1. Place the target rod in the center of the manhole lid cover, to show the top. Remove the lid and collect the pipe data as previously described in the section on pipes. If it is too deep for a rod placement, use the previous discussed measuring procedures.
2. **ADDITIONAL DRAINAGE AND HYDRAULICS TOPICS**
3. Break lines must be shot in a manner that will run smoothly and not cross other break lines. They are required to be tied to structures and on occasions to other breaklines. Refer to the manual entry on breaklines for more detailed information.
4. When Hydraulics personnel are required in the data collection of any above topic, they can be contacted at the Bridge Scour Section, Bridge Hydraulics Engineer, or the State Hydraulics Engineer.
5. High water data must be attained along with drainage collection. This would be the highest recorded elevation the water has ever risen to in times of flooding. On occasions there will be a marker denoting this in certain locations. Some high water records can be obtained at such locations as D.O.T. offices, County Courthouse Officials, Law Enforcement, Civil Defense Personnel or local residents in the area. Often, you will need to contact a long time resident of the area and obtain their help in showing you the highest they have ever seen the water. When you have determined the location, place the target rod there and collect a reading. Note the date when this high water occurred and the information source.
6. Flood plain sections are generally desired in drainage collection, especially in a low lying or flood prone area. The flood plain is the plain or topographic area adjoining a stream that is covered by its waters in a time of flood. A flood plain section is taken on natural ground on the downstream side, perpendicular to the flood plain. Begin the target rod placements above high water on one side and continue them across the plain at appropriate intervals, approximately 50 feet, showing breaks and the stream itself, as described in the topic on streams, to a location above high water on the other side.
7. During any drainage collection you will want to note any information that is of use. Some examples of such information would be scouring at the drainage structure, rocky bottom, or debris in the plain.

**LOCATION SURVEY PROPERTY MANUAL FOR RIGHT-OF-WAY**

1. **Acquiring Right-of-Way and Property Maps**
   1. The first things needed to be acquired when beginning a new project are Right-of-Way maps. Some Right-of-Way maps are available online through the Alabama Department of Transportation’s Right of Way Map Viewer Website at [http://algis.dot.state.al.us/rmv/rmv.html.](http://algis.dot.state.al.us/rmv/rmv.html)
   2. The Region and Area offices of ALDOT usually have Right-of-Way maps and some As-built plans available copies and or use to find Right-of-Way and Property monumentation.

# Tax Plats

1. Ad valorem tax maps can be obtained from the Tax Assessors office at the county courthouse. Some counties maintain web sites for parcel data. Please be aware that this information may not be current.

# Total Property Sketches

* 1. Inset sketches of very large tracts of land can be drawn to depict important items. The “total property sketch” does not have to be drawn to scale. It should be noted on the drawing if it’s to scale or not to scale.

# Subdivisions

* 1. Subdivision plats and monumentation should be used in order to plot subdivisions. The plats usually contain bearings, angles, and distances which are vital for establishment of the boundary lines. The name of the subdivision, plat book, and page should be noted on the map. The lot numbers should, also, be noted.

## Monument Descriptions

* 1. Right-of-Way monument cell placement and text descriptions can be found in ALCAD. Monuments shall be described with the abbreviation ROWM, or ROWM DAMAGED if the monument is damaged.
  2. Monuments that represent property corners or quarter corners can be placed by cells, line styles, and text found in ALCAD. Monuments are to be described with the size & type of the monument.

Example: ¾” IP.

## Designating Ownership

* 1. Property ownership text settings can be found in ALCAD. The text is to include the owner’s name (person property is conveyed to) exactly as the deed shows. The Deed book and page are to be included.

Example: DENNY S. LEWIS DB 550 PG 752

# ROW and Easement Dimensions

1. Right-of-Way dimension text placement tools are found in ALCAD. Dimensions are defined by the assigned Dimension Style in ALCAD when describing ROW dimensions.

Example: 120’ ROW

1. Easement dimensions, text styles, and line styles are found in ALCAD when describing easements.

Example: 120’ DRAINAGE ESMT

**Note**: After Right-of-Way lines are plotted, all section, quarter, and property lines are trimmed back to the Right-of-Way. No lines of the above mentioned types should cross Right-of-Way.

# Section Corners

* 1. Section corner cells and text placement are found in ALCAD when placing the section corner. Section, ½ section, and 1/4-1/4 line styles are also found in ALCAD. They are to be described with the size & type of monument.

Example: 4” x 4” CM

* 1. The section numbers should be placed within the section corner cell at each section. This text is placed inside the cell data fields provide within the cell using the “Edit Text” command, or “Enter Single Data Field” command.

Example: “29 / 30” is placed in the top 2 data fields and “32 / 31” in the bottom 2 data fields.

# Township and Range Lines

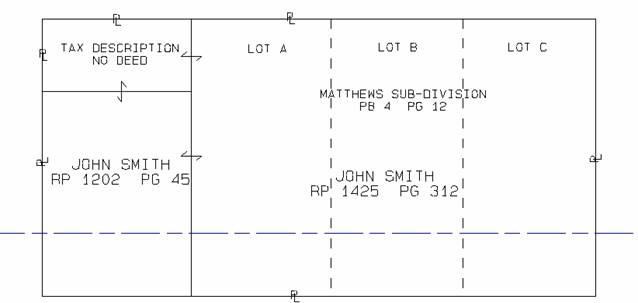
1. All township and range line and text placement tools are found in ALCAD. The text should include the section number, township number (townships run north or south of the base line) and range number (ranges run east or west of the principal meridian)

Example: SEC 31 TSHP-18-N RGE-03-E

SEC 32 TSHP-18-N RGE-03-E

# Preferred Property Ownership Map Designation

* 1. The property line style is located in ALCAD which is a solid line will be used for deed boundary with a “PL” symbol already on the line. A land hook cell is also found in ALCAD for showing ownership across adjacent deed boundaries.
  2. A common mistake is showing deeds with partial descriptions as total ownership with no true deed separation.
  3. Solid lines with land hooks should separate parcels of land acquired via different methods/deeds, even if the land is contiguous with identical ownership names.
  4. Any line type that is not solid or ROW will be assumed to be included within the deed or property boundary.
  5. The illustration below is for reference.
  6. Property Lines Property Line Style
  7. Same owner with Different deed Property Line Style land hook cells
  8. Parcels within deed Dashed
  9. Present ROW Present ROW Line Style
  10. Non-property section, & quarter Lines Designed line type



**RIGHT-OF-WAY BUREAU MAPPING MANUAL PRELIMINARY GUIDELINES & PROCEDURES**

**\*Right-of Way Mapping Manual can be found at the following locations: Internet:**

[**http://www.dot.state.al.us/rwweb/doc/proceduralmanuals/ROW%20guidelines%20with%20lett er\_031912.pdf**](http://www.dot.state.al.us/rwweb/doc/proceduralmanuals/ROW%20guidelines%20with%20letter_031912.pdf)  **Intranet:**

[**http://csnts020/Bureaus/Right%20of%20Way/Engineering%20and%20Mapping/Document% 20Library/ROW%20guidelines%20with%20letter\_082113.pdf**](http://csnts020/Bureaus/Right%20of%20Way/Engineering%20and%20Mapping/Document%20Library/ROW%20guidelines%20with%20letter_082113.pdf)

**I. INTRODUCTION**

# GENERAL

1. The intent of this document is to provide guidance in the development of ALDOT Right-of-Way maps. The reference to "Right-of-Way" maps will be used throughout this document and collectively refers to the following:
   1. "Right-of-Way" roll maps
   2. Property sketches (also referred to as property plats)
   3. Property deeds (also referred to as legal descriptions)
2. The aforementioned Right-of-Way maps are a distinct document whose primary purpose is to expedite the Right-of-Way acquisition process. The Right-of-Way map is a document developed separate from the Contract plans, although there is much information common to both. For full construction details, refer to the Contract Plans.

# INTENDED AUDIANCE

1. This document is intended for both ALDOT employees and consultants under contract to produce Right-of-Way maps. The information has been organized to follow the logical progression of Right-of-Way map development.
2. This document provides guidelines and standards that are to be adhered to by both ALDOT personnel and consulting firms under contract to produce Right-of-Way maps. Refer to Guidelines for Operations (GFO) for more details.
3. Any deviation from the standards set forth in this document are to be approved first by the State Right-of-Way Engineer.
4. **INSTRUCTIONS TO CONSULTANTS**
5. Consultants providing man-day estimates and fee proposals for Right-of-Way map production should note that the "Data Collection" guidelines outlined in this document are ***not*** considered a part of the Right-of-Way tasks, but fall under the "Field Survey" man-day estimate. The "Field Survey" tasks are performed initially for the purpose of preliminary engineering, most of which ends up in the Right-of-Way maps. ***Do not include "Field Survey" tasks in the Right-of-Way man-day estimates and fee proposals.***

The Data Collection guidelines herein are provided to ensure that property-related topography is properly collected and interpreted, as this information is the foundation upon which the Right-of-Way maps and all subsequent computations are based.

1. When submitting man-day estimates to ALDOT for Right-of-Way map production, it is recommended that this proposal be based on the total number of "takings". For large tracts that border along stretches of a project, there exists the possibility of several "takings" for that particular tract. A "taking" is defined as any separate piece of property acquired by ALDOT for highway construction purposes. This could include parcels, drainage easements, construction easements, etc. These individual "takings" are what dictates the number of property plats and deeds that must be prepared per project, which in turn determines the time required to complete the Right-of-Way tasks for a project.
2. Completion of the Right-of-Way maps shall be defined as that time when final Contract Plans are submitted and accepted by ALDOT. The Right-of-Way maps shall be a "snapshot" of the Contract Plans at final submittal and shall reflect all necessary revisions to the maps, property plats, and deeds. These revisions shall include, but not be limited to, the following occurrences:
   1. Design changes
   2. Errors and omissions related to data collection and/or map preparation
   3. Property sell-offs
3. For consultants under contract to produce Contract Plans, the agreement shall also include provisions for the development of Right-of-Way Maps when applicable. It is the policy of ALDOT that the same consultant be used for the development of both the Contract Plans and the Right-of-Way Maps.

**II. ROW Data Collection**

1. **General Guidelines**
2. "Data Collection" refers to the process of compiling and plotting all survey data pertaining to existing boundary lines, man-made structures, and natural features. Of special interest are the topographical features that may be impacted in some way by highway construction and that play a vital role in the Right-of-Way acquisition process.
3. ALDOT does ***not*** perform boundary surveys. It is the policy of ALDOT to replicate existing property lines on the maps as accurately as possible, but with consideration of the limitations of tax maps, source deeds, monumentation, and other available data.

Intent should always take precedence when interpreting the information found in the Right-of-Way maps. It is the intent of ALDOT to compute the area of any "takings" for the sole purpose of determining "fair market value". Minor property boundary disputes typically do not have a major impact on these computations and it is ALDOT's desire to avoid any legal responsibility in such matters.

1. No document or guideline can substitute for experience and professional judgment. However, the guidelines set forth in this document are intended to aid the surveyor and mapper with the development of Right-of-Way maps so that they are useful, consistent in appearance and reasonably accurate.

# Researching Property & ROW

1. The county Tax Assessor maintains records of ownership of individual parcels of land as well as Ad Valorem (Tax) maps showing the relationship of recorded tracts of land and plats of subdivisions. This information can be used to locate specific deeds and descriptions for the subject tracts of land. Overlaying the preliminary project control line, construction limits, and required Right-of-Way on the tax map will assist in identifying the affected tracts.
2. Check with county mappers to see if affected properties have any pending splits or sell-offs that are not reflected on tax maps.
3. Once the affected and adjacent tracts are identified, use the parcel ID numbers to obtain owner and source deed information. If affected properties fall within a recorded subdivision, recorded plats need to be obtained.
4. Ownership names and source deed book & page should be shown accurately in the Right-of-Way maps (refer to "Map Detail" on page 8 of ROW Mapping Manual). Where affected properties fall within a recorded subdivision, recorded plats need to be obtained. The subdivision map book & page should also be shown in the maps.
5. On projects that follow an existing roadway, the present ROW needs to be verified. This can be obtained from existing ROW maps and/or as-built plans. Sources for this information include ALDOT, city, and county engineering departments.

# Site Improvements & Land Use

1. A field review/survey should be performed to show all improvements to affected properties. All improvements that fall within the required Right-of-Way should be located and shown on the maps, including the following:

a. Buildings

* 1. Outbuildings
  2. Sheds
  3. Fences
  4. Septic systems and field lines, etc.
  5. Walks and drives
  6. Ponds
  7. Other site improvements, etc.

1. For improvements on affected tracts that fall outside of the required Right-of-Way, use the following criteria:
   1. Rural - Obtain topography of structures and major site improvements within 200 feet of proposed Right-of-Way. Even on extremely large properties, improvements should be shown that fall within the general project corridor. The determining factor is the type of improvement and how it affects the value of the affected property.
   2. Urban - Show all structures and site improvements.
   3. Transitional areas - Professional judgement should prevail in linking Urban and Rural requirements.
2. It is important that minimum distances can be scaled on the maps between the required Right-of-Way line and the nearest point on an improvement (structure) found outside the required Right-of-Way. This includes porches, canopies, etc. and requires that this topography be accurately surveyed and indicated on the maps.
3. Minor crossroads that extend outside the required Right-of-Way should be labeled as to their function, such as dirt logging road, field road, gravel drive, etc.
4. Identify adjacent land use such as cultivated, pasture, wooded, parking, etc. This is especially significant in urban and/or commercially developed areas. Special use properties, (e.g., parks, institutions, airports, etc.), should be clearly identified.

# Monumentation

1. A reasonable effort should be made to locate and tie with coordinates or traverse from a known control (i.e., project control line) a monument such as a section corner, 1/4 section corner, etc.
2. For rural areas, tie the properties to a minimum depth of the second ¼ section line past the proposed Right-of-Way. The closest ¼ section line may only be 50 feet past the proposed Right-of-Way and this would be too close to provide accurate information as to the land use and/or improvements. Additional markers are helpful, such as back property corners, row markers, etc. All monuments should be described in the maps. These monuments are sometimes referenced in the source deeds and are helpful in establishing an accurate property map.
3. For urban areas, all in-place monuments for affected tracts up to approximately 20 acres should be located and identified.
4. Special attention should be paid to any monuments; iron pins or other property corner markers, natural boundaries such as tree lines or creeks, and man-made boundaries such as fence lines or rock walls, as they relate to establishing accurate property lines. Also, all reasonable efforts should be made to locate and describe the original source deed’s Point of Commencement to maintain the chain of title.
5. Locate and identify all existing Right-of-Way markers on the ground. If they do not exist, re-establish (on the proposed maps) from the center of the road using old Right-of-Way maps.

# Boundary Lines

1. The term "Boundary Lines" refers to all man-made or artificial lines such as township, range, section, property and easement.
2. All section corners should be tied to an identifiable, recoverable monument.
3. 1/4 section lines should be tied when possible, especially if they are used to establish property lines of affected tracts.
4. 1/4 section lines that are not tied, but rather "gridded" on the maps are to be used for visual reference only, and ***not*** for computational purposes or as commencing points in legal descriptions. The maps should clearly differentiate the "gridded" lines from those that were tied to a known monument by the survey. (Refer to the Right-of-Way maps legend.)
5. Liberal use of property line and land hook symbols should be used throughout the maps to clearly delineate boundaries.
6. Ownership names should be clearly labeled for all properties along with deed book/page, fiche, or instrument number of the owner’s source deed. Also, as it pertains to extremely large properties, this would be a good place to put the total “before” acreage of the property; if the property is not going to be shown in total. The acreage should be obtained from the source deed. If no deed is available, or the acreage is not given on said deed, the acreage from the tax map should be used.
7. Easements should be clearly delineated and defined.

# Total Property Considerations

1. The total periphery of affected tracts shall be shown on the Right-of-Way maps, with the exception of extremely large properties (See Right-of-Way Maps Formatting).
2. When encountering large properties, a decision must be made as to whether it is practical to show the total property and all of its improvements. For example, timber companies, power companies, railroads properties, etc. tend to have extremely large areas of land often acquired over time by means of several source deeds. It can be very difficult to show the boundary of all contiguous properties accurately. In these cases, it is probably best to use the source deed(s) for the before acreage. In most cases, this is sufficient because ALDOT will acquire relatively small parcels and the impact to the total property value (remainder) is minimal. In some cases, a before acreage may not be available or necessary for this reason.
3. **PROPERTY SUBMITTAL AND FOLDER STRUCTURE**
4. All property information will be submitted in a legible electronic format. Grantor, grantee, legal description, book, page, and parcel number should be visible on ALL deeds if possible.
5. Hard copies will be sorted and submitted in the same order as electronically submitted files.
6. Photos and scans should be taken with care. Images should have little to no distortion. Post-its or other methods should be used to include as much information as reasonably possible on photos.
7. All property information will be saved under the folder “DEEDPICS”; a sub-folder of folder “Survey”. Survey is a sub folder of the CADD number.
8. Deeds, subdivision plats, and tax maps will be separated into the appropriate subfolders named Township Locator Number\_ Area Number\_ Section Number\_ Quarter Section Number as listed at the courthouse with sub-folder(s) for blocks.
9. Deeds will be named using the following format: “Book\_Page\_Parcel#” (D328\_1423\_p12o18.doc) for each page. The first page number is used in the name if the document contains multiple pages.
10. Books will include book type and number as located at the courthouse.
    * + I for instrument
      + R for Real Property
      + D for deed
      + W for will
      + P for Plat
    1. Parcel number will include “p” followed by parcel number. A lower case “o” shall be used for a decimal point.
11. If no deed is available or deed is partial description, Tax Records should be included and named with parcel number and TAX (p12\_Tax)
12. Tax maps will be at the same location as deeds and named as is recorded; beginning with “TM” (TM13\_5\_04\_1.jpg).
13. Sub-division plats will be at the same location as deeds named by sub-division name or plat book and page following “SD” (SD\_Maple\_Springs.jpg)
14. ROW maps should be saved in folder “ROW” directly under \DEEDPICS and named with corresponding project number (STPAA0239\_500.pdf).
15. Example of folder and file structure:

/8802/SURVEY /DEEDPICS /13\_5\_03\_0

D8808\_659\_p13.jpg p17\_TAX.jpg

I43689\_p12o1.doc

TM13\_5\_03.jpg /13\_5\_04\_1

TM13\_5\_04\_1.jpg

/Block1

/Block2

D328\_1423\_p12o18.doc

D328\_1424\_p12o18.doc

D1228\_419\_p12o17.jpg

SD\_Maple\_Springs.jpg

/ROW

STPAA0239\_500.pdf

1. The township, range, section, block, and parcel number should be easily located on the survey field map. Only the first page of the deed is noted on the Field map.

**CONSTRUCTION SURVEYS (TRADITIONAL)**

1. **GENERAL**

Traditional Construction Surveys require many processes that differ from the 3-D Modeling Program Construction Surveys. The ALDOT Construction Manual still contain many manual processes verses the automated electronic procedures in the 3-D Modeling Program Construction Surveys. Some of these manual procedures may be substituted if permitted by the Region Construction Engineer. It is possible that some, if not all, of these manual procedures may be replaced in future editions of the ALDOT Construction Manual.

1. **CONSTRUCTION SURVEY PROCEDURES (TRADITIONAL)**

The SURVEYOR shall follow these procedures when performing Traditional Construction Surveys:

1. Consultant Surveyors and the Contractor’s Consultant Surveyors shall be notified by the Project manager or the Region Construction Engineer’s representative, of any new policies, guidelines, or changes to the ALDOT Construction Manual, or any other applicable guideline changes, that impact the information presented in this manual.
2. Locate survey control, stake construction horizontal alignment(s), and set necessary control or cardinal points (P.C.’s, P.T.’s, etc.). This procedure shall conform to the specifications in Part 1, Section 2, Article E, Sub-Article 1.5 of the State of Alabama Department of Transportation Construction Manual. The Construction Manual is available on the internet at <http://www.dot.state.al.us/conweb/Construction%20Manual.htm>. Any resurveying required due to changes in the original plans shall conform to Section I-A of the General Instructions for Compiling Data Required for Highway Surveys.
3. Locate project bench marks, field check, and set necessary temporary bench marks. This procedure shall conform to Part 1, Section 2, Article E, Sub-Article 1.7 of the Alabama Department of Transportation Construction Manual. Any levels required due to changes in the original plans shall conform to Section II-A of the General Instructions for Compiling Data Required for Highway Surveys.
4. Staking out right-of-way lines. This procedure shall conform to Part 1, Section 2, Article E, Sub-Article 1.9 of the Alabama Department of Transportation Construction Manual. Any re-staking required due to changes in the original plans shall conform to Section I-A of the General Instructions for Compiling Data Required for Highway Surveys.
5. Taking cross-sections. This procedure shall conform to Part 1, Section 2, Article E, Sub-Article 1.10 of the Alabama Department of Transportation Construction Manual.
6. Staking out of small drainage structures. The survey party shall be required to furnish sufficient alignment and flowline data (i.e., structure station, length, skew and flowline data) to the Project Manager for design of small drainage structures.
7. Marking clearing limits. The survey party shall mark clearing limits using plan cross-sections and measuring distance from centerline or right-of-way line.
8. Final excavation cross-sections. This procedure shall conform to Part 1, Section 2, Article E, Sub-Article 1.17 of the Alabama Department of Transportation Construction Manual.
9. Staking out bridges. The survey party shall be required to establish a minimum of two horizontal control points and one vertical control point for each bridge site. This should also conform to any of the project’s Contract Control Plan controls approved for the bridge controls.
10. Reporting and documenting quantities for estimates. The survey party shall be required to measure quantities used by contractor and/or subcontractors, for payment on estimates. Any quantity, to be measured and submitted to the Project Manager by the survey party, shall be documented in accordance with Part 1, Section 3, Part 1, Section B of the Alabama Department of Transportation Construction Manual. The estimate data, submitted by survey party, shall be complete enough to allow any subsequent complete check of estimated quantities by competent personnel.
11. All data submitted by a survey party to the Project Manager shall conform to the format outlined in Section II of the Alabama Department of Transportation Location Survey Guidelines and shall be recorded in standard hardback Engineer’s Field and Level Books. Any electronic files such as EXCEL spreadsheets, shall be archived with other project electronic Construction Survey files.
12. A contractor or contractor’s consultant survey party cannot employ on any project, a person who is also employed by the Alabama Department of Transportation.
13. In such case where measured quantities by a consultant surveyor are not acceptable to the contractor and to the Project Manager, any re-measuring shall be paid by the STATE if measurements by survey party prove accurate.
14. All time charges by a survey party shall be on the active construction project with no allowance for travel, etc.
15. **UTILITIES**
16. The Contractor’s Surveyor shall thoroughly identify existing utilities throughout the project limits. These utilities are to be field surveyed and included in an electronic field map prepared in accordance with the ALDOT Cadd Standards. All affected utility company names, address, phone number, and contact person(s) shall be included on the field map. Any electronic and/or hard copy information collected from the utility companies shall be included in the deliverables. The Project Manager shall not any changes from the plans assembly in-place utilities or proposed relocated utility sheets.
17. **PROPERTY**
18. The Contractor’s Surveyor shall field survey all property adjacent to survey limits. Each individual property shall be located in its entirety to the second ¼ section line past the proposed Right-of-Way. For example the closest ¼ section line may only be 50 feet past the proposed Right-of-Way and this would be too close to provide accurate information as to the land use and/or improvements. All effort is to be given to replicate existing property lines as accurately as possible. Any property information found shall be identified in a new property map, including any changes from the contract plans, prepared in accordance with the ALDOT Cadd Standards, and submitted to the Project Manager.
19. Items to be shown on field map are but not limited to:
20. Lot lines
21. Subdivision lines & names,
22. Source deed book and page
23. Existing row markers & lines
24. Easements
25. Township & range lines
26. Section lines
27. Monumentation such as iron pins
28. Existing ROW lines.
29. **HYDRAULICS/DRAINAGE STRUCTURES**

The following is a synopsis of the data to be gathered:

Refer to the **“Hydraulic & Drainage Collection”** section in this manual for additional information and guides.

1. **STRUCTURES SMALLER THAN 36” DIAMETER (7.1 SQ.FT. OPENING) AND/OR SMALL DEPRESSIONS**:
   1. Traverse the stream a minimum distance of 250 feet from centerline and exceed construction limits.
2. **STRUCTURES 36” AND LARGER DIAMETER AND/OR EXISTING DRAINS:**
3. Traverse streams a minimum distance of 500 feet perpendicular from centerline.
4. Rivers and large creeks, where the drainage structure is a bridge or a multiple barrel culvert (bridge culvert), the flow lines shall be located to a minimum distance of 1000 feet. The first 500 feet shall consist of full TOPO to a shot outside the bank.
5. **CHANNELS PARALLELING THE ROADWAY/ALIGNMENT:**
6. Traverse streams a minimum distance of 500 feet perpendicular from centerline.
7. Rivers and large creeks require a minimum distance of 1000 feet perpendicular from centerline crossing.
8. **BRIDGE STRUCTURES:**
9. Acquire all data as listed in Item 2 above.
10. Sufficient DTM shall be gathered to generate a three line profile along proposed roadway (bridge) centerline and natural ground left and right of said centerline.
11. Sufficient bridge structures as determined by the project scope of work.
12. **EXISTING DRAINAGE STRUCTURES:**
13. Show location, skew, inlet flow line elevation, outlet flow line elevation, length, size, type, and flow direction arrows for all structures exceeding survey limits. Show headwalls and pipe end treatments as applicable and where slope warping occurs at the drainage structure.
14. Review proposed design to ensure limits are adequate.
15. **DRAINAGE ON RESURFACING PROJECTS**
16. Collect channel DTM to right of way and a minimum 100’ past existing structure.
17. Review proposed design scope to ensure limits are adequate.

**Note:** Please consult the State Hydraulics Engineer if you have any questions or need additional clarification.

1. **ELECTRONIC DATA COLLECTION AND DRAFTING**

Field information necessary for development of construction contract plans shall be collected electronically by total station equipment or by combination of total station, GPS equipment, digital aerial mapping, and/or LiDAR. It is the intent of these guidelines to provide procedures in which the Alabama Department of Transportation’s electronic field data shall be interpreted and easily utilized by all Region offices and the central office. It is essential uniform formats be utilized for the purpose of exchange of information which must be in the file formats of the ALDOT current version of MicroStation and InRoads, with associated resources. This guideline covers data transfer and storage on the STATE’S current version of MicroStation and InRoads, with associated resources. It is the intent of these guidelines that all field survey data is processed prior to transfer to the STATE’S current version of MicroStation and InRoads, with associated resources.

1. All raw data files shall be submitted to the State in a format compatible with the STATE’S current version of MicroStation and InRoads, with associated resources. The raw data shall accurately reflect the data contained with the existing terrain and surface model such that the existing terrain and surface model can be accurately reproduced utilizing the STATE’S current version of MicroStation and InRoads.
2. All instrument raw data files are to include date, starting and finishing time, instrument type, and instrument serial number.
3. All points collected in the field shall be assigned a defined point code, utilizing the provided standard ALDOT survey codes and associated resources, for identification and upload.
4. **UPLOADING AND EDITING OF SURVEY FIELD INFORMATION**
5. Original raw data files are downloaded from the instrument and archived to a safe location. This data shall remain un-modified and be submitted separately when the survey is complete.
6. Copies of raw data are edited and processed. The final edited files shall be saved to a folder for submittal.
7. All binary format survey data shall be processed and saved to individual ASCII format text files for submittal.
8. **SURVEY SUBMITTAL FOR REVIEW**
   * 1. The CONSULTANT shall furnish the STATE a PRELIMINARY submittal for review. The submittal must be approved for content and format prior to submittal of final files. All requested information shall be included. If minor items are observed during the review, comments and/or questions shall be returned to the CONSULTANT for correction. If multiple or major procedural problems exist, the submittal shall be rejected, the CONSULTANT shall be notified, and all payments shall be stopped.
9. **FINAL SURVEY SUBMITTAL**
10. After approval of survey content and format, The Surveyor shall furnish the STATE a final submittal of all survey information.
11. . The following shall be provided:
12. Any files generated in software different from the submitted ALDOT CADD system shall be submitted for archive. The submittal agency shall be responsible for translating all applicable files into the format of the current version of MicroStation and InRoads, or compatible LANDXML format.
13. Any files related or pertaining to collection and/or reduction of field survey data shall be compressed to ZIP files.
14. Electronic property information, tax maps, deeds, ROW maps, etc.
15. Files received from other consultants or designers pertaining to preliminary construction limits, alignments, etc.
16. Any photographs and/or GIS data received from a county or municipal government.
17. Any special files used on projects, but do not fall in above categories.
18. All drawing files must be in the current MicroStation DGN version currently used by ALDOT. DWG and other formats must be converted by the agency delivering the drawings to the State.
19. **NOTE KEEPINGS**

Survey field notes and all calculations performed which are necessary to determine X, Y and Z coordinates of all points shall be reduced.

1. The STATE shall be furnished all original field note books used in surveys or printouts.
2. Electronically recorded notes shall be submitted on a CD or as an ASCII file listing of point numbers, point codes, X Y Z coordinates, and descriptors.
3. Any graphic files submitted shall be in a format compatible with ALDOT CADD Software.
4. All electronic data shall be submitted.
5. All Field Books, Level Books and other data used in location surveys shall be labeled, pages numbered, titled, and indexed. Any and all hardcopy items shall be scanned and provided in electronic format.
6. The cover of said book shall be labeled in ink and indicate the following information:
7. Name of firm or ALDOT Bureau/Region/Area performing survey.
8. (Project Number) Example: FR-275(6)
9. (CPMS Number) Example: 1000048915
10. (Project Description) Example: On AL Hwy. 75 from U.S. Hwy. 431 to Marshall-DeKalb County Line
11. (County) Example: Marshall
12. (General Description of Contents)
13. (Book Number) Example: Book 1 of 3
14. Pages shall be numbered consecutively 1 through “?”, page 1 being the first ruled page on the right (left hand pages shall not be numbered).
15. Page 1 shall contain the information as listed on said cover (See 3 above).
16. Pages 2, 3, and 4 shall be the index.
17. Page 5 shall contain General Notes; i.e., any notes pertinent to said project.
18. Survey notes shall begin on Page 6.
19. Description of each survey shall be noted at the top of the page, at the beginning of each book and/or survey.
20. Blank pages shall be noted as Blank in said index.
21. Firm or Division Office address and telephone number shall be on the first page inside said cover, i.e.:

Property of: Alabama Department of Transportation

Address: West Area, East Central Region,

P.O. Box 2745, Birmingham, AL 35202

Telephone: 205-328-5820

1. The following items shall be placed in upper right-hand corner of the appropriate page for each day’s work:
   1. Date, time of day (a.m. or p.m.), starting and finishing time
   2. Weather
   3. The names and duties of all party members
   4. Instrument type and serial number
   5. Signature of Party Chief
   6. Brief description of work
   7. Point number range used for each set-up
   8. Any notes about data collection; to include any “office” modifications
2. There shall be no erasures in recorded data. A single line shall be drawn through an incorrect entry in order that it is legible, and correct value placed above it. Void an entire page by drawing diagonal lines to corners of the page. The person making said corrections shall initial all changes.
3. Notes shall be entered with a 3H or harder pencil. Books shall be prepared to withstand damp weather in the field while maintaining its legibility.
4. Notes shall be neat, legible and explicit.

**APPENDIX A**

**SAMPLE PROPERTY OWNER CONTACT LETTER**

**ALABAMA DEPARTMENT OF TRANSPORTATION**

1409 Coliseum Boulevard, Montgomery, Alabama 36110

P.O. Box 303050, Montgomery, Alabama 36130-3050

*Telephone: 334-242-6311 FAX: 334-262-8041*

*Robert Bentley* <<DATE>> *John R. Cooper*

*Governor*  *Transportation Director*

RE: Project # ????-????(???), ???? County

<<<<<Description>>>>>> CADD ?????

Dear Property Owner,

The Alabama Department of Transportation is currently conducting a preliminary survey on the above referenced project. Survey crew members may need to access your property to gather information necessary for design purposes.

Information gathered by our survey will be used to determine feasibility and location of additional lanes along <<<Road>>>. It will take a few months to complete this survey and may require the crew to set remote points marked with a stake, flagging, and/or paint.

Your patience and understanding will be greatly appreciated. In addition, any assistance locating property corner monuments, deeds, septic systems, high water elevations, or any other important information would be very helpful and welcomed.

All employees are to respect you and your property to the highest degree.

I will make every attempt to contact all property owners personally before we enter the property. If I fail to speak with you personally and you have questions or concerns, please contact me at cell number <<<Number>>>. Our work hours are Monday - Thursday (6:00 am to 4:00 pm).

**Please find the attached Right of Entry form for your approval and return.**

My supervisor, <<<Name>>>, can be reached on his cell at <<<Number>>>or his Montgomery office at <<<Number>>> if I am not available.

**ATTACHMENT A**

**SAMPLE PROPERTY OWNER CONTACT LETTER**

Sincerely,

<<Name>>, Chief of Party

Alabama Department of Transportation

<<<<Physical Address>>>>

<<<Mailing Address>>>>

<<<<City, State Zip>>>>

<<<<Phone Number>>>>

cc: File



**APPENDIX B**

**ALDOT SURVEY POINT CODES**

|  |  |  |  |
| --- | --- | --- | --- |
| ALDOT SURVEY CODES (PRECONSTRUCTION) | | | |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Survey Back Site Point | 100 | SRVBS | SURVEY POINTS |
| Survey Benchmark | 102 | SRVBM |
| Survey Existing US Benchmark Point Feature | 103 | SRVUSGS |
| Survey Project Control w/o Vertical | 104 | SRVCPNV |
| Survey Project Control with Vertical | 105 | SRVCPWV |
| Survey Existing Ground Spot Point | 106 | SRVDTMPT |
| Survey Check Point | 111 | SRVCKPT |
| Survey Temporary Control Remote Point Cell | 112 | SRVTMPPT |
| Survey Refernce Point Cell | 113 | SRVRFPT |
| Misc Staked Out Point Cell | 118 | SRVSKPT | SURVEY STAKE-OUTS |
| Survey Staked Out Line | 119 | SRVSKLN |
| Survey Section Corner Monument Point Cell | 120 | SRVSCOR | SURVEY ROW POINTS |
| Survey Property Corner Monument Point Cell | 121 | PRPPCOR |
| Survey Property Line | 122 | PRPPLINE |
| Survey Existing Row Marker Point Cell | 123 | ROWERWMK |
| Utility Easement Line | 124 | ROWUTEMT |
| Permanent Drainage Easement Line | 125 | ROWPDEMT |
| Permanent Construction Easement Line | 126 | ROWPCMNT |
| Temporary Drainage Easement Line | 127 | ROWTDEMT |
| Temporary Construction Easement Line | 128 | ROWTCEMT |
| Denied Access Fence | 129 | ROWDAFNC |
| Draped Acquired Row Feature | 130 | ROWARWLN |
| Acquired ROW Marker | 131 | ROWARWMK |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Geometry Annotation Horizontal PC Style | 150 | GMPC | GEOMETRY |
| Geometry Horizontal Annotation PI Style | 151 | GMPI |
| Geometry Horizontal Annotation PT Style | 152 | GMPT |
| Geometry Horizontal Annotation PCC Style | 153 | GMPCC |
| Geometry Horizontal Annotation PRC Style | 154 | GMPRC |
| Geometry Horizontal Annotation CS Style | 155 | GMCS |
| Geometry Horizontal Annotation ST Style | 156 | GMST |
| Geometry Horizontal Annotation TS Style | 157 | GMTS |
| Cl Survey Geometry Feature from Field Survey | 170 | GMCLSUR |
| CL Construction Geometry Feature | 171 | GMCLCNT |
| Cl Side or Cross Road Geometry Feature | 172 | GMCLSDRD |
| Cl Detour/Diversion Geometry Feature | 173 | GMCLDET |
|  | 173 | GMCLDIV |
| CL EBR Geometry Feature | 175 | GMCLEBR |
| CL NBR Geometry Feature | 176 | GMCLNBR |
| CL SBR Geometry Feature | 177 | GMCLSBR |
| CL WBR Geometry Feature | 178 | GMCLWBR |
| CL Major Steam Geometry Feature | 180 | GMCLCRK |
|  | 180 | GMCLRIVR |
| BL EBR Geometry Feature | 190 | GMBLEBR |
| BL NBR Geometry Feature | 191 | GMBLNBR |
| BL SBR Geometry Feature | 192 | GMBLSBR |
| BL WBR Geometry Feature | 193 | GMBLWBR |
| BL Roundabout Geometry Feature | 194 | GMRNDBT |
| BL Ramp A Geometry Feature | 195 | GMBLRMPA |
| BL Ramp B Geometry Feature | 196 | GMBLRMPB |
| BL Ramp C Geometry Feature | 197 | GMBLRMPC |
| BL Ramp D Geometry Feature | 198 | GMBLRMPD |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Mainline Cl or Crown of Pavement Breakline | 200 | EXCL | EX CL FEATURES |
| Existing Cl Feature for NBR Pavement Breakline | 201 | EXCLNB |
| Existing Cl Feature for SBR Pavement Breakline | 202 | EXCLSB |
| Existing Cl Feature for EBR Pavement Breakline | 203 | EXCLEB |
| Existing Cl Feature for WBR Pavement Breakline | 204 | EXCLWB |
| Existing Cl Feature for Side Road Pavement Breakline | 210 | EXCLSDRD |
| Existing Cl Railroad Tracks Breakline | 220 | EXCLRR |
| Existing CL Median Crossover/Gore Line Beakline | 225 | EXCLCRVR |
|  | 225 | EXGORLIN |
| Existing Lt Outside Edge of Pavement Feature Breakline | 230 | EXLOEP | EX EOPS |
| Existing Lt Inside Edge of Pavement Feature Breakline | 231 | EXLIEP |
| Existing Rt Inside Edge of Pavement Feature Breakline | 232 | EXRIEP |
| Existing Rt Outside Edge of Pavement Feature Breakline | 233 | EXROEP |
| Existing Lt Outside Lane EOP Feature Breakline | 234 | EXLOLN |
| Existing Lt Inside Lane EOP Feature Breakline | 235 | EXLILN |
| Existing Rt Inside Lane EOP Feature Breakline | 236 | EXRILN |
| Existing Rt Outside Lane EOP Feature Breakline | 237 | EXROLN |
| Existing LOTurn/Accel Lane EOP Feature Breakline | 240 | EXLOTRN |
| Existing LITurn/Accel Lane EOP Feature Breakline | 241 | EXLITRN |
| Existing RI Turn/Accel Lane EOP Feature Breakline | 242 | EXRITRN |
| Existing RO Turn/Accel Lane EOP Feature Breakline | 243 | EXROTRN |
| Existing Ramp Lt Outside Edge of Pavement Feature Breakline | 245 | EXRAMPLP |
| Existing Ramp Rt Outside Edge of Pavement Feature Breakline | 246 | EXRAMPRP |
| Existing Ramp Lane Edge of Pavement Feature Breakline | 247 | EXRAMPLN |
| Existing Lt Outside Edge of Pavement Side RD Feature Breakline | 250 | EXLOEPSR |
| Existing Lt Outside Edge of Pavement Radius Side RD Feature Breakline | 251 | EXLOSRRD |
| Existing Rt Outside Edge of Pavement Side RD Feature Breakline | 252 | EXROEPSR |
| Existing Rt Outside Edge of Pavement Side RD Radius Feature Breakline | 253 | EXROSRRD |
| Existing Truck Wt Lane Divider EOP Feature Breakline | 254 | EXTRKEOP |
| Existing Truck Wt Lane Outside Edge of Pavement Feature Breakline | 255 | EXOTKEOP |
| Existing Truck Climb/Runaway Lane EOP Breakline | 256 | EXTRKLN |
| Existing Ramp Lt Edge of Pavement Feature Breakline | 257 | EXRPLEP |
| Existing Ramp Rt Edge of Pavement Feature Breakline | 258 | EXRPREP |
| Existing Ramp Turn Lane EOP Breakline | 259 | EXRMPTL |
| Existing Edge of Asphalt Dr Beakline | 260 | EXPVDDR |
| Existing Edge of Asphalt Parking Lot Breakline | 261 | EXPVDPK |
| Existing Edge of Concrete Dr Beakline | 262 | EXCONCDR |
| Existing Edge of Concrete PK Lot Beakline | 263 | EXCONCPK |
| Existing Edge of Air Field Pavement Feature Breakline | 264 | EXAIRFLD |
| Existing Edge of Gravel Drive Breakline | 265 | EXGRVLDR |
| Existing Edge of Gravel Parking Lot Breakline | 266 | EXGRVLPK |
| Existing Edge of Dirt Drive Breakline | 267 | EXDRTDR |
| Existing Edge of Dirt PK Lot Breakline | 268 | EXDRTPK |
| Existing Lt Outside Edge of Pavement Top Joint Seal Feature Breakline | 270 | EXLOTPJS |
| Existing Lt Outside Edge of Pavement Bottom Joint Seal Feature Breakline | 271 | EXLOBPJS |
| Existing Rt Outside Edge of Pavement Top Joint Seal Feature Breakline | 272 | EXROTPJS |
| Existing Rt Outside Edge of Pavement Bottom Joint Seal Feature Breakline | 273 | EXROBPJS |
| Existing Lt Inside Edge of Pavement Top Joint Seal Feature Breakline | 274 | EXLITPJS |
| Existing Lt Inside Edge of Pavement Bottom Joint Seal Feature Breakline | 275 | EXLIBPJS |
| Existing Rt Inside Edge of Pavement Top Joint Seal Feature Breakline | 276 | EXRITPJS |
| Existing Rt Inside Edge of Pavement Bottom Joint Seal Feature Breakline | 277 | EXRIBPJS |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing LO Paved Shoulder Breakline | 280 | EXLOPS | EX PAVED SHLDS |
| Existing LI Paved Shoulder Breakline | 281 | EXLIPS |
| Existing RI Paved Shoulder Breakline | 282 | EXRIPS |
| Existing RO Paved Shoulder Breakline | 283 | EXROPS |
| Existing LO Paved Shoulder Drive Breakline | 284 | EXLOPSDR |
| Existing RO Paved Shoulder Drive Breakline | 285 | EXROPSDR |
| Existing LO Paved Shoulder Side RD Breakline | 286 | EXLOPSRD |
| Existing RO Paved Shoulder Side RD Breakline | 287 | EXROPSRD |
| Existing Ramp Lt Paved Shoulder Breakline | 288 | EXRPLPS |
| Existing Ramp Rt Paved Shoulder Breakline | 289 | EXRPRPS |
| Existing Lt Outside Shoulder Feature Breakline | 290 | EXLOS | EX GRADED SHLDS |
| Existing Lt Inside Shoulder Feature Breakline | 291 | EXLIS |
| Existing Rt Inside Shoulder Feature Breakline | 292 | EXRIS |
| Existing Rt Outside Shoulder Feature Breakline | 293 | EXROS |
| Existing Lt Outside Shoulder Side RD Feature Breakline | 294 | EXLOSSR |
| Existing Rt Outside Shoulder Side RD Feature Breakline | 295 | EXROSSR |
| Existing Lt Guardrail Shld | 296 | EXLOGRS |
| Existing Rt Guardrail Shld | 297 | EXROGRS |
| Existing Ramp Lt Shld | 298 | EXRPLSH |
| Existing Ramp Rt Shld | 299 | EXRPRSH |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing FL of Concrete Pipe Feature Breakline | 300 | EXFLRCP | EXISTING PIPES |
| Existing FL of Metal Pipe Feature Breakline | 301 | EXFLCMP |
| Existing FL of BCCM Pipe Feature Breakline | 302 | EXFLBCMP |
| Existing FL of PVC Pipe Feature Breakline | 303 | EXFLPVCP |
| Existing FL of Plastic Pipe Feature Breakline | 304 | EXFLPLSP |
| Existing FL of Side Drain Pipe Feature Breakline | 305 | EXFLSDP |
| Existing FL Slotted Drain Pipe Feature Breakline | 306 | EXFLSDRP |
| Existing FL Storm Sew Pipe Feature Breakline | 307 | EXFLSTSP |
| Existing Box Culv Outside Edge Breakline | 310 | EXOUTCLV | EXISTING BOX CULVERTS |
| Existing FL of Box Culvert Feature Breakline | 311 | EXFLCULV |
| Existing Box Culv Inside Edge Breakline | 312 | EXINCULV |
| Existing Top Box Culvert Wing Wall Breakline | 315 | EXTCLVWW |
| Existing Back Box Culvert Wing Wall Breakline | 316 | EXBCLVWW |
| Existing Top Box Culvert HW Breakline | 317 | EXTCLVHW |
| Existing Back Box Culvert HW Breakline | 318 | EXBCLVHW |
| Existing Pipe HW or End Treatment Top Feature Breakline | 320 | EXTHWP | EXISTING PIPE END TREATMENTS |
| Existing Pipe HW or End Treatment Bottom Feature Breakline | 321 | EXBHWP |
| Existing Pipe Headwall or End Treatment Feature Breakline | 322 | EXPET |
| Existing Side Drain Pipe Headwall or PET | 323 | EXSDPET |
| Existing TY AB End Treatment Line | 325 | EXABPET |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Top of Inlet Feature Breakline | 326 | EXTDI | EXISTING INLETS |
| Existing FL of Drop Inlet Feature Breakline | 327 | EXFLDI |
| Existing Inlet Inside Shell | 328 | EXINVTIN |
| Existing Inlet Outside Shell | 329 | EXINVOUT |
| Existing Weep Hole Point Cell | 330 | EXWEEP |
| Existing Single Wing Curb Inlet Feature Breakline | 331 | EXSWSIN |
| Existing Double Wing Curb Inlet Feature Breakline | 332 | EXDWSIN |
| Existing Inlet TY Y Median Feature Breakline | 333 | EXINY |
| Existing Inlet TY X Median Feature Breakline | 334 | EXINX |
| Existing FL of Drainage JCT Box Feature Breakline | 335 | EXDRJBFL | EXISTING JCT BOXES |
| Existing JCT Box Inside Shell | 336 | EXJBVIN |
| Existing JCT Box Outside Shell | 337 | EXJBVOUT |
| Existing Storm Sewer Manhole Point Cell | 338 | EXSTSMH | EXISTING STORM SEWERS |
| Existing Storm Sewer Inside Shell Feature Breakline | 339 | EXSTSIN |
| Existing Storm Sewer Outside Shell Feature Breakline | 340 | EXSTSOUT |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Ditch CL Feature Breakline | 345 | EXDITCL | EXISTING DITCHES |
| Existing Ditch LT CL Feature Breakline | 346 | EXLTDTCL |
| Existing Ditch RT CL Feature Breakline | 347 | EXRTDTCL |
| Existing Lt Ditch Bottom Feature Breakline | 348 | EXLTDTDB |
| Existing Lt Ditch Foreslope Feature Breakline | 349 | EXLTDTFS |
| Existing Rt Ditch Foreslope Feature Breakline | 350 | EXRTDTFS |
| Existing Rt Ditch Bottom Feature Breakline | 351 | EXRTDTDB |
| Existing Lt Median Ditch Bottom Feature Breakline | 353 | EXLMD |
| Existing Rt Median Ditch Bottom Feature Breakline | 354 | EXRMD |
| Existing Lt Edge of Concrete Flume Breakline | 355 | EXLFLMED |
| Existing Lt Concrete Flume Bottom Feature Breakline | 356 | EXLFLMBT |
| Existing Rt Concrete Flume Bottom Feature Breakline | 357 | EXRFLMBT |
| Existing Rt Edge of Concrete Flume Breakline | 358 | EXRFLMED |
| Existing Lt Top Rip Rap Ditch Feature Breakline | 359 | EXLTRIPT |
| Existing Lt Rip Rap Ditch Bottom Feature Breakline | 360 | EXLTRIPB |
| Existing Rt Rip Rap Ditch Bottom Feature Breakline | 361 | EXRTRIPB |
| Existing Rt Top Rip Rap Ditch Feature Breakline | 362 | EXRTRIPT |
| Existing FL of Drain Feature Breakline | 363 | EXFLDRN |
| Existing FL of Major Stream Feature Breakline | 364 | EXFLSTRM |
| Existing Lt Ditch Bank Feature Breakline | 365 | EXLBANK |
| Existing Lt Drain Bottom Feature Breakline | 366 | EXLSTRMB |
| Existing Rt Drain Bottom Feature Breakline | 367 | EXRSTRMB |
| Existing Rt Ditch Bank Feature Breakline | 368 | EXRBANK |
| Existing High Water Line Feature Breakline | 369 | EXHWM | EXISTING MISC. DRAINAGE ITEMS |
| Existing Pond Bank Edge | 370 | EXPONDBK |
| Existing Pond Water Surface Edge | 371 | EXPNDEDG |
| Existing Misc Drainage Items | 379 | EXMSCDRN |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Brdg Wing Guardrail Curb Bottom Feature | 400 | WGRCURBB | EXISTING CONCRETE CURBS |
| Existing Brdg Wing Guardrail CurbTop Feature | 401 | WGRCURBT |
| Existing Concrete Gas Pump Island Feature Breakline | 402 | EXGASISL |
| Existing CL of Gutter Feature Breakline | 403 | EXCLGTTR |
| Existing Front Concrete Gutter Edge Breakline | 404 | EXFRGTTR |
| Existing Back Concrete Gutter Edge Breakline | 405 | EXBKGTTR |
| Existing Concrete Curb Base Feature Breakline | 406 | EXCBBASE |
| Existing Top of Concrete Curb Feature Breakline | 407 | EXTC |
| Existing Back of Concrete Curb Feature Breakline | 408 | EXBC |
| Existing Concrete Island Feature Breakline | 409 | EXCONISL | EXISTING CONCRETE FEATURES |
| Existing Concrete Picnic Table Point Cell | 410 | EXPICTAB |
| Existing Concrete Handrail Feature Breakline | 411 | EXCONHDR |
| Existing Concrete Step Feature Breakline | 412 | EXCONSTP |
| Existing Lt Concrete Walk Feature Breakline | 413 | EXLWALK |
| Existing Rt Concrete Walk Feature Breakline | 414 | EXRWALK |
| Existing Lt Concrete Barrier Feature Breakline | 415 | EXLBARR | EXISTING CONCRETE BARRIERS & WALLS |
| Existing Lt Concrete Barrier Reveal Feature Breakline | 416 | EXLREVEL |
| Existing Lt Conc Barrir 7-10 Feature Breakline | 417 | EXLTSVTN |
| Existing Lt Top Concrete Safety Barrier Feature Breakline | 418 | EXLTBARR |
| Existing Rt Concrete Barrier Feature Breakline | 419 | EXRBARR |
| Existing Rt Concrete Barrier Reveal Feature Breakline | 420 | EXRREVEL |
| Existing Rt Conc Barrir 7-10 Feature Breakline | 421 | EXRTSVTN |
| Existing Rt Top Concrete Safety Barrier Feature Breakline | 422 | EXRTBARR |
| Existing Top of Concrete Wall Feature Breakline | 423 | EXTPWALL |
| Existing Back of Concrete Wall Feature Breakline | 424 | EXBKWALL |
| Existing Misc. Concrete Feature Breakline | 425 | EXMSCONC | EXISTING MISC CONC |
| Existing Concrete Planter Feature Breakline | 426 | EXPLANTR |
| Existing Misc. Fence Breakline | 430 | EXFNC | EXISTING FENCES |
| Existing Barbed Wire Fence Breakline | 431 | EXBARBFN |
| Existing Chain Link (Cyclone) Fence Breakline | 432 | EXCHANFN |
| Existing Hog Wire Fence Breakline | 433 | EXHGWRFN |
| Existing Wood Fence Breakline | 434 | EXWOODFN |
| Existing Electric Fence Breakline | 435 | EXELECFN |
| Existing PVC Fence Breakline | 436 | EXPVCFNC |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Sign Breakline | 440 | EXSGNLN | EXISTING SIGNS |
| Existing Sign Point Cell | 441 | EXSGNCL |
| Existing Billboard Feature Breakline | 442 | EXBILL |
| Existing OH Sign Bridge Breakline | 443 | EXOHSB |
| Existing OH Cantilever Sign Point Cell | 444 | EXOHC |
| Existing Marsh Edge Feature Breakline | 450 | EXMRSH | MISC TOPO FEATURES |
| Existing Water Edge Feature Breakline | 451 | EXWATED |
| Existing Propane Tank Point Cell | 452 | EXLPTNK |
| Existing Satellite Dish Point Cell | 453 | EXSAT |
| Existing Septic Tank Point Cell | 454 | EXSEPTNK |
| Existing Field Lines Breakline | 455 | EXFLDLN |
| Existing Well Point Cell | 456 | EXWELL |
| Existing Parking Meter Point Cell | 457 | EXPKMTR |
| Existing Water Sprinkler Point Cell | 458 | EXSPRNK |
| Existing Building Breakline | 459 | EXBLDG |
| Existing Awning Feature Breakline | 460 | EXAWNG |
| Existing Woods Line Breakline | 461 | EXWDSLN |
| Existing Tree Point Cell | 462 | EXTREE |
| Existing Bush/Shrub Point Cell | 463 | EXBSH |
| Existing Flower Bed Feature Breakline | 464 | EXFLWBD |
| Existing Buried Tank Point Cell | 465 | EXBURTNK |
| Existing Gas Pump Point Cell | 466 | EXGASPMP |
| Existing Railroad Top of Rail Feature Breakline | 468 | EXTRRRL |
| Existing Railroad Bottom Rail Breakline | 469 | EXBRRR |
| Existing Guardrail Feature Breakline | 470 | EXGR |
| Existing Cable Guide Rail Feature Breakline | 471 | EXCABGUR |
| Existing Rip Rap Feature Breakline | 472 | EXRIPRAP |
| Existing High Point Feature Breakline | 473 | EXHIGH |
| Existing Toe of Slope Feature Breakline | 474 | EXTOSLP |
| Existing Misc Topo Line Feature Breakline | 475 | EXTOPOLN |
| Bore Hole Point Cell | 480 | BORE |
| Staked Out Bore Hole Breakline | 481 | BORESK |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Gas Valve Point Cell | 500 | EXGVAL | EXISTING GAS FEATURES |
| Existing Gas Service Line Feature Breakline | 501 | EXGSERL |
| Existing Gas Main Line Feature Breakline | 502 | EXGMN |
| Existing Gas Regulator Point Cell | 503 | EXGREG |
| Existing Gas Dryer Station Point Cell | 505 | EXGDRY |
| Existing Gas Transmission Line Feature Breakline | 506 | EXGTRNS |
| Existing Gas Well Point Cell | 507 | EXGWELL |
| Existing Water Fire Hydrant Point Cell | 510 | EXFHY | EXISTING WATER FEATURES |
| Existing Water Valve Point Cell | 511 | EXWVAL |
| Existing Water Meter Point Cell | 512 | EXWMTR |
| Existing Water Main Line Feature Breakline | 513 | EXWML |
| Existing Water Service Line Feature Breakline | 514 | EXWSRV |
| Existing Water Tower Point Cell | 515 | EXWTWR |
| Existing Water Spigot Point Cell | 516 | EXWSPIG |
| Existing Utility Transmission Crossing Feature Breakline | 520 | EXOHXNG | EXISTING ELECTRIC FEATURES |
| Existing Power Pole Point Cell | 521 | EXPP |
| Existing OH Electric Line Elev | 522 | EXOHELV |
| Existing Transmission Tower Point Cell | 523 | EXTRSTWR |
| Existing Buried Electric Cable Feature Breakline | 525 | EXBECAB |
| Existing Electrical Manhole Point Cell | 526 | EXEMH |
| Existing Electrical JCT Box Point Cell | 527 | EXEBURJB |
| Existing Telephone Pole Point Cell | 530 | EXPHPL | EXISTING PHONE FEATURES |
| Existing Telephone Pedestal Point Cell | 531 | EXPHPED |
| Existing Telephone (Public) Point Cell | 532 | EXPHPUB |
| Existing Phone Jct Box Feature Breakline | 533 | EXPHJBLN |
| Existing Buried Phone Cable Feature Breakline | 535 | EXBPHCAB |
| Existing Buried Phone JCT Box Point Cell | 536 | EXBPHJB |
| Existing Telephone Manhole Point Cell | 537 | EXPHMH |
| Existing Buried Fiber Opt Cable Feature Breakline | 538 | EXBFOC |
| Existing Overhead Phone JCT Box Point Cell | 539 | EXOHPHJB |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Television Pole Point Cell | 540 | EXTVPL | EXISTING TV FEATURES |
| Existing OverheadTV Cable Feature Breakline | 541 | EXOTVCAB |
| Existing Buried TV Cable Feature Breakline | 545 | EXBTVCAB |
| Existing Sanitary Sewer Manhole FL Note | 549 | EXFLSSMH | EXISTING SAN SEWER FEATURES |
| Existing Sanitary Sewer Manhole Point Cell | 550 | EXSANSMH |
| Existing SanSew Manhole Inside Shell | 551 | EXSSVTIN |
| Existing SanSew Manhole Outside Shell | 552 | EXSSVTOT |
| Existing Sanitary Sewer Feature Breakline | 553 | EXSNSLIN |
| Existing Sanitary Sewer Pumping Station Point Cell | 554 | EXSSPUMP |
| Existing Light Pole Point Cell | 555 | EXLTPL | EXISTING LIGHTING FEATURES |
| Existing OvHead Elec Lighting Line | 556 | EXOLGTLN |
| Existing OH Lighting Luminaire Cell | 557 | EXLUM |
| Existing OH High Mast Cell | 558 | EXHMST |
| Existing Misc Lighting (Cell) | 559 | EXOLGTCL |
| Existing Traffic Signal Pole Point Cell | 565 | EXSGNLPL | EXISTING SIGNAL FEATURES |
| Existing Traffic Signal Point Cell | 566 | EXSGNLCL |
| Existing Traffic Signal (Flashing Beacon) Point Cell | 567 | EXSGNLFB |
| Existing OvHead Elec Traffic Signal Line | 568 | EXSGNLLN |
| Existing Traffic Signal Controller Cabinet Breakline | 569 | EXSGNLCB |
| Existing Ovhead Elec Line (ITS) Feature Breakline | 575 | EXOITSLN | EXISTING ITS FEATURES |
| Existing ITS Changeable Message Sign Feature Breakline | 576 | EXITSCHN |
| Existing ITS Feature Point Cell | 577 | EXITSCL |
| Existing Traffic Detection Loop Line | 578 | EXTRFLP |
| Existing Weigh in Motion Line | 579 | EXWIM |
| Existing Utility Pole Anchors Point Cell | 590 | EXOHUPLA | EXISTING MISC UTILITY FEATURES |
| Existing RR Telegraph Pole Point Cell | 591 | EXRRTGPL |
| Existing Brace Pole Point Cell | 592 | EXBRPL |
| Existing Solar Pannel Installation | 593 | EXSOLPNL |
| Existing Oil Trans Line (Above ground) | 594 | EXOILMN |
| Existing Buried Oil Trans Line | 595 | EXBOILMN |
| Existing Misc. Utility Line Feature Breakline | 596 | EXMSUTLN |
| Existing Utility Line Elevation Note | 597 | EXUTELEV |
| Existing Misc Utility Pole | 598 | EXMSCUPL |
| Feature Description | Numeric Code | Alpha Code | CATEGORY |
|
| Existing Concrete Bridge End Slab Feature Breakline | 600 | EXBES | EXISTING BRIDGE FEATURES |
| Existing Concrete Bridge Deck End Breakline | 601 | EXBREND |
| Existing CL/Crown of Bridge Breakline | 602 | EXCLBRCR |
| Existing Left Concrete Bridge Deck Breakline | 605 | EXLTBRDK |
| Existing Left Brdg Barrier/Handrail NJB 3inch Lip Breakline | 606 | EXLBRBLP |
| Existing Left Brdg Barrier/Handrail NJB 7-10 Breakline | 607 | EXLBRBST |
| Existing Left Brdg Barrier/Handrail Top | 608 | EXLBRBTP |
| Existing Left Brdg Barrier/Handrail Back | 609 | EXLBRBBK |
| Existing Left Brdg Barrier/Handrail Bottom Line | 610 | EXLBRBBT |
| Existing Left Brdg Wheel Guard Base Feature Breakline | 611 | EXLBRWBS |
| Existing Left Brdg Wheel Guard Face Bottom Feature Breakline | 612 | EXLBRWFC |
| Existing Left Brdg Wheel Guard Top Feature Breakline | 613 | EXLBRWTP |
| Existing Left Brdg Wheel Guard Back Feature Breakline | 614 | EXLBRWBK |
| Existing Left Brdg Wheel Guard Back Bottom Feature Breakline | 615 | EXLBRWBT |
| Existing Right Concrete Bridge Deck Breakline | 620 | EXRBRGDK |
| Existing Right Brdg Barrier/Handrail NJB 3inch Lip Breakline | 621 | EXRBRBLP |
| Existing Right Brdg Barrier/Handrail NJB 7-10 Breakline | 622 | EXRBRBST |
| Existing Right Brdg Barrier/Handrail Top | 623 | EXRBRBTP |
| Existing Right Brdg Barrier/Handrail Back | 624 | EXRBRHBK |
| Existing Right Brdg Barrier/Handrail Bottom Line | 625 | EXRBRHBT |
| Existing Right Brdg Wheel Guard Base Feature Breakline | 626 | EXRBRWBS |
| Existing Right Brdg Wheel Guard Face Bottom Feature Breakline | 627 | EXRBRWFC |
| Existing Right Brdg Wheel Guard Top Feature Breakline | 628 | EXRBRWTP |
| Existing Right Brdg Wheel Guard Back Feature Breakline | 629 | EXRBRWBK |
| Existing Right Brdg Wheel Guard Back Bottom Feature Breakline | 630 | EXRBRWBT |
| Existing Concrete Bridge Abutment Breakline | 640 | EXCBRABT |
| Existing Rip Rap Bridge Abutment Feature Breakline | 641 | EXRBRABT |
| Existing Aggregate Bridge Abutment Breakline | 642 | EXABRABT |
| Existing Concrete Bridge Bent Breakline | 645 | EXBRBENT |
| Existing Concrete Bridge Girder Breakline | 660 | EXBRGRD |
| Existing Concrete Bridge Seat Breakline | 680 | EXBRSEAT |
| Existing Misc Bridge Feature Breakline | 685 | EXBRMSC |

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| APPROVED STANDARD ABBREVIATIONS | |
| To conserve space and time during field operations, certain work  abbreviations are acceptable and shall be observed by the survey party unless long hand spelling is preferred. | |
| ABANDON(ED) | ABAN |
| ABUTMENT | ABUT |
| ACCELERATION | ACCL |
| ACQUIRED | ACQD |
| ACRE | AC |
| AHEAD | AH |
| ALABAMA | AL |
| ALABAMA DEPARTMENT OF TRANSPORTATION | ALDOT |
| ALTERNATE | ALT |
| AND OTHERS | ET AL |
| AND WIFE | ET UX |
| APPROXIMATE(LY) | APP |
| AREA | A |
| ASPHALT | ASP |
| AVERAGE ANNUAL DAILY TRAFFIC | AADT |
| BACK | BK |
| BATTERBOARD | BB |
| BACK OF GUARDRAIL | BK-GR |
| BACKSIGHT | BS |
| BARBED WIRE | B/W |
| BARREL | BBL |
| BARRIER | BAR |
| BASE LINE | BL |
| BEARING | BRNG |
| BEGIN | BEG |
| BEGINNING OF PROJECT | BOP |
| BETWEEN | BTW |
| BENCH MARK | BM |
| BILLBOARD | BBD |
| BITUMINOUS | BIT |
| BITUMINOUS COATED CORRUGATED METAL PIPE | BCCMP |
| BOUNDARY | BDY |
| BRIDGE | BRG |
| BUILDING | BLDG |
| CAPACITY | CAPY |
| CAST IRON | CI |
| CATCH BASIN | CB |
| CENTER LINE | CL |
| CHAIN LINK | C/L |
| CHURCH | CH |
| CLASS | CLS |
| CONCRETE | CONC |
| CONNECTION | CONN |

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| --- | --- | --- |
| CONSTRUCTION |  | CONST |
| CORNER |  | COR |
| CORRECTION |  | CORR |
| CORRUGATED IRON |  | CORI |
| CORRUGATED METAL |  | CM |
| CORRUGATED METAL PIPE |  | CMP |
| COUNTY |  | CO |
| COUNTY ROAD |  | CO-RD |
| CREEK |  | CK |
| CROSS SECTION |  | X-SEC |
| CROWN REMOVED |  | CR |
| CUBIC FEET |  | FT3 |
| CUBIC FEET PER SECOND |  | CFS |
| CUBIC YARD |  | YD3 |
| cubic meters |  | m3 |
| CULVERT |  | CULV |
| CULTIVATED |  | CULT |
| CURB FACE |  | CF |
| CURB AND GUTTER |  | C&G |
| CUT |  | C |
| CURVE TO SPIRAL |  | CS |
| DECELERATION |  | DECEL |
| DECLINATION |  | DECL |
| DEGREE OF CURVE |  | DC |
| DENIED ACCESS |  | D/A |
| DEPARTURE |  | DEP |
| DIAMETER |  | DIA |
| DIRECTION |  | DIR |
| DISTANCE |  | DIST |
| DOUBLE |  | DBL |
| DOUBLE BARREL CULVERT |  | CD |
| DRAINAGE AREA |  | DA |
| DRIVE |  | DR |
| DROP INLET |  | DI |
| EACH |  | EA |
| EASEMENT |  | ESMT |
| EAST |  | E |
| EAST BOUND ROADWAY |  | EBR |
| EDGE OF PAVEMENT |  | EP |
| ELEVATION |  | EL |
| END OF RETURN |  | ER |
| END ANCHOR |  | E/A |
| END OF PROJECT |  | EOP |
| EQUATION |  | EQ |
| EXCAVATION |  | EXCAV |
| EXISTING |  | EX |
| EXPANSION |  | EXP |

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| --- | --- | --- |
| EXTENSION |  | EXT |
| EXTERNAL |  | E |
| EXTRA STRENGTH |  | EXT STR |
| FEET |  | FT |
| FILL |  | F |
| FILTER BLANKET |  | FLT BLNK |
| FINISHED GRADE |  | FG |
| FINISHED SURFACE |  | FS |
| FISCAL YEAR |  | FY |
| FIXED |  | FIX |
| FLAT BOTTOM |  | FB |
| FLOW LINE |  | FL |
| FORESIGHT OR FRONTSIGHT |  | FST |
| FRACTIONAL |  | FRAC |
| FULL SUPERELEVATION |  | FS |
| GALLON |  | GAL |
| GASOLINE PUMPS |  | GPP |
| GARAGE |  | GAR |
| GIRDER |  | GDR |
| GOVERNMENT |  | GOV |
| GRASS |  | GRS |
| GRADE CHANGE |  | GC |
| GRADE POINT |  | GP |
| GRADE ROD |  | GRD |
| GRAVEL |  | GRV |
| GAUGE |  | GA |
| GUARD RAIL |  | GR |
| HECTARE |  | HA |
| HEADWALL |  | HDWL |
| HIGH WATER MARK |  | HWM |
| HEIGHT |  | HT |
| HEIGHT OF INSTRUMENT |  | HI |
| HIGH WATER |  | HW |
| HIGHWAY |  | HWY |
| HORIZONTAL |  | HOR |
| HUB & TACK |  | H&T |
| IN ACCORDANCE WITH |  | I/A/W |
| IN PLACE |  | IN-PL |
| INCHES |  | IN |
| INCLUDING |  | INCL |
| INSTRUMENT |  | INST |
| ISLAND |  | ISL |
| JOINT |  | JT |
| JUNCTION |  | JCT |
| JUNCTION BOX |  | JB |
| kilometer |  | km |
| kilometer post |  | kmp |

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| --- | --- | --- |
| kilometers per hour |  | kph |
| LANE |  | LN |
| LATITUDE |  | LAT |
| LEFT |  | LT |
| LEFT AHEAD |  | LA |
| LEFT BACK |  | LB |
| LENGTH OF CURVE |  | L |
| LINK |  | LK |
| LIMIT |  | LIM |
| LINEAR |  | LIN |
| LINEAR FEET |  | LIN FT |
| LONGITUDE |  | LONG |
| MANHOLE |  | MH |
| MARKER |  | MRK |
| MAXIMUM |  | MAX |
| MEAN HIGH WATER |  | MHW |
| MEAN LOW WATER |  | MLW |
| MEASUREMENT |  | MEAS |
| MEDIAN |  | MED |
| meter |  | m |
| MERIDIAN |  | MER |
| MILE POST |  | MP |
| MILES |  | MI |
| MILES PER HOUR |  | MPH |
| millimeter |  | mm |
| MINIMUM |  | MIN |
| MOBILE HOME |  | MH |
| MONUMENT |  | MON |
| MULTIPLE |  | MULT |
| NORMAL |  | NORM |
| NORMAL CROWN |  | NC |
| NORMAL CROWN SLOPE |  | NCS |
| NORTH |  | N |
| NORTH BOUND ROADWAY |  | NBR |
| NORTHING-EASTING |  | NE |
| NUMBER |  | NO |
| OBSERVATION |  | OBS |
| OFFSET LEFT |  | LT |
| OFFSET RIGHT |  | RT |
| ON CENTERS |  | OC |
| ORIGINAL |  | ORIG |
| OVERHEAD |  | OHD |
| OVERHAUL |  | OH |
| OUT TO OUT |  | OO |
| PAGE |  | PG |
| PAINT |  | PNT |
| PAVED |  | PVD |

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| --- | --- | --- |
| PAVED SHOULDER |  | PVD SH |
| PAVEMENT |  | PVMT |
| PIPE END TREATMENT |  | PET |
| PLATE GIRDER |  | PL GDR |
| POINT OF BEGINNING |  | POB |
| POINT OF COMPOUND CURVE |  | PCC |
| POINT OF CURVATURE |  | PC |
| POINT OF REVERSE CURVATURE |  | PRC |
| POINT OF ENDING |  | POE |
| POINT OF INTERSECTION |  | PI |
| POINT OF TANGENCY |  | PT |
| POINT ON CURVE |  | POC |
| POUND |  | lb |
| PRESENT |  | PRES |
| PROFILE GRADE |  | PG |
| PROJECT |  | PROJ |
| PROPERTY LINE |  | PL |
| PROPOSED |  | PROP |
| QUADRUPLE |  | QUAD |
| QUADRUPLE BARREL CULVERT |  | CQ |
| QUANTITY |  | QUANT |
| RADIUS |  | R |
| RAILROAD |  | RR |
| RANGE |  | RGE |
| RECORD |  | REC |
| REDUCTION |  | RED |
| REFERENCE |  | REF |
| REFERENCE POINT |  | RP |
| REFERENCE POINT FOR POINT ON TANGENT |  | RPPOT |
| REINFORCED |  | REINF |
| REINFORCED CONCRETE |  | RC |
| REINFORCED CONCRETE DECK GIRDER |  | RCDG |
| REINFORCING STEEL |  | REINF STL |
| RELOCATE |  | RELC |
| REMOVE |  | REM |
| REQUIRED |  | REQ |
| RETAIN(ING) |  | RET |
| REVERSE CROWN |  | RC |
| REVISION |  | REV |
| RIGHT |  | RT |
| RIGHT AHEAD |  | RA |
| RIGHT BACK |  | RB |
| RIGHT OF WAY |  | ROW |
| RIGHT OF WAY MARKER |  | ROWM |
| RIVER |  | RIV |
| ROAD |  | RD |
| ROADWAY |  | RDWY |

|  |  |  |
| --- | --- | --- |
| SCHOOL |  | SCH |
| SECTION |  | SEC |
| SERVICE ROAD |  | SER RD |
| SHEET |  | SHT |
| SHEET PILING |  | SHT PILE |
| SHOULDER |  | SHLD |
| SIDE DRAIN |  | SD |
| SIDEWALK |  | SW |
| SIGHT DISTANCE |  | S DIST |
| SINGLE BARREL CULVERT |  | CS |
| SKEW |  | SK |
| SLOPE STAKE |  | SST |
| SOLID SODDING |  | SOL SOD |
| SOUTH |  | S |
| SOUTH BOUND ROADWAY |  | SBR |
| SPECIAL |  | SP |
| SPECIAL DITCH |  | SP-DT |
| SPECIAL DRAWING |  | SP-DWG |
| SPECIFICATIONS |  | SPEC |
| SPRING LINE |  | SL |
| SPIRAL TO CURVE |  | SC |
| SPIRAL POINT OF INTERSECTION |  | SPI |
| SPIRAL TO TANGENT |  | ST |
| SQUARE |  | SQ |
| SQUARE FEET |  | FT2 |
| square meters |  | m2 |
| STANDARD |  | STD |
| STAKE |  | STK |
| STANDARD DRAWING |  | STD-DWG |
| STANDARD STRENGTH |  | STD STR |
| STATION |  | STA |
| STATION & ELEVATION |  | SE |
| STATION & OFFSET |  | SO |
| STOPPING SIGHT DISTANCE |  | SSD |
| STORM DRAIN |  | STMD |
| STORM SEWER |  | STMS |
| STREET |  | St |
| STRUCTURE |  | STR |
| SUB-GRADE |  | SG |
| SUPERELEVATION |  | SE |
| SUPERELEVATION RATE |  | e |
| SURVEY |  | SRV |
| SYMMETRICAL |  | SYM |
| TANGENT |  | TAN |
| TANGENT LENGTH (CURVE DATA) |  | T |
| TANGENT TO SPIRAL |  | TS |
| TEMPORARY |  | TEMP |

|  |  |  |  |
| --- | --- | --- | --- |
| TEMPORARY BENCH MARK | |  | TBM |
| THROAT | |  | TH |
| TOWNSHIP | |  | TSHP |
| TRIPLE | |  | TR |
| TRIPLE BARREL CULVERT | |  | CT |
| TURN OUT | |  | TO |
| TURNING POINT | |  | TP |
| TYPE | |  | TY |
| UNIT | |  | U |
| UNPAVED | |  | UNPVD |
| VALLEY GUTTER | |  | VG |
| VARIABLE | |  | VAR |
| VERTICAL | |  | VERT |
| VERTICAL CURVE | |  | VC |
| VERTICAL POINT OF CURVATURE | |  | VPC |
| VERTICAL POINT OF INTERSECTION | |  | VPI |
| VERTICAL POINT OF TANGENCY | |  | VPT |
| VITRIFIED | |  | VIT |
| VOLUME | |  | VOL |
| WEST | |  | W |
| WEST BOUND ROADWAY | |  | WBR |
| WING WALL | |  | WW |
| WITNESS CORNER | |  | WC |
| WOOD | |  | WD |
| WORKING POINT | |  | WP |
| WOVEN WIRE | |  | W/W |
| YARD | |  | YD |
|  |  | | |
|  | **STRUCTURES** | | |
| NUMBER OF STORIES | |  | 1,2,3,4 |
| STORY | |  | S |
| FRAME | |  | F |
| BLOCK | |  | BLK |
| BRICK | |  | BR |
| STUCCO | |  | STU |
| METAL | |  | MET |
| RESIDENCE | |  | RES or -R |
| BUSINESS | |  | BUS |
| WAREHOUSE | |  | WHSE |
| CHICKEN HOUSE | |  | CH HSE |
| MOBILE HOME | |  | MH |
| DOUBLE WIDE MOBILE HOME | |  | DW MH |
|  | **EXAMPLE:** 1-S-F-R (One Story Frame Residence) | | |

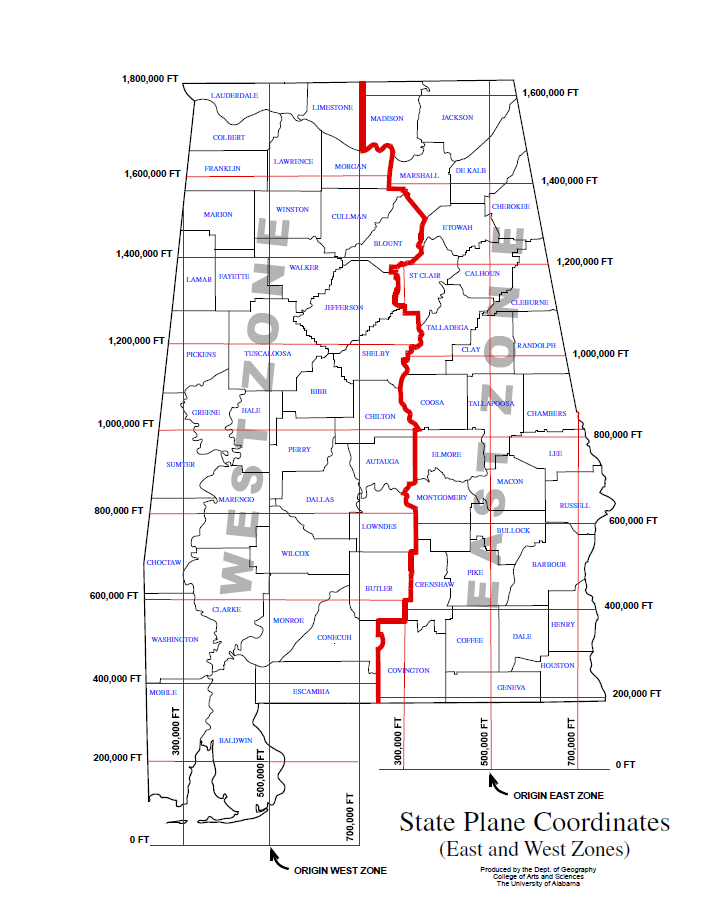
|  |  |
| --- | --- |
| **UTILITIES** | |
| ANCHOR WIRE | AW |
| BURIED ELECTRIC | BE |
| BURIED FIBER OPTIC | BFO |
| BURIED TELEPHONE CABLE | BTC |
| BURIED CABLE TELEVISION | BTV |
| CAST IRON | CI |
| CIRCUIT | CKT |
| DUCTILE IRON | DUC IRON |
| EASEMENT | ESM'T |
| ELECTRIC MANHOLE (SYMBOL) | EMH |
| FIBER OPTIC | FO |
| FIRE HYDRANT (SYMBOL) | FH |
| FORCED MAIN (SANITARY SEWER) | FM |
| GAS MAIN | GM |
| GAS METER (SYMBOL) | GMET |
| GAS VALVE | GV |
| GUY WIRE | GUY |
| HIGH PRESSURE | HP |
| KILOVOLT AMPS | KVA |
| MANHOLE | MH |
| MERCURY VAPOR LIGHT | MVL |
| OVERHEAD FIBER OPTIC | OFO |
| OVERHEAD TELEPHONE CABLE | OTC |
| OVERHEAD ELECTRIC CABL | OE |
| OVERHEAD CABLE TELEVISION | OTV |
| PAIR | PR |
| PEDESTAL | PED |
| POLY-VINYL CHLORIDE PIPE | PVC |
| POWER POLE (SYMBOL) | PP |
| SANITARY SEWER | SAN SEW |
| SERVICE | SERV |
| STEEL | STL |
| SWITCH | SW |
| TELEPHONE | TEL |
| TELEPHONE MANHOLE (SYMBOL) | TMH |
| TRANSFORMER | TRAN |
| TRANSMISSION LINE | TR LN |
| TRIAXIAL CABLE (SERVICE) | TRIX |
| VITRIFIED CLAY PIPE | VCP |
| WATER MAIN | WM |
| WATER METER (SYMBOL) | WMET |
| WATER VALVE (SYMBOL) | WV |

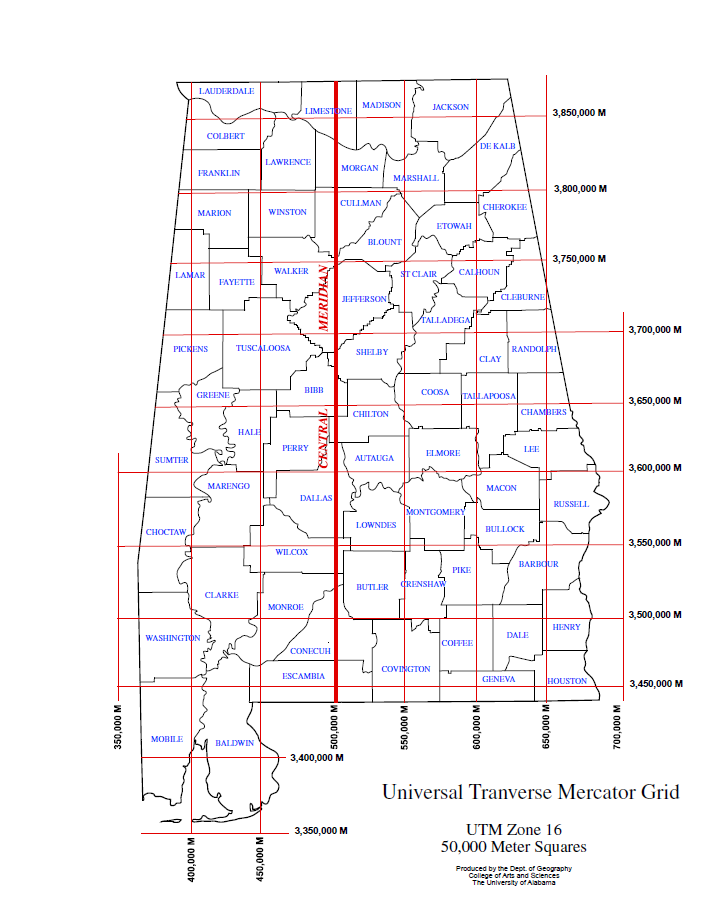
|  |  |
| --- | --- |
| **PROPERTY** | |
| BOOK | BK |
| DEED BOOK | DB |
| REAL PROPERTY BOOK | RP |
| PLAT BOOK | PB |
| MAP BOOK | MB |
| PAGE | PG |
| OFFICIAL RECORD | OR |
|  |  |
| CAPPED (TYPICAL PLASTIC SURVEYORS CAP) | CAP |
| ALUMINUM CAP | ALUM CAP |
| BRASS CAP | BR CAP |
| IRON PIPE | IP |
| CRIMPED | CR |
| REINFORCING STEEL | REBAR |
| CONCRETE MONUMENT | CM |
| RIGHT OF WAY MARKER (6"X6" RCM W/ 2"DISK) | ROWM |
| DAMAGED | DAM |
| CHISELED X | CH"X" |
| HUB AND TACK | H&T |
| NAIL AND BOTTLE TOP | N&BT |
| PARKER-KALON (MASONARY NAILS) | PK NAIL |
| FENCE POST | F-POST |
| RAILROAD IRON | RR IRON |
| COTTON SPINDLE | COT SP |
| ANGLE IRON | ANGLE IRON |
| PIPE | PIPE |

**EXAMPLES**

**REBAR PIPE CM MISC**

|  |  |  |  |
| --- | --- | --- | --- |
| 1/2" REBAR | 1/2"PIPE | 4X4CM | BUGGY |
|  |  | STAMPED | AXLE |
|  |  | "CMSAC" |  |
| 1/2"REBAR | 1/2"PIPE |  |  |
| & CAP | & CAP | ROWM | 2"ANGLE |
| 123456 | 123456 | "AHD 1967 | IRON |
|  |  | PC 123+24.34" |  |
|  | 3/4"CR |  | 1/2"IRON |
|  | PIPE | ROWM DAM | ROD  CAR AXLE |





|  |  |
| --- | --- |
| kilometers per hour | kph |
| LANE | LN |
| LATITUDE | LAT |
| LEFT | LT |
| LEFT AHEAD | LA |
| LEFT BACK | LB |
| LENGTH OF CURVE | L |
| LINK | LK |
| LIMIT | LIM |
| LINEAR | LIN |
| LINEAR FEET | LIN FT |
| LONGITUDE | LONG |
| MANHOLE | MH |
| MARKER | MRK |
| MAXIMUM | MAX |
| MEAN HIGH WATER | MHW |
| MEAN LOW WATER | MLW |
| MEASUREMENT | MEAS |
| MEDIAN | MED |
| meter | m |
| MERIDIAN | MER |
| MILE POST | MP |
| MILES | MI |
| MILES PER HOUR | MPH |
| millimeter | mm |
| MINIMUM | MIN |
| MOBILE HOME | MH |
| MONUMENT | MON |
| MULTIPLE | MULT |
| NORMAL | NORM |
| NORMAL CROWN | NC |
| NORMAL CROWN SLOPE | NCS |
| NORTH | N |
| NORTH BOUND ROADWAY | NBR |
| NORTHING-EASTING | NE |
| NUMBER | NO |
| OBSERVATION | OBS |
| OFFSET LEFT | LT |
| OFFSET RIGHT | RT |
| ON CENTERS | OC |
| ORIGINAL | ORIG |
| OVERHEAD | OHD |
| OVERHAUL | OH |
| OUT TO OUT | OO |
| PAGE | PG |
| PAINT | PNT |
| PAVED | PVD |

|  |  |
| --- | --- |
| PAVED SHOULDER | PVD SH |
| PAVEMENT | PVMT |
| PIPE END TREATMENT | PET |
| PLATE GIRDER | PL GDR |
| POINT OF BEGINNING | POB |
| POINT OF COMPOUND CURVE | PCC |
| POINT OF CURVATURE | PC |
| POINT OF REVERSE CURVATURE | PRC |
| POINT OF ENDING | POE |
| POINT OF INTERSECTION | PI |
| POINT OF TANGENCY | PT |
| POINT ON CURVE | POC |
| POUND | lb |
| PRESENT | PRES |
| PROFILE GRADE | PG |
| PROJECT | PROJ |
| PROPERTY LINE | PL |
| PROPOSED | PROP |
| QUADRUPLE | QUAD |
| QUADRUPLE BARREL CULVERT | CQ |
| QUANTITY | QUANT |
| RADIUS | R |
| RAILROAD | RR |
| RANGE | RGE |
| RECORD | REC |
| REDUCTION | RED |
| REFERENCE | REF |
| REFERENCE POINT | RP |
| REFERENCE POINT FOR POINT ON TANGENT | RPPOT |
| REINFORCED | REINF |
| REINFORCED CONCRETE | RC |
| REINFORCED CONCRETE DECK GIRDER | RCDG |
| REINFORCING STEEL | REINF STL |
| RELOCATE | RELC |
| REMOVE | REM |
| REQUIRED | REQ |
| RETAIN(ING) | RET |
| REVERSE CROWN | RC |
| REVISION | REV |
| RIGHT | RT |
| RIGHT AHEAD | RA |
| RIGHT BACK | RB |
| RIGHT OF WAY | ROW |
| RIGHT OF WAY MARKER | ROWM |
| RIVER | RIV |
| ROAD | RD |
| ROADWAY | RDWY |

|  |  |
| --- | --- |
| SCHOOL | SCH |
| SECTION | SEC |
| SERVICE ROAD | SER RD |
| SHEET | SHT |
| SHEET PILING | SHT PILE |
| SHOULDER | SHLD |
| SIDE DRAIN | SD |
| SIDEWALK | SW |
| SIGHT DISTANCE | S DIST |
| SINGLE BARREL CULVERT | CS |
| SKEW | SK |
| SLOPE STAKE | SST |
| SOLID SODDING | SOL SOD |
| SOUTH | S |
| SOUTH BOUND ROADWAY | SBR |
| SPECIAL | SP |
| SPECIAL DITCH | SP-DT |
| SPECIAL DRAWING | SP-DWG |
| SPECIFICATIONS | SPEC |
| SPRING LINE | SL |
| SPIRAL TO CURVE | SC |
| SPIRAL POINT OF INTERSECTION | SPI |
| SPIRAL TO TANGENT | ST |
| SQUARE | SQ |
| SQUARE FEET | FT2 |
| square meters | m2 |
| STANDARD | STD |
| STAKE | STK |
| STANDARD DRAWING | STD-DWG |
| STANDARD STRENGTH | STD STR |
| STATION | STA |
| STATION & ELEVATION | SE |
| STATION & OFFSET | SO |
| STOPPING SIGHT DISTANCE | SSD |
| STORM DRAIN | STMD |
| STORM SEWER | STMS |
| STREET | St |
| STRUCTURE | STR |
| SUB-GRADE | SG |
| SUPERELEVATION | SE |
| SUPERELEVATION RATE | e |
| SURVEY | SRV |
| SYMMETRICAL | SYM |
| TANGENT | TAN |
| TANGENT LENGTH (CURVE DATA) | T |
| TANGENT TO SPIRAL | TS |
| TEMPORARY | TEMP |

|  |  |
| --- | --- |
| TEMPORARY BENCH MARK | TBM |
| THROAT | TH |
| TOWNSHIP | TSHP |
| TRIPLE | TR |
| TRIPLE BARREL CULVERT | CT |
| TURN OUT | TO |
| TURNING POINT | TP |
| TYPE | TY |
| UNIT | U |
| UNPAVED | UNPVD |
| VALLEY GUTTER | VG |
| VARIABLE | VAR |
| VERTICAL | VERT |
| VERTICAL CURVE | VC |
| VERTICAL POINT OF CURVATURE | VPC |
| VERTICAL POINT OF INTERSECTION | VPI |
| VERTICAL POINT OF TANGENCY | VPT |
| VITRIFIED | VIT |
| VOLUME | VOL |
| WEST | W |
| WEST BOUND ROADWAY | WBR |
| WING WALL | WW |
| WITNESS CORNER | WC |
| WOOD | WD |
| WORKING POINT | WP |
| WOVEN WIRE | W/W |
| YARD | YD |
|  | |
| **STRUCTURES** | |
| NUMBER OF STORIES | 1,2,3,4 |
| STORY | S |
| FRAME | F |
| BLOCK | BLK |
| BRICK | BR |
| STUCCO | STU |
| METAL | MET |
| RESIDENCE | RES or -R |
| BUSINESS | BUS |
| WAREHOUSE | WHSE |
| CHICKEN HOUSE | CH HSE |
| MOBILE HOME | MH |
| DOUBLE WIDE MOBILE HOME | DW MH |
| **EXAMPLE:** 1-S-F-R (One Story Frame Residence) | |

|  |  |
| --- | --- |
| **UTILITIES** | |
| ANCHOR WIRE | AW |
| BURIED ELECTRIC | BE |
| BURIED FIBER OPTIC | BFO |
| BURIED TELEPHONE CABLE | BTC |
| BURIED CABLE TELEVISION | BTV |
| CAST IRON | CI |
| CIRCUIT | CKT |
| DUCTILE IRON | DUC IRON |
| EASEMENT | ESM'T |
| ELECTRIC MANHOLE (SYMBOL) | EMH |
| FIBER OPTIC | FO |
| FIRE HYDRANT (SYMBOL) | FH |
| FORCED MAIN (SANITARY SEWER) | FM |
| GAS MAIN | GM |
| GAS METER (SYMBOL) | GMET |
| GAS VALVE | GV |
| GUY WIRE | GUY |
| HIGH PRESSURE | HP |
| KILOVOLT AMPS | KVA |
| MANHOLE | MH |
| MERCURY VAPOR LIGHT | MVL |
| OVERHEAD FIBER OPTIC | OFO |
| OVERHEAD TELEPHONE CABLE | OTC |
| OVERHEAD ELECTRIC CABL | OE |
| OVERHEAD CABLE TELEVISION | OTV |
| PAIR | PR |
| PEDESTAL | PED |
| POLY-VINYL CHLORIDE PIPE | PVC |
| POWER POLE (SYMBOL) | PP |
| SANITARY SEWER | SAN SEW |
| SERVICE | SERV |
| STEEL | STL |
| SWITCH | SW |
| TELEPHONE | TEL |
| TELEPHONE MANHOLE (SYMBOL) | TMH |
| TRANSFORMER | TRAN |
| TRANSMISSION LINE | TR LN |
| TRIAXIAL CABLE (SERVICE) | TRIX |
| VITRIFIED CLAY PIPE | VCP |
| WATER MAIN | WM |
| WATER METER (SYMBOL) | WMET |
| WATER VALVE (SYMBOL) | WV |

|  |  |
| --- | --- |
| **PROPERTY** | |
| BOOK | BK |
| DEED BOOK | DB |
| REAL PROPERTY BOOK | RP |
| PLAT BOOK | PB |
| MAP BOOK | MB |
| PAGE | PG |
| OFFICIAL RECORD | OR |
|  |  |
| CAPPED (TYPICAL PLASTIC SURVEYORS CAP) | CAP |
| ALUMINUM CAP | ALUM CAP |
| BRASS CAP | BR CAP |
| IRON PIPE | IP |
| CRIMPED | CR |
| REINFORCING STEEL | REBAR |
| CONCRETE MONUMENT | CM |
| RIGHT OF WAY MARKER (6"X6" RCM W/ 2"DISK) | ROWM |
| DAMAGED | DAM |
| CHISELED X | CH"X" |
| HUB AND TACK | H&T |
| NAIL AND BOTTLE TOP | N&BT |
| PARKER-KALON (MASONARY NAILS) | PK NAIL |
| FENCE POST | F-POST |
| RAILROAD IRON | RR IRON |
| COTTON SPINDLE | COT SP |
| ANGLE IRON | ANGLE IRON |
| PIPE | PIPE |

**EXAMPLES**

**REBAR PIPE CM MISC**

|  |  |  |  |
| --- | --- | --- | --- |
| 1/2" REBAR | 1/2"PIPE | 4X4CM | BUGGY |
|  |  | STAMPED | AXLE |
|  |  | "CMSAC" |  |
| 1/2"REBAR | 1/2"PIPE |  |  |
| & CAP | & CAP | ROWM | 2"ANGLE |
| 123456 | 123456 | "AHD 1967 | IRON |
|  |  | PC 123+24.34" |  |
|  | 3/4"CR |  | 1/2"IRON |
|  | PIPE | ROWM DAM | ROD  CAR AXLE |

