



3-04.1 PURPOSE. Location surveys are performed to provide the department a clear and accurate record and marking of the highway corridor right-of-way lines and breaks. Location surveys include the execution of a survey compliant with the Missouri Minimum Standards for Property Boundary Surveys (4 CSR 30-16.010 through 4 CSR 30-16.110) and the development of a Location Survey Plan that will serve as the recordable survey plat.

Associated to the survey and plan should be a land description of the highway right-of-way containing two basic elements; (1) description of the interest being conveyed, and (2) description of the land itself. The description will be in the manner of a description by referral, making reference calls to the right-of-way survey plan, as well as calls to the survey and all right-of-way monumentation.

3-04.2 LOCATION SURVEYS AND DEFINITIONS. The surveys that are under the responsibility of a project surveyor (Registered Survey Party Chief) are generally described as Location Surveys, surveys used to the right-of-way corridor, used to locate public and private lands, used to locate tracts described by metes and bounds, or used to locate any property associated to a right or interest. Location Surveys performed by department project surveyors fall into four basic categories; (1) right-of-way surveys, (2) right-of-way resurveys, (3) department parcel surveys, and (4) public land surveys.

3-04.2 (1) RIGHT-OF-WAY SURVEYS. Right-of-way surveys are performed for the purpose of locating, monumenting and describing newly acquired lands to be used for development of highway corridor, creating a new parcel defined by the right-of-way limits. A right-of-way survey is an original survey of the corridor parcel made at the time the parcel is created. The right-of-way survey is not made to ascertain existing boundaries, it is made to create the new right-of-way.

Right-of-way surveys should be conducted as part of the larger highway project. The right-of-way survey will occur as part of the design stage of the project. In general terms, right-of-way procedures will be performed during the preliminary design phase and the final design phase.

3-04.2 (2) RIGHT-OF-WAY RESURVEYS. Right-of-way resurveys are performed for the purpose of remarking, reestablishing, restoring or delineating the right-of-way line or breaks of a previously created corridor. These surveys are to restore the original right-of-way lines in the same position as they were originally marked. Right-of-way resurveys are not generally performed as part of a new highway project. They are called for in instances of right-of-way encroachment, location disputes, excess right-of-way, etc.

3-04.2 (3) PARCEL SURVEYS. Department parcel surveys are standard boundary surveys performed for the locating, monumenting and describing of parcels that are acquired by the department for the purpose of facilities management. These surveys, not associated to any right-of-way, create a new parcel out of a larger parent tract, for the purpose of conveying the new parcel.

3-04.2 (4) PUBLIC LAND SURVEYS. Public land surveys are performed for the resurvey of the lands of the United States Public Land Survey System. These surveys will be performed during the conduct of all location surveys. Ties to the public land survey system are necessary for locating rights-of-way and parcels. Public land surveys will also be performed for the purpose of perpetuating the public corners that are affected by corridor development and highway construction.

3-04.3 DISTRICT RESPONSIBILITY. The location survey, the plan and the writing of the description are performed, prepared and completed in the district by the members of Design and Right of Way. The performance of the tasks associated to the survey, to the plan preparation and to the description writing should be supervised by a project surveyor assigned by and reporting to the Project Development Engineer. The project surveyor must have an active license as a Professional Land Surveyor in the state of Missouri.

3-04.4 SURVEY SUPERVISION. The project surveyor is required to provide immediate personal supervision of the location survey, the location survey plan preparation, and the writing of the land description. Supervision of the survey should entail; (1) acquisition of all necessary records and data, (2) investigation of the selection of the ground

control (such as section corners, block corners, survey corners or other corners or monuments found) as a result of the field survey to be used to position the survey on the ground; and (3) reviewing the execution of the survey, the survey computations and the preparation of the drawing. For the location survey plan and land description, the project surveyor should; (1) supervise each step of the preparation of the plats, maps, survey plans, drawings, reports, description, surveys or other documents and has input into their preparation prior to their completion, and (2) reviews the final plats, maps, survey plans, drawings, reports, descriptions, surveys or other documents and makes necessary appropriate changes to them.

3-04.5 SURVEY STANDARDS. Location surveys should be planned and performed on the basis of policies and procedures as outlined in this manual, as well as in compliance to applicable rules for surveys administered by the Missouri Board for Architects, Professional Engineers and Professional Land Surveyors defined in 4 CSR 30 and pertinent laws from Missouri Revised Statutes chapters 60, 226 and 327. All survey work in this section should be done in compliance with this regulation in English units.

There may be special circumstances where the project surveyor cannot comply with some provisions of the minimum standards. If the survey deviates from these minimum standards, it should be documented, justified and archived by the project surveyor. Minimum standards require that such deviation be shown, described, and justified on the right-of-way survey plan.

Where conditions require the use of procedures not covered in the minimum standards or this manual, General Headquarters Design may be consulted to establish criteria and procedures for those conditions.

3-04.5 (1) TOLERANCES. The required degree of accuracy for location surveys is shown in Table 3-04.1. The project surveyor is responsible for assuring that the degree of accuracy necessary to achieve these tolerances is met through the proper use of equipment and the method of making measurements.

**TABLE 3-04.1
POSITIONAL TOLERANCE**

PROPERTY CLASS	TOLERANCE
Urban	1:20,000
Suburban	1:10,000
Rural	1: 5,000

3-04.6 LOCATION SURVEY PLAN CRITERIA. The essential purpose of the location survey plan is to (1) represent the correct size and shape of the corridor to scale, (2) to define by dimension this size and shape, (3) to locate the right-of-way corridor within the United States Public Land Survey System, (4) to specify locative points such as physical monuments, planimetric features, accessories, etc., (5) show title identity, and (6) show data that lends authority to the plan, including date, surveyor’s name, certificate of accuracy and surveyor’s stamp and signature. The right-of-way survey plan should be developed on nominal size (22”x34”) sheets. An example location survey plan sheet can be found in [Figure 3-04.1](#).

The specifications for the location survey plan should conform to all of the following provisions, where applicable:

(1) The location survey plan should be a drawing made to a convenient scale on the type of material consistent with the purpose and permanency required. The project surveyor will also archive the plan in digital format. The project surveyor will sign and seal the location survey plan. The plan should be the official plat and should take precedence over the digital data.

(2) The location plan should show the department’s name and the date of certification.

(3) The plan should bear the signature and seal of the project surveyor in responsible charge. Whenever more than one (1) sheet must be used to accurately portray the survey, each sheet should bear the signature and seal of the project surveyor.

- (4) Lettering on the location survey plan presented to the recorder should be no smaller than eighthundredths inch (0.08") in height. All characters should be open, wellrounded and of uniform width.
- (5) The direction of boundary lines on the plan should be shown by direct angles between established lines or by azimuths or bearings based upon the Missouri Coordinate System of 1983. The direction reference system should be clearly described on the plat and must be retracable for future surveys.
- (6) A prominent north arrow should be drawn on every sheet.
- (7) Complete dimensions (distances, directions, and curve data) of the right-of-way corridor.
- (8) All dimensions should be shown in feet and decimal parts thereof. All plan dimensions or highway stations should be given as horizontal distances at the ground surface. A written scale should be noted on all plans.
- (9) All vertical dimensions should be shown by elevations above an established or assumed datum.
- (10) Measurements and calculated areas will be shown on the plan to a number of significant figures representative of the actual precision of the measurements.
- (11) Curved lines should show at least two (2) elements of the curve and preferably these three (3): radius, central angle and length of arc. When not tangent to the preceding and or succeeding course, the bearing or angle of either the initial tangent, radial line or long chord should be shown. Pertinent information on compound curves should be shown.
- (12) The survey should show sufficient data (distances and directions) to positively locate the right-of-way surveyed within the United States Public Land Survey. If the survey cannot be located by either of the previously mentioned provisions, it must be referenced to other lines and points sufficiently established by record.
- (13) All controlling corners accepted or restored should be shown or noted on the plat.
- (14) All controlling corner physical monuments either found or set should be shown and described on the plan. A note or symbol should show which were found and which were set.
- (15) The class of property should be noted on the plan.
- (16) Any material variation between measured and record dimensions should be noted on the plan.

3-04.7 STANDARDIZATION. Surveys, plans and descriptions should be standardized to the greatest extent throughout the department to promote efficiency, uniformity and ease of data analysis. Standardization includes the use of standard sheets, forms, procedures, monuments, archiving and procedures.

3-04.8 PROJECT RESPONSIBILITY. When a location survey is needed, the Design Project Development Engineer will appoint a project surveyor and assign a survey party and design technicians to the project for execution of the survey and the preparation of plans. The District Right of Way Manager will assign specialists from that division to the survey project for the purpose of research and description writing. Members of the project staff will be supervised by the project surveyor.

In the case of a right-of-way survey which is called for as part of a larger highway project, the project surveyor is an active participant on the project development team and working in partnership with the project manager to provide direction.

The project surveyor is responsible for and in charge of all phases of the survey, plan preparation and description writing. Project phases fall in the general order of; (1) title evidence research consisting of the written evidence found in deeds, abstracts, title policies and plats, (2) evidence research of county records of surveys, field books, notes, maps, General Land Office (GLO) survey records, county surveyor records, records from the State Land Surveyor's office, (3) inspect the parcels and search for existing monuments, (4) take and evaluate testimony evidence, particularly that associated to existing monuments, (5) make measurements to existing monuments and public corners, (6) perform calculations and analyze the results, (7) make conclusions in accordance with the priorities of evidence, (8) make measurements to set new monuments based on conclusions, and (9) prepare survey plans and write descriptions.

3-04.9 PROJECT CHRONOLOGY. While each survey project is unique and may pose its own particular adjustments to procedures, the following is provided as a general guideline for orderly project conduct and execution.

3-04.9 (1) EVIDENCE GATHERING. Collecting and compiling available records containing pertinent information associated to the lands of the survey project area.

- (a) Compile copies of assessor's maps and aerial photomaps.
- (b) Acquire names and addresses of possible affected parties.
- (c) Acquire deeds and plats for affected properties.
- (d) Acquire title records and abstracts (may include deeds of record, title certification, etc.).
- (e) Compile evidence from recorded surveys.
- (f) Gather highway plans in the affected area.
- (g) Field books from previous surveys in the area.
- (h) Gather right-of-way deeds.
- (i) Search records for available survey control.
- (j) Attain copies of USGS quad maps for the project area.
- (k) Acquire copies of aerial photography for the area.
- (l) Attain corner certification records.
- (m) Acquire descriptions, plats and notes from original government surveys.
- (n) Attain copies of survey plats and notes that have been made by county surveyors and private surveyors over the time frame from the original surveys to current date.
- (o) Acquire geodetic control data for the project area.

Evidence may have to be expanded to include other resources and other data such as unrecorded devices that may be provided from affected parties, private surveys that have been performed in the area, title policies for affected lands, limits of incorporation, etc.

3-04.9 (2) PRELIMINARY FIELD SURVEY. The field survey work to inspect the project location and affected parcels. Physical evidence may be recovered as well as initial measurements made.

- (a) Prior to the preliminary field survey, contact letters are to be sent to all possible affected parties.
- (b) During field reconnaissance and contacts with affected parties, witness evidence may be taken and locations of existing monuments and evidence of possession may be recovered.
- (c) Search and recover monuments called for in written conveyances acquired from title research. Locate accessories where monument evidence may not be found.
- (d) Locate cultural features and activities that may serve as evidence of possession.
- (e) Search for and recover public land corners.
- (f) Perform control survey throughout the project area. Establish control stations within the project that will facilitate accurate measurements to recovered evidence and public corners.
- (g) Make measurements and records of recovered evidence and public corners.

3-04.9 (3) EVIDENCE AND SURVEY ANALYSIS. The compilation and analysis of gathered evidence and results of field measurements.

- (a) Perform mathematical checks of control survey traverses. Check all measurement and observation data.
- (b) Execute appropriate data adjustments. Perform additional measurements if necessary.
- (c) Confirm compliance with the survey tolerances found in minimum standards.
- (d) Perform computations for any necessary public land corner reestablishment.
- (e) Prepare public corner certification documents.
- (f) Execute field survey needed for any public corner reestablishment.
- (g) File the certification documents with the State Land Surveyor.

3-04.9 (4) FINAL FIELD SURVEY. The measuring and placing of the right-of-way monuments and the development of the location survey plan.

- (a) Check layout computations for point locations of right-of-way corridor breaks.
- (b) Review prior documents, measurements and check computations. Prepare the location survey plan and record.
- (c) Perform a staking survey prior to acquisition in the area of each parcel. Staking survey should include placing permanent monuments at locations of right-of-way breaks and permanent easements as well as temporary monuments at the corners of temporary easements.
- (d) Place witness post at Location Survey monument locations on right-of-way. It is not necessary to place witness posts on any easement point unless it is at a Location Survey monument.
- (e) Confirm land descriptions are written by referral, with calls to the right-of-way survey plan, the monuments and the survey.

3-04.10 USE OF THE PROJECT SURVEYOR'S SEAL. Department project surveyors should certify location surveys they perform. Certification of the survey is by their signature and application of seal to the right-of-way survey plan or department parcel plats. Application of the certification must conform to the rules for use of the seal, with particular attention given to the following rule:

“The signing and sealing of plats, surveys, drawings documents, specifications, estimates, reports and other documents or instruments not prepared by the registered land surveyor or under his/her immediate personal supervision is prohibited.”

Survey project assignments must be organized in such manner the project surveyor is placed in a position of responsibility and authority of the work to which the surveyor signs and seals. To file or record any map, plat, or survey, requires the personal seal and signature of the professional land surveyor by whom or under whose authority and supervision the map, plat or survey was prepared.

3-04.11 MONUMENTATION. Highway right-of-way corridors should be monumented with such devices as to comply to the approved monumentation criteria set forth in state statutes. The devices should be set at the location of right-of-way breaks, which represent the “called to” locations of the land description of the highway corridor.

Permanent monuments are to be set prior to the recording of the location survey plan if they will not be moved or destroyed by construction activities within six months of their installation. Until the right of way acquisition is

completed, semi permanent monuments may be used. If the required permanent monuments will be disturbed by utility adjustment or construction activity, semi permanent monuments can remain until 12 months after the location survey plan is recorded. In any event, permanent monuments must be installed within 12 months after the plan has been recorded.

While variation may be necessary due to terrestrial conditions, the set monumentation should be compliant to the standards for permanent monuments. The standard department monument should consist of 5/8" steel rod 24" long. This rod should have a permanently attached aluminum cap of 2" in diameter. Upon the cap should be stamped the department's name, as well as the license number of the project surveyor as illustrated in [Figure 3-04.2](#). Cap installation details are shown on [Standard Plan 602.00](#).

The monument should be accompanied by a witness post offset from the monument itself by 1' along the right-of-way line. The witness post should be a white carsonite post, 6' long and 2 1/2" wide as shown in [Figure 3-04.3](#). It should have attached to the highway side of the post a department informational decal. Post installation details are shown on [Standard Plan 602.00](#).

The monumentation of right-of-way can only be performed under the supervision of a department project surveyor or consultant land surveyor, and only as part of a survey. Right-of-way monumentation by unauthorized department personal is not allowed. This not only applies to compliant monumentation, but to any marking placed along the highway corridor near or on the right-of-way lines with the intention of representing either the precise or approximate location of right-of-way.

3-04.12 RIGHT-OF-WAY DESCRIPTION. The right-of-way description must be written as to describe and locate the right-of-way corridor as a unique parcel of land. This description should (1) be based on the location survey, (2) be concise, (3) contain title identity, (4) contain measured dimensions and highway stationing in ground units, (5) contain measurement data that describes the geometric area of the corridor and closes mathematically, (6) contains information that does not lend to alternate interpretations, and (7) be written to facilitate the relocation of the corridor by a professional land surveyor.

The right-of-way description should be by referral, making calls to the location survey plan. The description must also contain calls to the right-of-way monuments and their station values. Written to locate the highway centerline relative to nearby, measured corners of the public survey system, the description will follow the form of a strip conveyance.