

**Title 2—DEPARTMENT OF  
AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 1—Organization and**  
**Description**

**2 CSR 90-1.010 General Organization**

*PURPOSE: This rule complies with section 536.023, RSMo (1986) which requires each agency to adopt as a rule a description of its operation and the method where the public may obtain information or make submissions or requests. Pursuant to HB28 The Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.*

*Editor's Note: The secretary of state has determined that the publication of this rule in its entirety would be unduly cumbersome or expensive. The entire text of the material referenced has been filed with the secretary of state. This material may be found at the Office of the Secretary of State or at the headquarters of the agency and is available to any interested person at a cost established by state law.*

(1) The Division of Weights and Measures is a unit of the Department of Agriculture, state of Missouri. The primary responsibility of this division is to maintain equity in the marketplace. This is accomplished by assuring the accuracy of weighing and measuring devices which are used commercially; monitoring the weighing and measuring practices of buyers and sellers alike to assure accuracy and fair dealing in the exchange of goods and services; establishing requirements for methods and tolerances for moisture-measuring devices; inspecting eggs to insure they meet proper grade standards for quality and size; prohibiting milk sales practices that unfairly divert trade from a competitor; establishing safety standards for handling and use of anhydrous ammonia, liquefied petroleum gases and petroleum products; [and] establishing quality standards for motor fuel; to restore, maintain and preserve locations of the corners set by the original surveys of the United States public land surveys and their subsequent extensions along with all pertinent field notes, plats and documents; to establish and maintain a record storage and retrieval system for all land survey records in this state; to extend geodetic control surveys to permit general use of the Missouri State Coordinate System; and to prescribe and disseminate regulations to assist in uniform and professional surveying methods and standards. The division consists of [four (4)] five (5) programs to carry out these duties—Metrology Laboratory, Scale/Egg/Milk Program, Petroleum/Propane/Anhydrous Ammonia Program, [and] Grain Moisture Meter Program and The Land Survey Program.

(2) The address of the division is 1616 Missouri Boulevard, P.O. Box 630, Jefferson City, MO 65102.

(3) The address of the Land Survey Program is 1251A Gale Drive, PO Box 937, Rolla, MO 65402-0937. Telephone (573) 368-2300.

(4) The Division of Weights and Measures utilizes the following forms in the course of inspection, laboratory testing and licensing duties: Application for Egg License; Egg Program Stop Sale Form; Egg/Milk Products Inspection Report; Milk Products Distributor License Application; Milk Products Distributor Questionnaire; Milk Products Distributor's Worksheet; Milk Products Processor License Application; Milk Products Processor's Worksheet; Fuel Quality Complaint/Violation Form; Official Motor Fuel Quality Inspection; Official Motor Fuel Quality Inspection—Follow Up Report; Petroleum Laboratory—Alcohol Test; Petroleum Laboratory—API Gravity; Petroleum Laboratory—Calculate Cetane Index; Petroleum Laboratory—Flash Point Test; Petroleum Laboratory—Lead in Unleaded Gasoline Test; Petroleum Laboratory—Reid Vapor Pressure; Petroleum Laboratory—Saybolt Color; Petroleum Laboratory—Water and Sediment Test; Petroleum Laboratory—Water Tolerance Test; Alcohol Detection Test Report; Distillation Test Report Form; Octane Run Sheet, Octane Test Report; Toluene Standardization Report; Stop Sale Notice; Fuel Quality Program—Stop Sale Tag; Refined Fuels Broken Seal Report; Refined Fuels Truck and Meter Test Report; Refined Fuels Truck and Meter Correction; Terminal Meter Calibration Report—A; Terminal Meter Calibration Report—B; Terminal Test Conclusions; Serviceman Registration Application for Installation and Service of Weighing and Measuring Devices; Refined Fuels Serviceman Registration Card; Refined Fuels Rejection Tag; Service Station Broken Seal Report; Gas Pump Inspection Form; Pump Correction Form; LPG Rejection Tag; LPG Broken Seal Report; Mobile Home Safety Inspection Form; LP Gas/Anhydrous Ammonia Inspection Form; Application For LP Gas System Installation; Official Accident Inspection Form; Official Inspection For Bulk Storage Plant, Industrial Consumer Plant, Bottled Gas Filling Facility and Commercial System with Large Storage; Gas Dispensing Devices Registration Application; Registration Application Form—Installers and Services; Registration Application Form—Bulk Storage Plant Operators and General LP Gas Sales and Service Business; Registration Application Form—LP Gas Transporter; LP Gas Inspection Authority Registration Certificate; Official School Bus Inspection—LPG Carburetion System; LP Gas System Annual Pressure Test Report; LP Gas Inspection Authority—Statement for Money Due; LP Gas Meter Testing Money Report; LPG Truck and Meter Test Report; LPG Motor Fuel

Conversion Report for Official Decal; Scale Reject Tag; Scale Inspection Report/Fee Invoice; Scale Test Report; Livestock Scale Test Report; Hopper Scale Test Report; Weekly Activity Report—Scales, Milk and Eggs; Weekly Activity Report; Placing in Service and/or Report of Scale Sale; Package Checking Report; Random Pack Report; Stop Sale/Use Order; Taximeter Test Report; Worksheet for Packages Labeled by Liquid Volume; Inter-Office Report; General Inspection Report/Request; Servicemen Registration Card; Recording Sheet For Weights Tolerance Testing; Recording Sheet for Weighing—Transportation, Substitution and Tolerance Testing; Metrology Calibration Statement; Certificate of Test—Volumetric Standards; Certificate of Test—Field Standards; Certificate of Test—Test Weights—Class S; Certificate of Test—Test Weights—Class F; Certificate of Test—Linear Measures; Certificate of Test—Tuning Forks; Moisture Meter Registration; Moisture-Measuring Device Registration Certificate; Moisture Meter Field Test Report; Moisture Meter Work Sheet; Moisture Meter Placing in Service Report; Weekly Activity Report—Moisture Meter Program; Laboratory Oven Test and Meter Comparison Form; Moisture Meter Daily Adjustment Sheet; Moisture Meter Inspectors Intercomparison Report; Moisture Meter Laboratory Meters Report; and Moisture Meter Program—Laboratory Oven Test and Meter Comparison; Certified Land Corner Document; and EDM Calibration Reports.

*AUTHORITY: section 536.023, RSMo 1986.\* This rule was previously filed as 2 CSR 40-1.010. Original rule filed April 9, 1976, effective July 15, 1976. Rescinded and readopted: Filed Nov. 9, 1981, effective Feb. 11, 1982. Rescinded: Filed Oct. 10, 1982, effective Jan. 13, 1983. Readopted: Filed May 17, 1988, effective Aug. 11, 1988. Amended: Filed April 17, 1990, effective June 28, 1990.*

*\*Original authority: 536.023, RSMo 1975, amended 1976, 1997.*

*LAND SURVEY AUTHORITY: section 60.510(7), RSMo 1986.\* Original rule filed June 14, 1976, effective Nov. 15, 1976.*

*\*Original Land Survey Authority: 60.510, RSMo 1969.*

**Title 2—DEPARTMENT OF AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 60—Missouri Standards for Property Boundary Surveys**

**2 CSR 90-60.010 Application of Standards**

*PURPOSE: These standards provide the surveyor and recipient of boundary surveys with a realistic guideline for adequate survey performance. This rule describes the types of surveys to which these standards apply. Pursuant to HB28 the Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.*

The standards in this chapter apply to all property boundary surveys made for determining the location of land boundaries and land boundary corners, but do not apply to preliminary plats or plans, plot plans, engineering surveys; geodetic surveys; or cartographic surveys. Any individual or corporation registered with the board to perform land surveying services in this state shall be familiar with and comply with these standards. The Missouri Standards for Property Boundary Surveys are not intended to be used in place of professional land surveying judgment. There may be special circumstances and conditions that make it impractical to comply with some provisions of the standards. If the survey deviates from these standards, this deviation shall be noted, described, and justified on the plat of survey by the professional land surveyor. This provision cannot be used to intentionally circumvent the basic tenets of these standards.

**AUTHORITY:** sections 60.510(7) and 60.550, RSMo 1986 and 448.2-109, RSMo Supp. 1988.\* Original rule filed Dec. 8, 1975, effective Dec. 18, 1975. Amended: Filed Feb. 10, 1982, effective May 13, 1982. Amended: Filed Feb. 14, 1984, effective May 11, 1984. Amended: Filed Oct. 15, 1984, effective Feb. 11, 1985. Readopted: Filed March 18, 1987, effective June 25, 1987. Rescinded: Filed March 21, 1989, effective August 11, 1989. Rescinded and readopted: Filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.510(7) and 60.550, RSMo 1969 and 448.2-109, RSMo 1983, amended 1988.

**2 CSR 90-60.020 Definitions**

*PURPOSE: This rule defines the various technical and legal terms used in this chapter.*

- (1) Condominium Survey: a property boundary survey that creates and defines condominium property in accordance with Chapter 448, RSMo.
- (2) Controlling Corners: those corners that determine the location of the exterior corners of the surveyed boundary.
- (3) Exterior Corners: corners that define the shape and size of the parcel.
- (4) Material Variations: the differences between surveyed lines and lines of possession or measurements called for in the record source of the property being surveyed that are, in the professional judgment of the surveyor, significant enough to warrant particular notice.
- (5) Original Survey: a survey which creates a new parcel, or parcels, out of a larger parent tract.

- (6) Physical Monument: natural or artificial objects which are accepted and used to mark boundaries and corners.
- (7) Positional Uncertainty: the positive and negative range of values expected for a computed horizontal position as a result of random errors.
- (8) Property Boundary Survey: any survey that creates, defines, marks, remarks, retraces, or reestablishes the boundaries of parcels of real property or the subdivision of lands.
- (9) Property Description: a description of the limits of real property by recitation of metes and bounds or by an aliquot part of the United States Public Land Survey System or by lot or parcel designation referenced to a subdivision, survey or other document recorded in the public records.
- (10) Record Title Boundaries: the limits of real property ownership as evidenced and provable by one (1) or more written means of real property transfer and having provided constructive notification by being duly entered into the public records.
- (11) Random Errors: unavoidable errors in measurement that are caused by the inability of the operator to make exact measurements. (Random errors generally follow statistical principles and can be reduced with care in measurement, but can never be completely eliminated).
- (12) Rural Property: any property that is not urban property.
- (13) Subdivision: a property boundary survey that partitions land into two (2) or more parcels by platting the divisions of land in accordance with Chapter 445.
- (14) Systematic Errors: errors in measurement that conform to mathematical and physical laws and remain the same under set conditions. Systematic errors are detectable and can be removed by ensuring the proper adjustment of equipment, by applying appropriate corrections to observations and by using appropriate observation techniques to eliminate the effects of imperfection in equipment manufacture.
- (15) United States Public Land Survey Corners: those points that determine the boundaries of the various subdivisions of the United States Public Land Survey as set forth in section 60.301(1), RSMo.
- (16) Urban\_ Property: any property that is located wholly or partly \_within the corporate limits of any municipality or any commercial, industrial or multi-unit developmental property.

AUTHORITY: sections 60.510(7), 60.550 and 448.2-109, RSMo 2000.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

Amended: Filed March 20, 2003, effective Oct. 30, 2003.

\*Original authority: 60.510(7), RSMo 1969; 60.550, RSMo 1969; and 448.2-109, RSMo 1983, amended 1988.

## **2 CSR 90-60.030 General Land Surveying Requirements**

*PURPOSE:* This rule sets forth standards that apply to all property boundary surveys.

- (1) Records Research:
  - (A) Every survey executed shall be based on the property description of the parcel or parent tract taken from the public records; and,
  - (B) Prior to performing the fieldwork, the surveyor shall acquire sufficient data to ascertain the record title boundary of the parcel(s) to be surveyed, (such as; adjoining deeds, maps,

right of way plans, subdivision plats, original plats and notes, and subsequent surveys). This requirement does not obligate the surveyor to search the entire chain of title.

(2) Field Investigation: The surveyor or a person under his/her direct personal supervision shall:

(A) Search thoroughly for monuments and accessories at the necessary controlling corners and any other physical evidence that may be required to define the location of the exterior corners of the parcel surveyed, (such as; location of streets, roads, lines of occupation, parole information);

(B) Obtain appropriate and sufficiently redundant measurements to correlate all found evidence;

(C) Evaluate the reliability of the evidence and monuments found and apply the proper theory of location in accordance with surveying precedent; and,

(D) Reach a conclusion on the location of the boundary and set monuments as defined herein.

(3) Monumentation:

(A) The land surveyor shall establish semi-permanent or confirm existing monuments at every exterior corner of the tract being surveyed, except for lines running along streams or lakes where witness monuments must be set along the connected sidelines. When it is impractical to set a monument at a required corner, a witness monument shall be set along a line of the survey or the prolongation thereof;

(B) Existing monuments shall be evaluated for permanency by the surveyor. Those needing restoration, preservation or replacement shall receive the due care necessary to insure that their permanency is secured in accordance with the requirements set forth herein;

(C) Additional Monumentation for Subdivision Surveys:

1. In addition to meeting the requirements set forth above, the surveyor shall, prior to the recording of the subdivision plat, establish at least two (2) permanent monuments for every four (4) acres of land developed by the subdivision. This requirement is waived if the survey does not create more than four (4) lots or parcels; and,

2. The permanent monuments required in subsection (3)(C)1. shall be set prior to the recording of the plat or if likely to be destroyed by construction, may be installed upon completion of the construction and must be set no later than twelve (12) months after the recording of the plat. The surveyor shall also monument all lot corners in the subdivision with semi-permanent or witness monuments within the same twelve month period.

3. When the subdivision is a cemetery, the requirements of subsection (3)(C)1. for installation of permanent monuments shall be increased to include four (4) permanent monuments per block and the monumentation of all lot corners required in subsection (3)(C)2. shall not be required.

(D) Condominium surveys shall meet the requirements for subdivisions.

(4) Publication of Results: A plat shall be made showing the results of the survey or subdivision and shall conform to all of the following provisions;

(A) The plat shall include a drawing that shall be made to a convenient scale on a reasonably permanent and dimensionally stable material;

(B) The plat shall include the name of the person or entity for whom the survey was made and the date of the survey;

(C) Lettering shall be no less than eight-hundredths of an inch (0.08") in height. All characters shall be open, well-rounded, and of uniform width;

(D) The direction of boundary lines shall be shown by angles, azimuths or bearings with

the directional reference system clearly described on the plat;

(E) A north arrow, a written scale and a graphic scale shall be shown on every sheet containing graphic survey data;

(F) Complete dimensions (distances, directions, and curve data) of all parcels surveyed or created. All linear measurements shall be shown as horizontal distances at the ground surface in feet or meters. Curved lines shall show at least two (2) elements. For non-tangential curves, a directional component shall be included to help define the direction of the curve (preferably the chord bearing);

(G) All vertical measurements shall be shown as elevations above an established or assumed datum in feet or meters. When elevations are shown, a clearly defined elevation datum shall be shown, including the location and elevation of the benchmark used to establish the project datum;

(H) Measurements and calculated areas will be shown on the plat to a number of significant figures representative of the actual precision of the measurements;

(I) The plat shall display either a property description for the parcel(s) and or parent tract surveyed or a reference to the source document from which the property description was taken. Any new parcel created by survey shall have its property description shown on the plat and must be complete enough so that the parcel can be located and clearly identified. Subdivision plats shall identify all lots for sale by numbers, as set forth in Section 445.010, RSMo;

(J) The plat shall show sufficient data (distances and directions) to positively locate the parcel surveyed within the United States Public Land Survey System (USPLSS), or within the recorded subdivision. 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;

(K) All controlling corner monuments that were found and exterior corners that were found or set shall be identified on the plat;

(L) Any material variation between record and measured dimensions; and any material variation and the extent of such variation between surveyed lines and lines of possession at all exterior corners shall be shown on the plat. Material variation will include, but is not limited to, survey monuments, fences, obvious occupation (i.e. mowed) lines, walls or other structures whether on the property surveyed or on adjacent property;

(M) The plat shall reference the source document(s) for any pertinent data obtained during the records research provision set forth above. The plat shall also reference the property type (Urban or Rural);

(N) The identity of the record title documents for adjoining properties, consistent with the records research provision set forth above, shall be shown on the plat, including their record source;

(O) In addition to the above, all condominium surveys shall show the pertinent information required in section 448.2-109, RSMo, and the legally sufficient descriptions of easements serving or burdening the condominium; and,

(P) The plat shall include a statement that the survey and or subdivision were executed in accordance with the Missouri Standards for Property Boundary Surveys as set forth herein. The statement on a condominium plat shall also include a declaration that the plat contains all information required by section 448.2-109, RSMo.

(5) Deliverables: The surveyor shall furnish to the client a plat containing the drawing and other pertinent information identified above. Each sheet of the plat shall bear the signature and seal of the surveyor in responsible charge. This signed and sealed plat shall be the official plat and shall take precedence over any other formatted data that may be delivered to the client or his representatives, successors or assigns.

AUTHORITY: sections 60.510(7), 60.550 and 448.2-109, RSMo 2000. \* Original rule filed May 3, 1994, effective Dec. 30, 1994. Amended: Filed March 20, 2003, effective Oct. 30, 2003.

\*Original authority: 60.510(7), RSMo 1969; 60.550, RSMo 1969; and 448.2-109, RSMo 1983, amended 1988.

## **2 CSR 90-60.040 Accuracy Standards for Property Boundary Surveys**

*PURPOSE: This rule sets forth the accuracy standards for all property boundary surveys.*

(1) The surveyor shall make an effort to detect and remove systematic errors.

(2) Precision requirements for Urban Property:

(A) The uncertainty due to random errors of any dimension of direction or distance shown on the plat shall not exceed fifty parts per million (50ppm) or one tenth of a foot (0.10') for distances less than two thousand feet (2,000') at the sixty-eight percent (68%) confidence level (one sigma); and,

(B) The positional uncertainty of any coordinates shown on the plat relative to the control that is held fixed, shall not exceed fifty parts per million (50ppm) or one tenth of a foot (0.10') for distances less than two thousand feet (2,000') at the sixty-eight percent (68%) confidence level (one sigma).

(3) Precision requirements for Rural Property:

(A) The uncertainty due to random errors of any dimension of direction or distance shown on the plat shall not exceed one hundred parts per million (100ppm) or one tenth of a foot (0.10') for distances less than one thousand feet (1,000') at the sixty-eight percent (68%) confidence level (one sigma); and,

(B) The positional uncertainty of any coordinates shown on the plat relative to the control that is held fixed, shall not exceed one hundred parts per million (100ppm) or one tenth of a foot (0.10') for distances less than one thousand feet (1,000') at the sixty-eight percent (68%) confidence level (one sigma).

AUTHORITY: sections 60.510(7) and 60.550, RSMo 1986 and 448.2-109, RSMo Supp. 1988.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.510(7) and 60.550, RSMo 1969 and 448.2-109, RSMo 1983, amended 1988.

## **2 CSR 90-60.050 Use of Missouri Coordinate System of 1983**

*PURPOSE: This rule sets forth the requirements for referencing land boundary corners to the Missouri Coordinate System of 1983.*

(1) When the surveyor is specifically requested or required to reference land boundary corners to the Missouri Coordinate System of 1983, the surveyor shall comply with the following requirements:

(A) The position of the corner shall be based upon a geodetic control station having a

horizontal accuracy of second order (as defined in 20 CSR 2030-18) or higher order;

(B) The survey connecting the corner to the geodetic control station shall meet the accuracy standards for property boundary surveys set forth in this chapter; and

(C) The plat or other publication of results shall identify the geodetic control station(s) that were used to determine the position of the corner(s), along with a list of the coordinates of those control stations(s); the appropriate adjustment date or realization designation on the North American Datum of 1983, along with the epoch date when applicable; a brief statement of the method used to obtain those positions; and the grid factor used.

**AUTHORITY:** sections 60.510(7), 60.550 and 448.2-109, RSMo 2000.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

Amended: Filed March 20, 2003, effective Oct. 30, 2003.

\*Original authority: 60.510(7), RSMo 1969; 60.550, RSMo 1969; and 448.2-109, RSMo 1983, amended 1988.

## **2 CSR 90-60.060 Approved Monumentation**

**PURPOSE:** *This rule prescribes the approved type of monumentation to be used on property boundary surveys.*

(1) The surveyor shall select a type of monument providing a degree of permanency consistent with that of the adjacent terrain and physical features and as required by these standards. All monuments shall be solid and free from movement. They shall be set in the ground at least to the depth of the length given unless they are encased in concrete. With the exception of drill holes and cut crosses, the precise position of the corner shall be marked by a point on a cap and the cap shall be inscribed with the licensure number of the land surveyor in responsible charge, or the corporate licensure number or name of the company.

(2) Permanent monuments shall be selected from the following:

(A) Concrete monuments consisting of reinforced concrete at least four inches (4") square or in diameter and no less than twenty-four inches (24") in length with its precise position marked by a point on a brass or aluminum cap not less than one and one-half inch (1 1/2") in diameter;

(B) Commercial cast iron or aluminum survey markers no less than twenty-four inches (24") in length. Nonferrous markers shall have ceramic magnets attached to aid in recovery;

(C) Steel, coated steel, or aluminum rod markers not less than five-eighths inch (5/8") in diameter, iron pipe markers not less than three-quarter inch (3/4") inside diameter and not less than twenty-four inches (24") in length. These monuments shall have a permanently attached cap of the same metal or of a dissimilar metal if the metals are insulated with a plastic insert to reduce corrosion. Nonferrous rod markers shall have ceramic magnets attached to aid in recovery; and

(D) Brass or aluminum disks not less than two inches (2") in diameter, countersunk and well-cemented in a drill hole in either solid rock or concrete. Ceramic magnets shall be attached or installed with the disk to aid in recovery.

(3) Semi-permanent monuments shall be selected from the following:

(A) Iron pipe markers not less than three-fourths inch (3/4") outside one half inch (1/2") inside diameter at least eighteen inches (18") in length and having a plastic or metal cap;

- (B) Steel or aluminum rod markers not less than one-half inch (1/2") in diameter and not less than eighteen inches (18") in length and having a plastic or aluminum cap;
- (C) A cross-cut or drill hole in concrete, brick, stone paving, or bedrock at the precise position of the corner or on a prolongation of a boundary line; and
- (D) In asphalt paving, cotton picker spindles, railroad spikes (center punched or chiseled cross), semi-permanent ½" rebar, and magnetic spikes (minimum of 8" in length) that are solid and not easily removed or destroyed.

AUTHORITY: sections 60.510(7) and 60.550, RSMo 1986 and 448.2-109, RSMo Supp. 1988.\*  
Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.510(7) and 60.550, RSMo 1969 and 448.2-109, RSMo 1983, amended 1988.

## **2 CSR 90-60.070 Location of Improvements and Easements**

*PURPOSE: This rule sets forth how and what improvements and easements are to be located and shown on a property boundary survey.*

- (1) When the surveyor is specifically requested by the client to locate the improvements on the property surveyed, the surveyor shall locate by measurement all permanent structures having fixed foundation, slabs or footings and shall reference them to the property boundary on the plat with a minimum of three (3) dimensions. Dimensions shall be parallel, perpendicular or radial to the property lines.
- (2) When the surveyor is specifically requested by the client to show easements on a property boundary survey, he/she shall show by graphic representation all easements appearing on the recorded subdivision plat and all easements provided to the surveyor by the client. If the surveyor is specifically requested by the client to locate any easements on the ground, he/she will do so in accordance with the standards defined herein.

AUTHORITY: sections 60.510(7) and 60.550, RSMo 1986 and 448.2-109, RSMo Supp. 1988.\*  
Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.510(7) and 60.550, RSMo 1969 and 448.2-109, RSMo 1983, amended 1988.

**Title 2—DEPARTMENT OF AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 61—United States Public Land Survey Corners**

**2 CSR 90-61.010 Definitions**

*PURPOSE: This rule defines the various technical and legal terms used in Chapter 3. Pursuant to HB28 the Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.*

- (1) Alteration of a corner: changing the physical monumentation of a corner or adding witness accessories.
- (2) Corners of the United States Public Land Survey: those points that determine the boundaries of the various subdivisions represented on the official plat such as the township corner, the section corner, the quarter-section corner, blank quarter section corners, fractional section corner, center of section, grant corner, lot corner and meander corner.
- (3) Date of the field work: the date on which the monument was physically altered or removed and referenced.
- (4) Existential corner: a corner whose position can be identified by verifying the evidence of the original monument or its accessories, or by some physical evidence described in the field notes, or located by an acceptable supplemental survey record or some physical evidence thereof, or by testimony. The physical evidence of a corner may have been entirely obliterated but the corner will be considered existential if its position can be recovered through the testimony of one (1) or more witnesses who have a dependable knowledge of the original location. A legally reestablished corner shall have the same status as an existential corner.
- (5) Lost corner: a corner whose position cannot be determined, beyond reasonable doubt, either from traces of the original marks or from acceptable evidence or testimony that bears upon the original position.
- (6) Monument: the physical object which marks the corner point determined by the surveying process. The accessories, such as bearing trees, bearing objects, reference monuments, mounds of stone and other similar objects that aid in identifying the corner position, are also considered a part of a corner monument.
- (7) Reestablishment of a corner: the monumentation of a lost corner whose position has been determined by proportionate measurement.
- (8) Removal of a corner: the complete elimination of an existing corner monument.
- (9) Restoration of a corner: the alteration of an existential corner.
- (10) Reference Monument: a monument set in such a manner and location that the position of the actual corner can be located from it by direction and distance or by two (2) distances when two reference monuments are set.

*AUTHORITY: sections 60.321, RSMo Supp. 1989 and 60.550, RSMo 1986.\* Original rule filed Dec. 8, 1975, effective Dec. 18, 1975. Rescinded and readopted: Filed Feb. 10, 1982, effective May 13, 1982. Rescinded and readopted: Filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.321, RSMo 1989 and 60.550, RSMo 1969.*

## **2 CSR 90-61.020 Authorization for Removal or Alteration of Corners**

*PURPOSE: This rule identifies who is authorized to alter or remove a corner of the United States Public Land Survey and how to obtain permission from the Department of Agriculture.*

Only a professional land surveyor is authorized to remove, alter, restore or reestablish a corner of the United States Public Land Survey. Any professional land surveyor who removes, alters, restores or reestablishes a corner of the United States Public Land Survey report his actions by filing an approved document with the Missouri Department of Agriculture, Land Survey Program within ninety (90) days from the date of the field work. The permission required by section 60.550, RSMo is granted upon filing the approved document with the Missouri Department of Agriculture Land Survey Program.

*AUTHORITY: sections 60.321, RSMo Cum. Supp. 1989 and 60.550, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.321, RSMo 1989 and 60.550, RSMo 1969.*

## **2 CSR 90-61.030 Procedure for Filing Documents**

*PURPOSE: This rule describes the procedure for filing certified land corner [restoration or reestablishment] documents with the Department of Agriculture.*

(1) Approved documents shall be filed with the Department of Agriculture, Weights, Measures & Consumer Protection Division, Land Survey Program, P.O. Box 937, Rolla, MO 65402-0937. Documents filed with the county recorder must first be filed with the Department of Agriculture.

(2) Certified Land Corner Document and Resident Witness Affidavit forms may be obtained in a reasonable number from the Department of Agriculture, Weights, Measures & Consumer Protection Division, Land Survey Program, P.O. Box 937, Rolla, MO 65402-0937.

(3) There is no fee for filing these documents.

(4) Filing of corner documentation with the Department of Agriculture does not create an implied warranty by either the surveyor or the Department of Agriculture as to conclusive evidence of the corner location.

*AUTHORITY: sections 60.321, RSMo Supp. 1989 and 60.550, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.321, RSMo 1989 and 60.550, RSMo 1969.*

## **2 CSR 90-61.040 Monumentation**

*PURPOSE: This rule prescribes the type of monument to be installed to preserve the position of the United States Public Land Survey Corner.*

(1) All corner monuments monuments and reference monuments shall be permanent monuments of a type providing a degree of permanency consistent with that of the adjacent terrain and physical features. Monuments shall meet the requirements for a permanent monument in accordance with the Missouri Standards for Property Boundary Surveys.

(2) In such cases where the placement of a required corner monument at its proper location is impractical, it shall be permissible to set a reference or witness monument or mark near that point, and if such reference monument or mark is set, its location shall be properly shown on the certified land corner document.

(3) All monuments shall be marked and designated in accordance with the Bureau of Land Management (BLM) system of marking monuments that furnishes ready identification of the position of the monument which bears the mark. Letters and numerals should be carefully stamped with three-sixteenths inch (3/16") or one-eighth inch (1/8") steel dies and should always be made to read from the south. Lines and crosses should be made with a sharp cold chisel. The precise position shall be marked by a point, cross, or appropriate symbol on the monument.

(4) Where possible, four (4) reference ties (distance and direction) to durable objects will be made to provide the means for restoring the position of the marked corner if the monument is disturbed. Durable objects include, but are not restricted to: house corners, marks on concrete structures or pavement, marks on ledge or bedrock, trees, additional permanent monuments, fence posts, utility poles, and crosses on curbs. All durable objects and reference ties shall be fully described on the document.

(5) In some special cases where an existing monument is found and it is deemed appropriate to preserve the monument in its original location, a reference or witness monument may be installed nearby.

(6) At locations where a stone, iron pin, pipe or other monument is to be replaced by a permanent monument, the existing monument will be removed and buried or placed alongside the permanent monument in such a manner that it will not be confused with the permanent monument.

*AUTHORITY:* sections 60.321, RSMo Supp. 1989 and 60.550, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.321, RSMo 1989 and 60.550, RSMo 1969.

## **2 CSR 90-61.050 Missouri Coordinate System of 1983**

*PURPOSE:* This rule prescribes requirements for referencing corners of the United State Public Land Survey to the Missouri Coordinate System of 1983.

(1) When the corner that is removed, altered, restored or reestablished is referenced to the Missouri Coordinate System of 1983, the corner coordinates shall be shown on the Certified Land Corner Document form.

(2) Coordinates referenced to the Missouri Coordinate System of 1983 and shown on Certified Land Corner Document forms shall comply with the following requirements:

(A) The position of the corner shall be based upon a geodetic control station having a horizontal accuracy of second order (as defined in 2 CSR 90-62) or higher order.

(B) The survey connecting the corner to the geodetic control station shall meet the accuracy standards set forth in the Missouri Standards for Property Boundary Surveys.

(C) The following information shall be included on the Certified Land Corner Document form:

- (i) the geodetic control stations(s) that were used to determine the position of the corner;
- (ii) the coordinates of the geodetic control station(s) used and the appropriate Zone designation;
- (iii) the appropriate adjustment date or realization designation on the North American Datum of 1983 along with the epoch date, when applicable
- (iv) a brief statement of the method used to obtain the position; and
- (v) the grid factor used.

(3) Coordinates referenced to the Missouri Coordinate System of 1983 may be used to reference corners in lieu of monuments.

*AUTHORITY: sections 60.321, RSMo Supp. 1989 and 60.550, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.321, RSMo 1989 and 60.550, RSMo 1969.*

## **2 CSR 90-61.060 Approved Documents**

*PURPOSE: This rule prescribes the form of the document to be filed with the Department of Agriculture.*

(1) An approved document may be any one (1) of the following:

- (A) Certified Land Corner Document form and
- (B) Special form approved by the Department of Agriculture.

(2) Preparation of Certified Land Corner Document Forms. All information (except drawings) will be typed or completed in black ink. Lettering or typing shall not be less than eight-hundredths inch (0.08") in height. Drawings may be made in black pencil so long as all drawings will make sharp and clear copies.

(A) The following information shall be included on all corner forms:

1. The description of the original monument, witness ties and any subsequent restorations, including the date of the survey, the document reference book and page and/or microfilm location and the surveyor of record. Original survey notes need not be given in urban or built-up areas;

- 2. Signature and seal of the professional land surveyor;
- 3. Date of the survey field work;
- 4. Basis of bearing system used;
- 5. Description of the monument, monument marking and witness/reference ties;
- 6. Comprehensive sketch of the corner location sufficient to find the monument; and
- 7. Coordinates referenced to the Missouri Coordinate System of 1983, if known.

(B) The following additional information is required for forms showing the restoration or alteration of existing corner monuments:

1. Description of the evidence found indicating the corner is existent;
2. Resident witness affidavits, when the corner is restored from testimony;
3. Distances and directions used to retrace prior evidence.

(C) The following additional information will be required for reestablished corners:

1. Statement of the method used to reestablish the corner; and
2. Distances and bearings used in the reestablishment procedure.

*AUTHORITY: sections 60.321, RSMo Supp. 1989 and 60.550, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.321, RSMo 1989 and 60.550, RSMo 1969.*

**Title 2—DEPARTMENT OF AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 62—First and Second Order Horizontal and Vertical Control**

**2 CSR 90-62.010 Definitions**

*PURPOSE:* This rule defines technical terms used in Chapter 4. Pursuant to HB28 the Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.

(1) Positional accuracy of a station: the uncertainty in the position of the station relative to the stations that are held fixed (i.e., National Geodetic Survey (NGS) or other higher order stations) in the process of the adjustment. Positional accuracy of a station is computed from the constrained, correctly weighted, least squares adjustment at the ninety-five percent (95%) confidence level.

(2) Relative accuracy: the uncertainty in the position of one station relative to another station. It is computed for all directly connected stations from the minimally constrained and the constrained correctly weighted, least squares adjustment at the ninety-five percent (95%) confidence level.

(3) Rural area: For purposes of this chapter, a rural area is any second, third or fourth class county according to 48.020, RSMo.

(4) Urban area: For purposes of this chapter, an urban area is any first class county according to 48.020, RSMo.

*AUTHORITY:* sections 60.451.3. and 60.461, RSMo 1986.\* Original rule filed March 1, 1978, effective July 15, 1978. Rescinded and readopted: Filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.451.3, RSMo 1984 and 60.461, RSMo 1984.

**2 CSR 90-62.020 Horizontal Control Classification**

*PURPOSE:* This rule describes the classes of horizontal control.

(1) First Order Horizontal Control Classification. The purpose of this class of survey is to establish primary horizontal control station of the Missouri Geographic Reference System or the National Spatial Reference System.

(2) Second Order Horizontal Control Classification. The purpose of this class of survey is to establish secondary and supplemental horizontal control stations of the Missouri Geographic Reference System or the National Spatial Reference System.

(3) Both first and second order stations are dependent stations constrained to the existing first and second order stations of the Missouri Geographic Reference System and/or the National Spatial Reference System. These stations are intended to be used to meet the needs of mapping, geographic information systems, land information systems, property [boundaries,] boundary surveys, and engineering surveys.

*AUTHORITY: sections 60.451.3. and 60.461, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.451.3, RSMo 1984 and 60.461, RSMo 1984.*

## **2 CSR 90-62.030 Accuracy of Horizontal Control**

*PURPOSE: This rule prescribes the acceptable accuracy of first and second order control.*

(1) The accuracy of a horizontal control station is classified according to constrained and unconstrained, relative accuracy of the distance between stations, and the positional accuracy of the station relative to the stations held fixed in the adjustment. If the requirements for all three criteria are not satisfied, the station shall fail to qualify for the classification.

(2) First Order Horizontal Control.

(A) The relative accuracy of the distance between directly connected adjacent stations shall be equal to or less than twelve millimeters (12 mm) for distances equal or less than one kilometer (1 km), and ten parts per million (10 ppm) for distances greater than one kilometer (1 km).

(B) The positional accuracy of a station shall be thirty millimeters (30 mm) in urban areas and sixty millimeters (60 mm) in rural areas.

(3) Second Order Horizontal Control.

(A) The relative accuracy of the distance between directly connected adjacent stations shall be equal to or less than twenty-five millimeters (25 mm) for distances equal to or less than one kilometer (1 km), and twenty parts per million (20 ppm) for distances greater than one kilometer (1 km).

(B) The positional accuracy of a station shall be sixty millimeters (60 mm) in urban areas and one hundred (100) mm in rural areas.

(4) To fully qualify as a first or second order control station, the station must be accepted and published by the Missouri Department of Agriculture or the National Geodetic Survey or its successor organization.

*AUTHORITY: section 60.451.3. and 60.461, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.451.3, RSMo 1984 and 60.461, RSMo 1984.*

## **2 CSR 90-62.040 Acceptance and Publication by Missouri Department of Agriculture**

*PURPOSE: This rule designates the procedures for determining which control will be a part of the Missouri Geographic Reference System.*

(1) The following information will be submitted for each control survey that is to be evaluated for inclusion into the Missouri Geographic Reference System (MO GRS) as a first or second order station.

(A) A sketch will be submitted showing all stations occupied during the control survey. In addition to occupied stations, the sketch should show other existing horizontal or vertical stations located within or near the project area.

(B) A legend on the sketch should show the following information:

Project Name

General Locality

Name of organization performing observations

Date of project start and completion

(C) A north arrow and graphic scale should appear on the sketch. All station symbols should be labeled with the station name. When [with an inset used when] stations are spaced too closely together to be clearly depicted on the network sketch an inset shall be used.

(2) A report shall be submitted for each project and shall be signed and sealed by the surveyor or engineer in responsible charge. The report shall be the main source of information for judging whether or not the stations should be accepted as MO GRS stations. It shall be the responsibility of the surveyor or engineer to supply sufficient information in the report to facilitate inclusion of the stations in the MO GRS.

(3) The report shall contain a clear description of the survey procedures and equipment used in the field. This includes, but is not limited to the information entered into the field log and auxiliary information such as logistics, preanalysis, satellite selection results (if Global Positioning System (GPS) survey), personnel involved, and difficulties encountered.

(4) In the report there shall be a clear description of the procedures used in the office. This includes, but is not limited to, computer software and hardware used to process observations, options used (if any), data editing performed, source of orbital data (if GPS survey), parameters adjusted and held fixed, results of self-validation and any difficulties encountered.

(5) The following shall be included for GPS surveys. The version number and date of the GPS software used must be reported. For GPS surveys, the surveyor or engineer must also specifically report the baselines rejected for the project. All parameters used for any coordinate transformations shall be presented and any scaling of the covariance matrix by the surveyor or engineer must be described in detail. If the covariance matrix has been scaled, the scale factor used must also be presented. These results must be reported for all single base line and network solutions. Statistical testing of the survey results from the network solution, including analysis of variance factors, semi-major axis of two dimensional (horizontal) or three dimensional ninety-five percent (95%) relative confidence regions between all directly connected pairs of stations, residuals and residual outliers shall be provided. In addition, the results of any self-validation checks must be reported, including but not limited to, comparisons of any repeated single base line solutions.

(6) For traverse surveys, all field data used to determine directions, distances, azimuths and elevations, as well as, the adjustment calculations shall be submitted along with the name of the software used in the adjustment. The data submitted shall show the final results of the adjustment and the error analysis.

(7) Only those stations meeting the requirements of 2 CSR 90-62.030, 2 CSR 90-62.040, 2 CSR 90-62.050, 2 CSR 90-62.060 will be accepted for publication in the MO GRS.

*AUTHORITY: sections 60.451.3. and 60.461, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.451.3, RSMo 1984 and 60.461, RSMo 1984.*

## **2 CSR 90-62.050 GPS Survey Guidelines**

*PURPOSE: This rule prescribes the minimum procedures for first or second order Global Positioning System surveys.*

- (1) Direct connections must be made to any adjacent observable National Spatial Reference System (NSRS) and/or Missouri Geographic Reference System (MO GRS) station located five kilometers (5 km) or less from any new station.
- (2) At least three (3) existing higher or equal order control points must be included in any proposed Global Positioning System (GPS) survey. Whenever possible these should be three (3) three-dimensional control stations. Otherwise two (2) sets of three (3) stations, (three (3) two-dimensional (2-d) horizontal stations and three (3) vertical control stations) must be used. These control stations should be chosen to be roughly equidistant on the periphery of the proposed project so that they enclose as much of the project as possible.
- (3) Each new station to be established by the proposed GPS survey must be occupied at least two (2) separate times to enable proper checking of blunders (for example, incorrect point, setup errors, incorrect antenna heights). A separate occupation is one in which the antenna and its supporting device (tripod) have been taken down and set up again and the receiver restarted.
- (4) Each station must be connected by simultaneous occupations (baselines) to at least three (3) other stations in the network after outlier base lines have been rejected from the adjustment. Because it is generally easier to resolve the integer phase ambiguities over shorter base line, adjacent stations should be connected wherever possible.
- (5) At least two (2) receivers must be used for relative positioning, although three (3) or more may be used for more efficient operation and increased station reoccupation and base line repeatability.
- (6) A preanalysis should be performed to determine the minimum occupation time required to achieve the required standard of accuracy. In addition, the most appropriate satellites to observe at each site should also be selected for receivers unable to track all of the "visible" satellites. The preanalysis should be specific for carrier phase relative positioning.
- (7) In order to meet second order accuracies, the carrier beat phase must be observed together with a time tag for each observation. Pseudo-range observations are not precise enough for control surveys and cannot be used.
- (8) A detailed field log must be kept during observation taken at each station. At the very least the following information must be recorded:
  - (A) Universal Time Coordinated (UTC) date of observations;
  - (B) Station identification (name and number);
  - (C) Session identification;
  - (D) Serial numbers of receiver, antenna, and data logger;
  - (E) Receiver operator;
  - (F) Antenna height and offset from monument, if any to one millimeter (1 mm). Note should be made as to whether the height is measured as a slant height or vertical height;
  - (G) Diagram illustrating stamping on the monument;
  - (H) Other stations observed during session;
  - (I) Starting and ending time (UTC) of observations;
  - (J) Satellites observed (including time of changes); and

(K) Completed field log data forms for each station occupation will be submitted either using those provided by the Missouri Department of Agriculture (MDA) or some other type containing all necessary information included on the MDA forms.

(9) The raw data files for all station occupations must be submitted. Each file will consist of one (1) set of raw observations for each station occupation session. For example, four (4) receivers operating during each of five (5) sessions will produce twenty (20) raw data files.

(10) The unadjusted base line vector solution files for all observed base lines, non-trivial and trivial, will be submitted.

(11) If station description information is not provided by MDA it must be submitted for each station occupied. Station descriptions must include station name, county, township, range, section, United States Geological Survey (USGS) 7.5-minute quadrangle name, date monumented, date of observations, complete descriptions of the station, azimuth and all reference monuments, a current "to reach" description, and any special information such as property owner name, address, and phone number. A sketch depicting the station and reference marks with dimensions and directions shown should accompany all narrative data. Examples of complete station description information may be obtained from MDA.

(12) If the GPS survey project includes any surveys using conventional or terrestrial horizontal surveying techniques, copies of all field notes and associated data must be submitted. This would include eccentric point establishment and reduction. Polaris, solar, or direct observational data to establish azimuth marks shall also be submitted.

(13) When the GPS survey project includes surveys performed using conventional differential leveling techniques, copies of all field notes and associated data must be submitted. An example of this would be a vertical tie from a nonoccupied bench mark to a GPS station.

(14) A tabulation of the results of the repeat base line comparisons will be included in the project report.

(15) A minimally constrained (free) least squares, three dimensional (3-d) adjustment will be submitted in the form of the input and output files.

*AUTHORITY: sections 60.451.3. and 60.461, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.451.3, RSMo 1984 and 60.461, RSMo 1984.*

## **2 CSR 90-62.060 Traverse Survey Guidelines**

*PURPOSE: This rule prescribes the minimum procedures for first or second order traverse surveys.*

(1) First Order Traverse Procedure.

(A) The location of first order traverse lines and monumented stations shall be determined by a thorough field reconnaissance. The traverse point spacing shall not be less than six hundred meters (600m).

(B) All first order traverse lines shall start from, and close upon, first order stations or higher order stations of the Missouri Geographic Reference System (MO GRS) or National Spatial Reference System (NSRS) in accordance with these procedures.

(C) Properly maintained theodolites with a least count of one second (1") or a DIN 18723 specification of one and one-half seconds (1.5") or smaller shall be used to observe directions and azimuths. At least four (4) positions or repetitions of the angles shall be observed. The theodolite and targets should be centered to within two millimeters (2 mm) over the survey station or traverse point.

(D) Electronic distance measuring (EDM) instruments shall be used to measure all distances. EDM instruments shall be tested on an MDA base line at the start of and on the completion of any first order traverse. Copies of the EDM base line comparisons shall be included in the survey report submitted to the Department. Barometric pressure to the nearest five millimeters (5 mm) of mercury and temperature to the nearest one degree Celsius (1°C) shall be recorded for each measurement.

(E) Each traverse shall be tied to a minimum of two (2) bench marks. Trigonometric or spirit leveling will be observed along all traverse lines. All HI's, HO's and zenith angles shall be recorded and submitted.

(F) The traverse shall be controlled by an astronomic azimuth at each end of the traverse line and at not more than every six (6) segments along the line. Astronomic azimuths shall have a standard deviation of one and one-half seconds (1.5") or less.

(G) All field data shall be submitted to Missouri Department of Agriculture (MDA) in a format acceptable to the Department. This shall include directions, distances, azimuth and elevations.

(2) Second Order Traverse Procedure.

(A) The location of second order traverse lines and monumented stations shall be determined by a thorough field reconnaissance. The traverse point spacing shall not be less than three hundred meters (300m).

(B) All second order traverse lines shall start from and close upon, second order or higher order stations of the MO GRS or NSRS in accordance with these procedures.

(C) Properly maintained theodolites with a least count of one second (1") or DIN 18723 specification of one and one-half seconds (1.5") or smaller shall be used to observe directions and azimuths. At least four (4) positions or repetitions of the angles shall be observed. The theodolite and targets should be centered to within two millimeters (2 mm) over the survey station or traverse point.

(D) Electronic distance measuring (EDM) instruments shall be used to measure all distances. EDM instruments shall be tested on an MDA base line at the start of and on the completion of any second order traverse. Copies of the EDM base line comparisons shall be included in the survey report submitted to the Department. Barometric pressure to the nearest five millimeters (5 mm) of mercury and temperature to the nearest one degree Celsius (1°C) shall be recorded for each measurement.

(E) Each traverse shall be tied to a minimum of (two) 2 bench marks. Trigonometric or spirit leveling will be observed along all traverse lines. All Instrument Heights (HI), Reflector Heights (HO), and zenith angles shall be recorded and submitted.

(F) The traverse shall be controlled by an astronomic azimuth at each end of the traverse line and at not more than every eight (8) segments along the line. Astronomic azimuth shall have a standard deviation of two seconds (2") or less.

(G) All field data shall be submitted to the DNR in a format acceptable to the Department. This shall include directions, distances, azimuth and elevations.

AUTHORITY: sections 60.451.3. and 60.461, RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority: 60.451.3, RSMo 1984 and 60.461, RSMo 1984.

**Title 2—DEPARTMENT OF AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 63— Standards for Surveyor's Real Property Report**

**2 CSR 90-63.010 Surveyor's Real Property Report**

**PURPOSE:** This rule provides a uniform standard for a type of report used by the real estate industry to verify the location of improvements and to check for encroachments onto or from the subject property. This type of work has been referred to as spot survey house on lot survey and mortgage inspection report. *Pursuant to HB28 the Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.*

(1) A registered land surveyor in Missouri shall not provide to any party a Surveyor's Real Property Report unless they are in the possession of a work order specified elsewhere in this chapter and signed by the borrower/purchaser indicating that they have been advised of the different types of surveying services available and the scope of each of these services. The required work order is to be initiated and signed during the loan application process. The Surveyor's Real Property Report is to be used only for residential, single-family detached dwellings; duplexes; triplexes and fourplexes with not more than one (1) dwelling structure per previously surveyed and recorded parcel or tract. The Surveyor's Real Property Report is not to be used for commercial, institutional, industrial buildings or multifamily dwelling which share a common entranceway or stairwell.

(2) **Research and Records**-The surveyor shall perform adequate research, maintain sufficient recorded documentation and provide the field crew with information necessary to locate the property in the field.

(3) **Field Procedures**-Detailed notes shall be taken on each Surveyor's Real Property Report and kept as a part of the surveyor's permanent records. A diligent search for existing control shall be made by the field crew and the highest order of monumentation available shall be used.

Monumentation is defined as permanent and semi-permanent monuments described in the Minimum Standards for Property Boundary Surveys and other survey control, such as stones, axles, rebars, crosses and pipes. Occupation lines such as fence lines, hedge rows, mowing lines, are not considered monumentation unless supported by survey control. The surveyor must obtain sufficient evidence relating to the property boundary to demonstrate general knowledge of the given area. Appropriate field instrumentation and measuring equipment needed to achieve the stated level of certainty shall be utilized. The norm would include (EDM), theodolite, transit, and measuring tapes.

(4) **Form of Report**-The report is a drawing of the parcel and it shall be furnished to the borrower/purchaser and shall show the following:

(A) Property lines with the boundary dimensions from the deed description or subdivision plat shall be shown;

(B) The monumentation accepted or adopted to locate and orientate the parcel, shall be shown or noted on the report;

(C) Permanent structures having fixed foundations or footings such as buildings and in-ground swimming pools, shall be located and dimensioned. Permanent structures shall be shown with a minimum of three (3) dimensions sufficient to locate the structure in relation to the property lines.

Dimension offsets shall be shown perpendicular to straight property lines and radially to curved property lines. The level of uncertainty of these locations shall be shown in parentheses after each dimension or by means of a general note. Two (2) of the many possible examples are: 12.5' (or ± 0.5') or 21' (or ± 1'). The uncertainty of all dimensions of permanent structures shall not be greater than one-tenth of a foot (0.1'). Walks and drives shall be shown graphically but need not be dimensioned. When the uncertainty of the dimensions to permanent structures is not precise enough for a positive determination, a property boundary survey shall be recommended to the borrower/purchaser and this recommendation shall be stated on the report;

- (D) Means of access and platted setback lines shall be shown;
  - (E) Easements shown on the subdivision plat shall be shown. If documentation of other easements is provided the surveyor, they shall be shown together with their source;
  - (F) The posted address shall be shown, if not posted, so state;
  - (G) A north arrow and graphic scale shall be shown;
  - (H) Apparent encroachments shall be noted and shown in an obvious manner. When the uncertainty of dimensions to possible encroachments are not precise enough for a positive determination, a property boundary survey shall be recommended to the borrower/purchaser and shall be stated on the report;
  - (I) The sheet size for the report shall not be less than eight and one-half inches by eleven inches (8 1/2" x 11"). Lettering size on the report shall not be smaller than eight-hundredths of an inch (0.08") in height;
  - (J) The following caption shall appear prominently on the drawing with minimum letter size of seventeen-hundredths of an inch (0.17"): Surveyor's Real Property Report; and
  - (K) If the certification and the drawing are on two (2) separate pieces of paper, it shall be so indicated. (For example: page 1 of 2, page 2 of 2).
- (5) Certification-A Surveyor's Real Property Report shall not contain the word survey in any part of the report except as required in this standard, and must contain the following:
- (A) The name, address and telephone number of the surveyor responsible for the report and the name of the party who ordered the work;
  - (B) A statement that the report was either conducted by the land surveyor or under his/her immediate personal supervision, the date the report was made and the real property description or the public record reference of the property shown in the report;
  - (C) A statement that the accompanying drawing is a representation of the conditions that were found at the time of the inspection and that the report does not constitute a property boundary survey and is subject to any inaccuracies that a subsequent property boundary survey may disclose. It shall state the fact that no property corners were set, and that the information shown on the drawing should not be used to construct any fence, structure or other improvements. If the property dimensions are based upon unverified recorded or deed information, this shall be so stated. Include notification that the land surveyor is not extending a warranty to the present or future owners or occupants; and

(D) The land surveyor shall sign, seal and date the report.

AUTHORITY: section 60.510(7), RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority 1969.

## **2 CSR 90-63.020 Required Work Order Form**

PURPOSE: This rule states the information given below must be contained in the work order form. The surveyor may want to include other data in the form.

### **WORK ORDER**

Please read carefully and indicate the type of service you wish to order.

. . . Surveyor's Real Property Report: It is a location of improvements and cursory check for encroachments onto or from the subject property based on existing but not confirmed evidence. This does not constitute a boundary survey and is subject to any inaccuracies that a subsequent boundary survey may disclose. No property corners will be set and it should not be used or relied upon for the establishment of any fence, structure or other improvement.

....No warranty of any kind is extended therein to the present or future owner or occupant.

. . . Property Boundary Survey with Location of Improvement: A boundary survey of the subject property will be made and the property corners will be located and verified or reset. The improvements on the property will be located and encroachments onto or from the subject property will be determined. This survey can be used by the property owner for the construction of a fence or other improvements. The survey will meet "Minimum Standards for Property Boundary Surveys."

. . . ALTA/ACSM (American Land Title Association/American Congress on Surveying and Mapping) Land Title Survey: This is the most comprehensive type of survey and improvement location. It covers all the aspects of the boundary survey and improvement location and identification for any additional evidence of possession or use which could be adverse to the interests of the purchaser. This type of survey is normally only performed on commercial property because of the expense involved.

I (We), the undersigned, have read, understand and have indicated the type of service desired and have authorized the work to be performed and agree to be responsible for the bill for this survey.

Borrower/Purchaser ..... Date

Lender

Ordered by

Common address

Legal description

Signature

AUTHORITY: section 60.510(7), RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.

\*Original authority 1969.

**Title 2—DEPARTMENT OF AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 64—Mapping Survey Standards**

**2 CSR 90-64.010 Definitions**

*PURPOSE: This rule defines the terms used in this chapter. Pursuant to HB28 the Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.*

- (1) A map is a graphic representation of the physical features (natural, artificial, or both) of a part of the whole of the earth's surface, by means of signs and symbols or photographic imagery, at an established scale, on a specified projection, and with the means of orientation indicated. A map may be in various forms such as printed maps, subdivision of land in the form of plats, or in graphic presentations on a computer screen such as in a Geographic Information System (GIS) or in a Land Information System (LIS).
- (2) Horizontal map accuracy is defined as the root mean square (rms) error in terms of the project's planimetric survey coordinates (X,Y) for checked points as determined at full (ground) scale of the map. The rms error is the cumulative result of all errors including those introduced by the processes of ground control surveys, map compilation, and final extraction of ground dimensions from the map.
- (3) Vertical map accuracy is defined as the rms error in elevation in terms of the project's elevation datum or well-defined points only.
- (4) The rms error is defined to be the square root of the average of the squared discrepancies. In this case, the discrepancies are the differences in coordinate or elevation values as derived from the map and as determined by an independent survey of higher accuracy (check survey). Well-defined points are those that are easily visible and recoverable on the ground, such as: monuments or markers, bench marks, property boundary monuments; intersections of roads, railroads, etc.; corners of large buildings or structures (or center points of small buildings); etc. In general what is well defined will also be determined by what is plottable on the scale of the map within one one-hundredth inch (1/100"). Thus while the intersection of two (2) road or property lines meeting at right angles would come within a sensible interpretation, identification of the intersection of such lines meeting at an acute angle would obviously not be practicable within one one-hundredth inch (1/100"). Similarly, features not identifiable upon the ground within close limits are not to be considered as test points within the limits quoted, even though their positions may be scaled closely upon the map. In this class would come timber lines, soil boundaries, etc.

*AUTHORITY: section 60.510(7), RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.510, RSMo 1984.*

**2 CSR 90-64.020 Map Accuracy Standards**

*PURPOSE: This rule prescribes minimum acceptable mapping standards.*

- (1) Horizontal Accuracy.

(A) Class I. The root mean square (rms) error of a map product shall be less than 0.01 of one inch (1") on the map or in the case of a metric map, 0.025 of one centimeter (1 cm) on the map.

**EXAMPLE (Customary Units)**

| Scale    | Limiting rms<br>Value in Feet |
|----------|-------------------------------|
| 1"= 20'  | 0.2'                          |
| 1"= 50'  | 0.5'                          |
| 1"= 100' | 1.0'                          |
| 1"= 200' | 2.0'                          |
| 1"= 400' | 4.0'                          |
| 1"=1000' | 10.0'                         |
| 1"=2000' | 20.0'                         |

**EXAMPLE (SI Units)**

| Scale     | Limiting rms<br>Value in Meters |
|-----------|---------------------------------|
| 1 cm= 5m  | 0.125                           |
| 1 cm= 10m | 0.250                           |
| 1 cm=100m | 2.50                            |
| 1 cm=200m | 5.00                            |

(B) Class II. The rms shall be twice that required for Class I.

(C) Class III. The rms shall be three (3) times that required for Class I.

(2) Vertical Accuracy.

(A) Class I. For Class I maps rms error in elevation shall be less than one-third (1/3) of the indicated contour interval for well-defined points only, and one-sixth (1/6) of the contour interval for spot heights.

(B) Class II. The rms error may be twice that required for Class I.

(C) Class III. The rms error may be three (3) times that required for Class I.

(3) Mixed Accuracy. A map may be compiled that complies with one (1) class of accuracy in elevation and another in planimetry.

*AUTHORITY: section 60.510(7), RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.510, RSMo 1984.*

## **2 CSR 90-64.030 Certification of the Map**

*PURPOSE: This rule prescribes the statement made by the surveyor of the map.*

(1) Maps meeting the requirements of this standard shall note this fact on their legends with the statement that "This map complies with the Missouri Map Accuracy Standard." The class of accuracy shall also be noted.

(2) When a map is a considerable enlargement of a completed map, that fact shall be stated in the legend. The scale of the original map shall also be noted.

*AUTHORITY: section 60.510(7), RSMo 1986.\* Original rule filed May 3, 1994, effective Dec. 30, 1994.*

*\*Original authority: 60.510, RSMo 1984.*

**Title 2—DEPARTMENT OF AGRICULTURE**  
**Division 90—Weights and Measures**  
**Chapter 65—Cadastral Mapping Survey Standards**

## **2 CSR 90-65.010 Application of Standards**

*PURPOSE: These minimum standards provide the digital mapper and recipient of digital cadastral parcel mapping products a realistic guideline for the product delivered. This rule describes the digital cadastral mapping system components to which these minimum standards apply. Pursuant to HB28 the Land Survey Program was moved from Department of Natural Resources to Department of Agriculture in August 2013.*

The minimum standards in this chapter apply to digital cadastral mapping as it relates to the location of the United States Public Land Survey System. Any map designed and used to reflect legal property descriptions or boundaries for use in a digital cadastral mapping system shall comply with these rules unless otherwise specified in writing. It is not the intention that these minimum standards address the particular requirements of assessment mapping included in the rulemaking authority of the Missouri State Tax Commission. The intention is to work in conjunction with Commission authority.

## **2 CSR 90-65.020 Organization and Description**

- (1) Scope: This standard describes digital cadastral mapping system components, content, design, and creation.
- (2) Mission: To provide a standard for the definition and structure of digital cadastral data in order to facilitate data compatibility, and to protect and enhance the investments in digital cadastral data at all levels of government and the private sector.
- (3) Goals:
  - (A) To provide common definitions for cadastral information found in public records, used to create the digital cadastre.
  - (B) To resolve discrepancies related to the use of homonyms and synonyms in land record systems, to minimize duplication within and among those systems.
  - (C) To provide guidance and direction for land records, mapping and land surveying professionals on standardized attribute values and definitions, to improve land records creation, management.
  - (D) To use participatory involvement in the Standard development to reach out to organizations to encourage broadly based application of the Standard.

## **2 CSR 90-65.030 Definitions**

*PURPOSE: This rule defines the terms as used in this standard.*

- (1) Cadastral Data: Source information used to delineate the geographic extent, quantity and dimensions of cadastral parcels. Source information includes the United States Public Land Survey System (PLSS), subdivision plats, land surveys, real estate conveyances, right-of-way plans, etc.
- (2) Cadastral parcel mapping: The delineated identification of all real property parcels. The cadastral map is based upon the United States Public Land Survey System (PLSS). For

cadastral parcel maps the position of the legal framework is derived from the PLSS, existing tax maps, and tax database property descriptions, recorded deeds, recorded surveys, and recorded subdivision plats;

(3) Digital Cadastral Parcel Mapping: Encompasses the concepts of automated mapping, graphic display and output, data analysis, and database management as pertains to cadastral parcel mapping. Digital cadastral parcel mapping systems consist of hardware, software, data, people, organizations, and institutional arrangements for collecting, storing, analyzing, and disseminating information about the location and areas of parcels and the United States Public Land Survey System.

(4) Digital Section Vertices: The points on a digital cadastral map that define the PLSS lines and corners.

(5) Metadata: Information that describes specific details about a dataset. Metadata for geographic information may include the source of the data, its creation date and format, its projection scale, resolution, and accuracy.

(6) Metes and Bounds: Describe the limits of a land parcel by reference to courses and distances around a tract, and by reference to natural and artificial monuments of record.

(7) Missouri State Plane Coordinate System: The system of plane coordinates that have been established by the National Oceanic Survey/National Geodetic Survey, or its successors, for defining and stating the geodetic positions or locations of points on the surface of the earth within the state of Missouri as defined in Sections 60.401 through 60.491 of the Missouri Revised Statutes.

(8) Parcel: A single unit of real property which can be described by location and boundaries and for which there is a history of defined, legally recognized interests. Parcel boundaries are usually described in a conveyance document by aliquot part, metes and bounds or by lot number in a recorded subdivision.

(9) Point: A vector map feature having no length and no area, but is simply defined by a coordinate location.

(10) Polygon: A vector map feature represented by a closed geometric figure.

(11) Polyline: A vector map feature formed by connecting two points and having no area.

(12) Tax Map: A document or map for taxation purposes showing the location, quantity, dimensions and other relevant information pertaining to a parcel of land subject to ad valorem taxes, commonly known as property taxes.

(13) Topology: The spatial relationships between connecting, or adjacent, geographic features. Topological relationships are for spatial modeling operations that do not require coordinate information.

(14) United States Public Land Survey System (PLSS): The rectangular survey system created by the United States Government founded on a principal meridian and base line and forming townships approximately 6 miles north and south by 6 miles east and west, which are subdivided into 36 sections approximately one mile square. The system, established by surveys executed under the direction of the General Land Office (GLO), and evidenced by township plats, field notes and other available documentation. This system includes nonconforming private claims and other surveys as may have been performed under the direction of the General Land Office. The Fifth Principal Meridian is the basis of the Missouri PLSS.

## **2 CSR 90-65.040 – Coordinate System for Digital Cadastral Parcel Mapping Specified**

*PURPOSE: This rule specifies the coordinate system utilized for digital cadastral parcel mapping in Missouri.*

- (1) The Missouri State Plane Coordinate System shall be the coordinate system used for digital cadastral parcel mapping in Missouri.
- (2) To convert metric mapping coordinates, if desired, to U.S. Survey Feet, use the conversion of 1-meter equals 3.28083333 feet, where 1 meter equals 39.37 inches exactly.

## **2 CSR 90-65.050 – Digital Cadastral Parcel Mapping Requirements Pertaining to the United States Public Land Survey System**

*PURPOSE: This rule describes the minimum standard requirements that apply to the United States Public Land Survey System in a digital cadastral parcel mapping system.*

- (1) The United States Public Land Survey System (PLSS) shall be the foundation for digital cadastral parcel mapping in Missouri.
- (2) Accurately delineate the PLSS layer through practical application of available source information. Missouri County Courthouses, the Missouri Land Survey Repository, and other official sources and authorities of PLSS and record surveys are appropriate sources for survey information and documentation.
- (3) Determination of the digital location of section and quarter section corners of the PLSS should adhere to the survey principles, which created the PLSS, and now guide maintenance. Digital section vertices shall be held to the accuracy standards defined in this rule, preferably existing only at the quarter-corners.
- (4) Data prevalence for the establishment of the digital location of section corners shall be:
  - (A) Known coordinate points established by a licensed professional land surveyor, or as recorded with the Missouri Department of Agriculture's Land Survey Program.
  - (B) Reference data from available recorded or unrecorded surveys established by the County Surveyor or by licensed private surveyors and/or surveys filed with the Missouri Department of Agriculture's Land Survey Program.
  - (C) Reference data from real estate conveyances, subdivisions plats, or other recorded land information.
  - (D) General Land Office (GLO) surveys and field notes.
  - (E) Established land use on digital orthophotography.
- (6) Documentation for the establishment of the PLSS section corners shall consist of a point data layer delineating how each corner was set. The PLSS registered section corner documents and subsequent research shall be referenced to this data layer within the digital mapping system. Delineation attribute may include but not be limited to:
  - (A) Coordinate
  - (B) Survey
  - (C) Deed
  - (D) Subdivision or Plat
  - (E) GLO
  - (F) Orthophotography
  - (G) Tax Map

## **2 CSR 90-65.060 – Digital Cadastral Parcel Mapping Requirements Pertaining to Land Parcels**

*PURPOSE: This rule describes the minimum standard requirements that apply to land parcels in a digital cadastral parcel mapping system.*

- (1) A digital cadastral parcel map shall be based upon the USPLSS.
- (2) Parcels shall be structured in a manner that facilitates topological analysis.
- (3) All parcels shall be constructed as polygons.
- (4) All PLSS corners lines shall be continuous and seamless within a mapping project and with adjoining mapping projects where mapping has been completed in conformity to these standards.

## **2 CSR 90-65.070– Accuracy Standard**

*PURPOSE: This rule prescribes the accuracy reporting requirements for digital cadastral parcel mapping.*

- (1) Accuracy reporting for digital cadastral parcel maps shall be made in accordance with Missouri Mapping Standards (MMS) of 10 CSR 30-6.010 to 6.030, or the Federal Geographic Data Committee's National Standard for Spatial Data Accuracy (NSSDA).
- (2) If accuracy reporting is not provided using MMS, NSSDA, or other recognized standards, information shall be provided that enables users to evaluate how the data fits the requirements of their application. This information may include descriptions of the source material from which the PLSS and cadastral parcels were digitally constructed, accuracy of ground surveys associated with PLSS and cadastral parcel digital construction, and quality control procedures used in the production process.

## **2 CSR 90-65.080 – Disclaimer**

*PURPOSE: This rule describes the disclaimer to be included with any digital or hard copy map produced from a digital cadastral parcel mapping system.*

A digital cadastral parcel map provides graphic representation and access to cadastral information, but it does not purport to represent the results of a property boundary survey of each parcel shown. It is not intended for property boundary determination of individual parcels, nor be used in lieu of a property boundary survey, by a licensed professional land surveyor. Therefore, prominent display of the following disclaimer, or equivalent wording, shall be on any digital or hard copy map that displays cadastral parcel data.

*“This Cadastral Map is for informational purposes only. It does not purport to represent a property boundary survey of the parcels shown and shall not be used for conveyances or the establishment of property boundaries.”*

*AUTHORITY: Section 60.670 RSMo (2010).*