



INTRODUCTION

This chapter relates the minimum criteria, standards and acceptable procedures for establishing survey monumentation required by the Subdivision Ordinance for use by qualified, registered professionals. Professional judgment and responsibility are essential in the application of this material and the execution of all survey work. The degree of accuracy in the performance of survey work must be consistent with the nature and importance of the survey. Where these instructions are in conflict with the current *Minimum Standards for Surveying in New Mexico*, in effect at the time of the performance of the survey, the *Minimum Standards for Surveying in New Mexico* will govern.

The City Engineer, through the City Surveyor, is responsible for subdivision monumentation, the interrelationship of City control monumentation with other agencies (National Geodetic Survey, NOAA, etc.), and the recordation and perpetuation of records and monumentation for the City's Albuquerque Geodetic Control-Reference Survey System (AGRSACS) network. Acceptability of deferred subdivision monumentation is also his/her responsibility.

All subdivision surveys are referenced to the AGRSACS-network in the City of Albuquerque. The system is published online at <http://www.cabq.gov/gis/map-views/geodetic-control-and-artgn>. This publication depicts in a bound and technically explicit format showing all City control monuments and data. Albuquerque Control Survey publications and other bench mark elevation data are available through the City Surveyor.

In general, any New Mexico Registered Professional Land Surveyor can perform most of the survey requirements for the development process; however, certain portions must be performed under the City Surveyor's approval and specifications.

Section 1. GOVERNING REGULATIONS

Subdivision Ordinance (Article 7-11 R.O.A. 1994). This ordinance contains the major regulations governing monumentation and surveys for subdivisions in Albuquerque. Survey, design, and construction professionals should be thoroughly familiar with the survey and monumentation requirements of this ordinance.

Section 2. REGULATED CRITERIA AND APPLICATION

This section presents pertinent criteria and standards from the Subdivision Ordinance and appropriate design standards and application procedures established by the City Surveyor.

A. Monumentation

1. Subdivision Control Monuments

a. All corners, angle points and points of curvature along the subdivision perimeter, points of curves or intersection on centerline or street rights-of-way, and intermediate points at right-of-way intersections with property lines of City property such as parks or open space, must be monumented as subdivision control monuments. In lieu of permanent subdivision control monuments, centerline monumentation may be established as permanent survey monuments with prior approval by the City Surveyor. A minimum of two (2) subdivision control monuments must be inter-visible and a tie to a third Permanent Survey or subdivision control monument must be assured. The surveyor setting the monumentation will be required to submit a subdivision plat of survey, notes, drawings, or other reproducible documentation of each point set for permanent files and publication. Acceptable formats are available from Albuquerque Development and Building Services Center. (DBSC)

NOTE: The developer may submit a centerline monumentation plan for approval by the City Surveyor. If acceptable, the monuments must be included in the street design package and will be constructed with the street improvements and will be inspected for acceptance by the City along with other street improvements at the time of final inspection.

b. Subdivision control monuments must meet the New Mexico Minimum Standards for Surveying in New Mexico in effect at the time the survey is being performed. be 5/8" mild steel bar, minimum 24" long. Alternate monuments may be 3/4" iron pipe, minimum 24" long or as approved by the City Surveyor. In loose sand or unstable soil, a monument 36" or longer will be required.

c. Monuments must be set flush with the earth or within 0.2 feet above and must bear a cap or permanent tag identifying the registration number of the surveyor setting the monument.

d. Subdivision control monuments shall be set only under the supervision of a Professional Land Surveyor registered in the State of New Mexico.

e. Subdivision control monuments must be set in conformance with the standards and specifications in accordance with the New Mexico Minimum Standards for Surveying in New Mexico in effect at the time the survey is being performed. for Class 3 surveys as defined in Table 26.1 or more accurately. The subdivision control monument must have a precision relative to the Permanent Survey Monuments no greater than 1/10,000 of the distance to the nearest Permanent Survey Monument plus 0.15 feet.

SURVEY STANDARDS AND SPECIFICATIONS

	<u>CLASS 1</u>	<u>CLASS 2</u>	<u>CLASS 3</u>
<u>POSITION CLOSURE</u>	<u>1"15,000</u>	<u>1:10,000</u>	<u>1:5,000</u>
<u>ANGLES ACCURATE TO DISTANCES ACCURATE TO (per 100 feet)</u>	<u>5 sec.</u>	<u>7 sec.</u>	<u>14 sec.</u>
	<u>0.002 ft. (1:50,000)</u>	<u>0.004 ft. (1:25,000)</u>	<u>0.007 ft. (1:15,000)</u>

REJECTION LIMIT OR SPREADS BETWEEN D & R AND SETS	5 sec.	5 sec.	10 sec.
NUMBER OF POSITIONS OR SETS			
1" Instrument	4 Pos.	4 Pos.	2 Pos.
10" Instrument	1 Set 6DR	1 Set 6DR	1 Set 2DR
20" Instrument	2 Sets 6DR	2 Sets 6DR	1 Set 4DR
30" Instrument	3 Sets 6DR	3 Sets 6DR	1 Set 6DR
1' Instrument			1 Set 8DR
AZIMUTH CLOSURE	8" (N*)0.5	10" (N*)0.5	30" (N*)0.5
AZIMUTH CLOSURE PER ANGLE POINT	3 Sec.	5 Sec.	10- Sec.
NUMBER OF REPETITIONS	1	1	1

(distance measurements)			
TAPING CRITERIA			
Temperature	Accurate to $\pm 0.5^\circ\text{F}$	Accurate to $\pm 3^\circ\text{F}$	Accurate to $\pm 6^\circ\text{F}$
Tension	Accurate to $\pm 1\%$ of standard	Accurate to $\pm 2\%$ of standard	Accurate to $\pm 3\%$ of standard
Calibration	**	**	**
			Plumb Bob String or
TYPE OF TARGET	Fixed	Fixed	Fixed

NOTES

- ~~It is recommended that 30" transits not be used for Class 1 & 2 surveys.~~
- ~~* N = Number of angle stations carrying azimuth. The smallest value for the azimuth closure criteria will apply.~~
- ~~Fractions of a full tape length must be checked.~~
- ~~Properly calibrated electronic distance measuring equipment may be used in place of metal tapes.~~
- ~~Side points observed from primary traverses shall conform within reason to the required accuracy for the primary traverse. The accuracy of the observations, of course, will depend on the type of point observed. Whenever indefinite points, such as fence corners, tree stumps, etc., are involved, the best approximation of the center or specific point previously described should be observed. Each angle should be observed 2 DR and~~

~~the spread between the D and R observations should not exceed ± 20 ".~~

~~6. Method of taping outlined in paper. Tension applied should be same used to standardize or calibrate tape.~~

~~7. Standardized tape or one calibrated with a standardized tape.~~

~~8. Detailed explanation can be found in the American Congress of Surveying and Mapping publication "Horizontal Control as Applied to Local Survey Needs."~~

2. Permanent Survey Monuments

a. No point within the subdivision shall be more than one-quarter mile from a permanent survey monument, and at least two corners or points on or near the perimeter of the subdivision traverse, must be tied or monumented with Permanent Survey Monuments as approved by the City Surveyor. These points or monuments must be tied by Grid Bearing in the New Mexico State Plane Coordinate System (Central Zone) and ground distance to the ~~AGRS~~ network. The location of Permanent Survey Monuments showing ties to the ~~AGRS~~ network together with the New Mexico State Plane Coordinates, the ~~mapping angle, Delta Alpha and ground to grid factor combined sea level and scale factor~~ at the point or for the centroid of the parcel of the subdivided land, and the elevation related to the

North American ~~Vertical Datum (NAVD) of 1982~~9, if established, shall be shown on the final plat for which the survey is made.

b. Permanent Survey Monuments must be brass ~~or aluminum~~ caps set in an acceptable base as ~~shown in Figures 26.1, 26.2, and 26.3~~. Caps shall bear the registration number of the surveyor establishing the point and identifying letters or numbers approved by the City Surveyor ~~and year the monument was established~~. This information must be stamped permanently into the cap and must be shown on the final plat for which the survey is performed. ~~Standard caps will be provided by the City Surveyor at actual cost if so desired.~~

c. ~~Upon the request of the City Surveyor, a~~ narrative covering the equipment and procedures used along with copies of all field notes, calculations, reductions, closures and State Plane Coordinate calculations ~~shall~~ must be submitted to the City Surveyor at least ten (10) days prior to submission of a final plat for review and approval. Monument information must be submitted on standard forms available from the City Surveyor, or on forms which are identical in format to ~~Figures 26.5 and 26.6~~. similar information, ~~upon the request of the City Surveyor, shall~~ must also be submitted for any found property corners or other monuments which substantially affect the representation of evidence used for property locations.

d. Permanent Survey Monuments shall be considered properly positioned and represented only after the City Surveyor has approved all survey procedures, calculations, and verified conformance to standards and specifications ~~as outlined in the New Mexico Minimum Standards for Surveying in New Mexico in effect at the time the surveying is being performed for Class 2 surveys or greater~~. If found to be deficient, the Land Surveyor submitting the final plat and documentation may be required to perform additional work to bring monumentation into conformance, regardless whether the final plat is recorded or not.

e. For points to be included in the AGRS, ~~t~~entative point identifiers may be established by the Land Surveyor; however, only the City Surveyor will assign permanent point identification.

f. Permanent Survey Monuments shall be considered to have a zero positional error when controlling subdivision control monuments within the property.

3. Bench Marks

a. Upon the request of the City Surveyor, ~~a~~t least one bench mark, located as approved by the City Surveyor, must be placed within each subdivision. Bench marks may be coincident with Permanent Survey Monuments, ~~or~~ subdivision control monuments, or AGRS control monuments. Upon the request of the City Surveyor, ~~m~~ore than one bench mark may be required within the perimeters of parcels or subdivisions in excess of ten (10) acres in size. Such additional bench marks will be at positions other than Permanent Survey Monuments.

b. Elevations of bench marks must be based on NAVD 1988~~mean sea level~~ datum as established by the U.S. Coast and Geodetic Survey, now National Geodetic Survey (NGS), and must be tied to the AGRS~~CS~~ network.

c. Level closures, running forward and backward between fixed elevations or loop closures, must be of Third Order accuracy or better as defined in Table 26.2. Loop closures are discouraged and are only used when it is not feasible to use two separate bench marks.

**TABLE
26.2
ACCURACY STANDARDS FOR LEVEL
CLOSURES**

	FIRST ORDER	SECOND ORDER	THIRD ORDER
Metric Units	4mm Sq.Rt. K	8.4mm Sq.Rt. K	12mm Sq.Rt. K
English Units	0.017 ft. Sq.Rt. M	0.035 ft. Sq.Rt. M	0.05 ft. Sq.Rt. M

K is the distance in kilometers; M is the distance in miles of the total level route; running forward and back between fixed elevations or along a level loop.

d. Level notes and calculations must be submitted to the City Surveyor prior to approval of the elevation to be published for the bench mark. The City Surveyor will review the submitted material and determine whether the elevation is satisfactory for publication within five (5) working days after receipt of submittal.

e. Bench marks must be brass or aluminum caps as specified for Permanent Survey Monuments; set as required for the Permanent Survey Monuments. They must be identified by permanent stamping on the brass or aluminum cap as required by the City Surveyor.

f. All bench marks established must be shown on the final plat for which the survey was made, accurately identified as to location and character.

B. Albuquerque Geodetic Reference System Control Survey Network

Complete information on existing AGRS network monumentation is available from the City Surveyor online at <http://www.cabq.gov/gis/map-views/geodetic-control-and-artgn>. ~~in the form of the City of Albuquerque Survey Monuments book.~~ The City Surveyor will provide information on any Permanent Survey Monument of the AGRS network within one (1) mile of the subdivision upon request. Should the City Surveyor be unable to provide such information within three (3) weeks after requested, the plat data may be referred to a substitute system approved by the City Surveyor.

C. Records Requirements

Land Survey Monument Record, a form available from Albuquerque Development and Building Services Center must be filled out and submitted to the City for all found property corners used in establishing survey control, all property corners found but of questionable position and not used for survey control, and for all set corners (excluding interior subdivision lot corners) which positionally determine the perimeters of land ownership, Middle Rio Grande Conservancy District Tracts, public right-of-way and Bureau of Land Management sectionalized positions thereby establishing a continuous history of existing property corners. Any corners not so described must be fully described on the plat.

Control Station Data form, available from Albuquerque Development and Building Services Center is self explanatory and is to be filled out and submitted to the City for all Permanent Survey Monuments set.

Section 3. CONSTRUCTION SURVEYS

The physical staking for the contractor's work in the construction phase of any project is the responsibility of the developer on a privately financed project. Either the developer or the City,

depending on the agreement with the City Engineer, may be responsible on projects which involve City master planned facilities.

The Registered Professional Land Surveyor certifying the plat for a project must provide Permanent Survey Monuments for at least two (2) critical points on the boundary; one or more permanent elevation control bench marks and the required subdivision control monuments. It is recommended that the same Surveyor also be retained by the developer to set basic construction controls such as street centerline positions, grading controls; temporary bench marks prior to construction and, if feasible, provide construction staking for the contractor on behalf of the developer.

1. It is the responsibility of the Registered Professional Surveyor performing construction staking (establishing grades and positions for improvements) to confer with the design engineer whose seal and statement appear on the approved construction plans prior to such staking activities.

2. The [Registered Professional Surveyor](#) performing construction staking is also responsible for conferring with the [Registered Professional Surveyor](#) who certified the plat, prior to construction staking.

3. The [Registered Professional Surveyor](#) performing construction staking must satisfy himself as to the accuracy of subdivision controls and to the intent of the construction plans, as they relate to positions and elevations prior to the commencement of work.

4. The developer must reasonably assure himself that the person(s) intending to provide construction staking have an understanding of the intent of the plans, conditions of control monuments and that construction surveying will be under the supervision of a Registered ~~Engineer or~~ [Professional Land Surveyor](#).

5. The contractor is responsible for protecting and maintaining all plat and monumentation controls set by the [Registered Professional Land Surveyor](#). In the event of inadvertent destruction or alteration, the contractor must immediately notify the [Registered Professional Land Surveyor](#) and the City Surveyor.

NOTE: If the developer desires the City to perform construction surveys on a project, he must make such request in writing to the City Surveyor no less than 72 hours prior to the day on which such survey is desired. In the event that the City is unable, due to workload, to perform the desired surveys within the time requested, the City Surveyor will notify the developer within the same 72 hours.

Section 4. FIGURE

INSTRUCTION FOR ITEMS ON MONUMENT RECORD FORMS

Figure 26.4, Land Survey Monument Record.

1. Check appropriate box at top of sheet to indicate monument type. "Other" monuments include block monuments in platted subdivisions, lot corners, corners of miscellaneous tracts or parcels, metes and bounds survey markers, private or local control surveys, monuments of "coranon report", witness corners or reference monuments for any of the above.

2. Show location of monument on section diagram in upper right hand corner of form. If monument is in an area not covered by public land survey system, so note or use projected section and identify as "projected".

Give section, township, range, and principal meridian or land grant.

3. List physical and record evidence found to substantiate validity of monument position. Include parole evidence (statement by witness) when applicable. Give description of original monument, if known.

In reporting evidence found, use as precise terminology as possible. Use nominal designation for pipe sizes as given in Table 26.3.

Use standard numbering for deformed rebars as shown in Table 26.4. Iron bars

without deformations should be designated as "smooth iron bars".

Tubing is measured by outside diameter.

For bench mark records, give the datum plane, last adjustment, if known, and your estimate of vertical tolerance.

4. Describe monument you set or any rehabilitation work done. Also describe any accessories or witness corners set. If restoring a monument, give your opinion of how close your restoration is to the original position. For bench mark records, give elevation and vertical tolerance of reference points. If resetting or witnessing any position, provide supplemental sketches and/or calculations, particularly where vertical and/or horizontal positions differ from original monument, including any State Plane Coordinate calculations. All re-set monuments must be stamped "re-established 19 . Call the City Surveyor prior to physical field work if intending to re-set or re-establish Permanent Survey Monuments.

5. Make a neat sketch showing the relative positions of the monument and reference points. Give dimensions with appropriate degree of precision; include north arrow; state basis of bearings used. Show both supporting and contradicting evidence.

6. Date of field work means either the date the monument was established, reestablished, restored, reconstructed, or rehabilitated by you or the date the monument was used by you as control.

7. Sign and record registration number in space provided.

FIGURE 26.2 - DELETED PER JOHN RUPLEY

(SHOULD BE PART OF THE CITY STANDARD

DETAILS) FIGURE 26.3 - DELETED PER JOHN RUPLEY

(SHOULD BE PART OF THE CITY STANDARDS

DETAILS) TABLE 26.3 - DELETED PER JOHN RUPLEY

(SHOULD BE PART OF THE CITY STANDARD

DETAILS) TABLE 26.4 - DELETED PER JOHN RUPLEY

(SHOULD BE PART OF THE CITY STANDARD DETAILS)

Click to view:

Figure 26.5 - Control Station Data

Figure 26.6 - Bench Mark Data

(Adobe Reader required to view this image)

FIGURE 26.7 - DELETED BY RUSSELL GIVLER

FIGURE 26.8 - DELETED BY RUSSELL GIVLER

FIGURE 26.9 - DELETED BY RUSSELL GIVLER