City of Arlington
Department of Public Works and Transportation

SURVEY MANUAL FOR CAPITAL IMPROVEMENT PROJECTS

1.01 CHAPTER INCLUDES

A. Suggested guidelines for use by engineers in development of construction drawings and Right-of-way maps inside the Arlington city limits. These guidelines are required for Capital Improvement Projects designed under professional services contracts with the City of Arlington.

1.02 REFERENCES

A. Professional Land Surveying Practices Act, latest revision.

1.03 DEFINITIONS

A. Control Base - elevations, and identification code; or station with offset left and right from a centerline or control line (baseline, traverse, survey, etc.).

B. City Surveyor - An authorized representative of the City having approval authority for Specifications for survey data administration for the City of Arlington.

C. GPS – Global Positioning System operated by US Department of Defense. When used with proper observation procedures and equipment, it can provide survey quality locations in Terrestrial space.

D. Site Control Monuments - Monuments needed to augment existing City monuments, conforming to standards established by the City Surveyor.

1.04 DESIGN REQUIREMENTS

A. Adhere to these guidelines for Capital Improvement Projects designed under professional service contracts with the City of Arlington.

B. Provide rights-of-way and easement requirements for the project.

1.05 SUBMITTALS

A. Deliver Electronic files in standard ASCII format (Point Number, Northing, Easting, Elevation, Description). Electronic files of the project in AutoCAD 2017 or an earlier version, at the completion of the design phase. Electronic files will be retained in the City's permanent files.

B. For right-of-way/easements drawings identifying or describing acquisition of new or additional right-of-way/easement parcels, deliver database printout files to the City Surveyor or a designee of the City Surveyor any additional documents to be submitted such as:

    1. Overall map of right-of-way with individual drawings of parcels identified on said overall map.

    2. Abstract Information, provide recording information on all recorded plats and recording information of deeds used in Preparation of the right-of-way drawings.

C. For the Project Site Control Monument Sheet, the surveyor responsible for setting the Monuments shall sign and seal said control monument sheet, with identified base datum data, (i.e. WDS GPS Network, City of Arlington GPS Monument AR-103).

1.06 QUALITY ASSURANCE

A. Field surveying used in the development of construction drawings, calculations and preparation of right-of-way maps and field note descriptions shall be performed by or under the direct supervision of a Licensed Registered Professional Land Surveyor with the State of Texas.

B. Field notes, metes and bounds descriptions, and right-of-way maps shall have the imprinted or embossed seal of the responsible Licensed Registered Professional Land Surveyor and shall be dated and signed by said Licensed Registered Professional Land Surveyor.

C. When establishing Horizontal Control monuments, surveyors shall set 1/2" x 18" Iron Rods in concrete, 5/8" x 18" Iron rods in concrete, Mag nails in asphalt, "X" cut in concrete or any combination thereof. Control Monuments should not to be placed where demolition phase would eliminate, or damage said Monuments.

D, Control Monuments are not to be set more than 800 feet apart from each other. Monuments shall have GPS coordinates assigned to each one in NAD 1983 -2007 surface datum or newer datum version. The control monuments shall be shown on the Project Site Control Monument Sheet with a description of the location and description of the monument used. Transcribe on the control sheet if coordinates shown are grid or surface coordinates. If showing grid coordinates, make a note of the total scale factor being used for the grid coordinates.

E. When establishing Vertical Control, the surveyor shall use differential leveling, or GPS methods. Transcribe on the Project Site Control Monument Sheet a description of the Benchmarks set or found on the project.

1.07 FIELD WORK

A. The control line must be monumented at its beginning, end, and at angle points with markers of a permanent nature.

B. Spikes, or other lasting identification. Make reference drawings for each control monument showing ties to planimetric features to allow easy recovery. Set markers at a maximum of 800 feet on long lines. (Wherever practical, all Horizontal and Vertical Control monuments must be marked in such a way as to identify the surveyor in responsible charge.)

C. Use the City datum as a basis for all elevations on the project. Set temporary benchmarks (TBMs) within 200 feet of the beginning and end of each project baseline and at intervals not to exceed 800 feet throughout the project.

D. Show the stations of all side street construction centerlines with angular relationships or bearings of said centerlines of side streets with the main roadway centerline station.

E. Record topographic features within the public right-of-way, proposed right-of-way, any contiguous easements to the right-of-way, and any construction right-of-way of the project and on intersecting streets for a distance of 100 feet beyond the intersection of the right-of-way lines. Identify all visible underground structures, such as inlets, manholes, and junction boxes, with size, depth, and type.

F. Show the elevations of driveways at intersection of driveway centerline with existing or proposed right-of-way line. Show the elevations of driveways at left edge centerline and right edge beyond the end of the approach slab.

G. For acquisition of new or additional rights-of-way/easements:

1. Tie points of commencing (POCs) or points of beginning (POBs) for each parcel to City of Arlington GPS coordinates or GPS coordinates from a VRS with the coordinates in NAD 1983 -2007 datum or newer version.

2. Identify monuments, corners, angle points, points of curve (PCs), points of intersection (PIs), points of tangency (PTs), and other points as either "found" or "set." Describe each monument in such a way as to clearly define size, type of material and the nature of the monument, i.e., 3/4-inch iron pipe, 5/8-inch iron rod, cotton spindle, mag nail, etc. See also (See also 1.06 QUALITY ASSURANCE C.)

1.08 CONSTRUCTION DRAWINGS

A. Found monuments must be plainly shown on the drawings and located by station and distance, right or left from the control line, or construction centerline. Monuments used to establish the control line must be identified as Control Points, and their relationship to the construction centerline and to the proposed right-of-way lines must be shown. If the project is dimensioned from a control line, such as construction or design baseline, which is different than the control line referenced in Paragraph 1.07, it must be established and monumented in accordance with the requirements of Paragraph 1.07. Coordinates for transverse control points and all points of curve, points of tangency, and points of intersection along the design baseline shall be shown.

B. Show location and identification of existing City survey monuments and found monument, by station and distance and whether right or left of control line or centerline. Show swing ties set for control or centerline control points.

C. Show and identify location of the City datum monuments and temporary benchmarks used for elevation control. List the TBM located closest to that particular sheet in a station/offset, description and elevation format.

D. Show centerline angles of intersection of side streets with main roadway centerline. Where bearings are used, identify source of bearings and show bearings on both control line and project centerline when they are not the same line.

E. Identify locations of manholes, angle points, bends, etc., for proposed sanitary sewer, storm sewers, water lines, and pavement features such as radius returns and centerlines of boulevard openings. Show relationship of proposed improvements to the right-of-way line.

F. For bridges, overpasses and underpasses show top of pavement elevations at gutter line and centerline for the following locations:

    1. Construction joints

    2. Armor or expansion joints

    3. Intervals between bents that correspond to the increments used for dead load deflection calculations.

G. For bridges and grade separations, drawings must incorporate layout sheets which identify proposed centerline and curve information plus:

    1. Surface coordinates for control points so that an inverse between coordinates reflects surface distances. Identify origin of coordinate system used.

    2. Show coordinates of centerline or control line at PIs.

    3. Show coordinates of curb lines at their intersection with the centerline of bents and abutments for irregular structures.

H. For all horizontal and vertical control monuments, show published coordinates expressed in units of U.S. Survey Feet and as a part of the Texas Coordinate System of 1983. Proper metadata for GPS – derived points should include the vertical adjustment, the Geoid used, the ITRF used and the current published coordinates of the base stations at the time of calculation.

1.09 RIGHT-OF-WAY MAPS

A. Show "X," "Y" values on monuments based on the City survey control and the scale factor used to convert grid coordinates to “surface” coordinates. All Distances shall be shown as

"surface" distances and plainly marked as such. All bearings shall be based on the Texas Coordinate System of 1983.

B. Distances on proposed right-of-way lines shall be continuous from beginning to end of the job. Show either straight line or arc distance across intersecting streets. Show right-of-way width of intersecting streets.

C. Where a parcel is taken from a larger tract, show dimensions, distances, and area of the remainder of the tract based on recorded information.

D. Identify the evidence used to decide the final placement or establishment of the proposed right-of-way line, such as angle points, or corner monuments, as either "set" or "found." The description of each point used shall be shown on the drawing as identified in the field survey.

E. Grid Coordinate values of "**NORTHING**," "**EASTING**" shall be shown for PCs, PTs, and PIs of curves on the proposed right-of-way lines. Curve data must include the following: delta, radius, arc length, chord length, and chord bearings.

F. Grid Coordinate values of "**NORTHING**," "**EASTING**" must be given on the POB of at least one tract in each block. Where the proposed right-of-way is to be acquired from a large tract of land, coordinate values should be given for the POB of field note description of the large tract.

G. Other information to be shown on right-of-way maps:

1. All visible improvements such as buildings, fences, permanent signs, utilities, and other structures located on the property or within 10 feet outside the right-of-way line, if accessible.

2. Abstract information used in preparation of the right-of-way map.

1.10 DOCUMENTS

A. Where new construction will damage, destroy, or alter existing survey markers, include in specifications booklet a requirement for installation of GPS Survey Monuments by construction contractor. The City Surveyor will determine the location and type of monuments to be furnished and installed by the contractor.

B. All Metes and Bounds descriptions shall have the Professional Surveyor's Seal, Signature and Date affixed to the instrument.