Collin County Outer Loop
Dallas North Tollway to East of SH 289 (Preston Road)

Scope of Work

The work to be performed by the Engineer shall consist of preparing a detailed schematic for the Collin County Outer Loop from the Dallas North Tollway (DNT) to approximately 2,000 LF East of SH 289 (Preston Road). The deliverables under this contract shall be aerial surveying and mapping, a hydraulic report, and preparation of a geometric schematic for a 2-lane, 2-way service road. Final design (PS&E) will be added by supplemental agreement to this contract as needed.

TASK 1 – DEVELOP SCHEMATIC LAYOUT

Using aerial and conventional survey methods, develop a schematic layout for the preferred alternative and submit to the County. The Engineer will prepare a schematic layout to a scale of 1"=200'. The schematic will be prepared using the English system of units. The Engineer will revise, as needed, the centerline horizontal and vertical alignments of the appropriate conceptual design and submit to the County for approval. All designs will be prepared in accordance with the latest versions of: *Roadway Design Manual* (TxDOT), *A Policy on Geometric Design of Highways and Streets* (AASHTO), *Standard Specifications for Construction of Highways, Streets and Bridges* (TxDOT), *Highway Operations Manual* of the *Traffic Operations Manual* (TxDOT), and *Highway Capacity Manual* (Transportation Research Board) for urban roadways. The Engineer shall undertake the following tasks:

1. Data Collection and Review
   The Engineer shall collect all pertinent project data from the Collin County, TxDOT, and any municipalities including plans, as-builts, survey information and other reports. The Engineer shall review this data for use in design of the project.

2. Collect Utility Plans Municipalities and Franchise Utility Owners
   The Engineer shall collect all pertinent utility plans from municipalities and franchise/private utility owners who have utilities in the project corridor.

3. Field Reconnaissance
   The Engineer shall visit the project site to record and photograph existing project conditions.

4. Develop Roadway Design Criteria
   The Engineer shall apply appropriate roadway design criteria and complete the Design Summary Report (DSR) for the project in accordance with the TxDOT Roadway Design Manual and AASHTO design guidelines for urban roadways and will submit to Collin County for approval. The Engineer shall use the design criteria to identify the maximum and minimum values for all design elements and will identify the project preferred.

5. Preliminary Cost Estimate
The Engineer shall develop an estimate of construction cost for this project based on a quantity take off of the design schematic using current average unit bid prices of TxDOT bid items.

6. Design Schematic
The Engineer shall develop a design schematic for the project including:

a. Geometric Layout, Plan and Profile Schematic
Prepare a design schematic depicting the proposed improvements for the project, including the transition and tie in of the Outer Loop service road to County Road 88, approximately 2,000 LF east of SH 289. The design elements to be shown will include the following:
Control data, horizontal alignment, curve data of centerline only, super elevation data, proposed pavement (type; thickness), pavement markings, signals, construction limits, culverts, easements, existing topography, existing and proposed right of way, existing utilities, existing ground profile and proposed vertical alignment. Include cross street centerline and profile.

b. Preliminary Typical sections
Prepare preliminary typical sections, which represent both the existing and proposed conditions. The typical sections shall incorporate the pavement design as specified by Collin County. Typical sections shall include representations of the various conditions proposed, such as slopes, number of lanes, retaining wall locations, shoulder widths, clear zones, border width and right-of-way width. This list is not all inclusive, and other information shall be added as needed to clarify the intent and purpose of the typical section.

c. Preliminary Design Cross Sections
In conjunction with the design schematic, preliminary design cross sections will be developed on 100' station intervals using Geopak. Each pavement layer and undercut, if any, will be shown together with the right of way limits, side slopes, pavement cross slopes, curbs and any retaining walls.

d. Develop Preliminary Construction Sequence
A conceptual construction sequence complete with typical sections and plan view depiction of the traffic control plan will be developed and provided to the State for approval. This will include traffic handling, roadway phasing and pedestrian routing during construction.

7. Right of Way (ROW) Determination
Based on the schematic and design cross sections, the Engineer shall verify preliminary right-of-way taking lines and they shall be depicted on the design schematic.

Deliverables – limited to one interim review cycle.

- Interim – Calculated horizontal and vertical alignments, typical sections, water surface elevations at major crossings, design cross-sections, and identification of utility constraints.

- Final – Finalize interim submittal, preliminary ROW requirements, and sequence of construction

TASK 2 – HYDROLOGIC AND HYDRAULIC INVESTIGATION

The Engineer shall perform the following tasks in the preparation of the schematic layout:

1. Drainage Area Mapping
   Delineate drainage area boundaries based on United States Geological Survey (USGS) contour maps, North Central Texas Council of Governments (NCTCOG) contour maps or other suitable topographic maps, if available.

2. Calculate Discharges
   Determine conveyance paths, channel slopes, time of concentration, and runoff coefficients and Soil Conservation Service (SCS) curve numbers and other factors as required to determine frequency-discharge relationships using hydrologic models.

3. Size Cross Drainage Structures
   Determine approximate cross drainage structure sizes denoting size, type, orientation, flowlines, tailwater, and headwater conditions. Approximate sizing will be shown on the schematic along with needed drainage easements.

4. Develop Hydraulic Models
   Develop water surface profile models of open channels for existing/pre-project and proposed design conditions in accordance with Collin County drainage criteria and to meet Federal Emergency Management Agency (FEMA) requirements, as necessary. All relevant conveyance features, (channels, culverts, slab bridges, encroachments) will be included in the hydraulic analysis using HEC-RAS, HEC-2, HY-8, or other models as approved by Collin County. A model will be developed for each highway stream crossing and for any affected parallel channels.

5. Develop Alternative Drainage Schemes
   Based on the results of the discharge calculations and water surface profile models, develop alternative schemes to alleviate potential adverse drainage issues associated with the highway construction.

6. Identify Easement Requirements
   The Engineer shall identify any required drainage easements needed to accommodate drainage facilities at inlet and discharge points along the route.

7. Prepare Drainage Report
   Prepare a Detailed Drainage Report summarizing the findings and recommendations of the drainage study. The report will document all relevant calculations, assumptions, exhibits and supporting documents.

Deliverables – limited to one interim review cycle

- Interim & Final Drainage Report

TASK 3 – SURVEY

The limits of this task are from DNT to approximately 3,500 LF East of SH 289.

General Standards
All surveys shall meet or exceed the standards set in the Professional Land Surveying Practices Act, the General Rules of Procedures and Practices promulgated by the Texas Board of Professional Land Surveying (TBPLS), and TxDOT's Survey Manual, latest edition, and shall be accomplished in an organized and workman-like manner, subject to the approval of the County.

TxDOT's *Right-of-Way Procedures Preliminary to Project Release, Volume 1*, (online at: http://manuals.dot.State.tx.us/) and TxDOT's Survey Manual, latest edition, will serve as a guide for the format and preparation of all right-of-way documents produced, including Right-of-Way maps, property descriptions (including parcel plats), and other Right-of-Way work products, unless otherwise directed by the County.

The North American Datum of 1983 (NAD83), Texas Coordinate System of 1983 (State Plane Coordinates), applicable to the zone or zones in which the work is performed, with values in U.S. Survey Feet, will be used as the basis for all horizontal coordinates derived, unless otherwise directed by the County.
Elevations will be based on the North American Vertical Datum 88 (NAVD88), unless otherwise directed by the County.

All GPS work, whether primary control surveys or other, shall meet or exceed the current TxDOT's GPS Manual of Practice, latest edition, to the order of accuracy specified in the categories listed below or in a work authorization. If the order of accuracy is not specified in this contract or in a work authorization, the work shall meet or exceed the order of accuracy specified in the publications listed in this paragraph.

All conventional horizontal and vertical control surveys shall meet or exceed the current, TxDOT's Survey Manual, latest edition, and the Texas Society of Professional Surveyors (TSPS) Manual of Practice for Land Surveying in the State of Texas, latest edition, to the order of accuracy specified, and in the categories listed below or in a work authorization. If the order of accuracy is not specified in this contract or in a work authorization, the work shall meet or exceed the order of accuracy specified in the publications listed in this paragraph.

In order to ensure accuracy and accountability of the services provided under this contract, the Surveyor may be required to certify work performed under this contract as true and correct according to, TxDOT's Survey Manual, latest edition, TxDOT's GPS Manual of Practice, latest edition, or the TSPS Manual of Practice for Land Surveying in the State of Texas, as may be applicable.

The Surveyor shall provide temporary signing and traffic control in and around survey operations. All signs, flags and safety equipment shall be provided by the Surveyor. Collin County shall be notified at least 48 hours in advance of any lane closures.

The Surveyor shall provide all personnel, equipment, and survey supplies necessary for the performance of the activities required by this agreement or by any work authorization.

Data (original and processed) shall be provided to the County on a compact disk or other approved medium and shall be in the following formats: Microsoft Word for word processing, MicroStation, Geopak V8i for graphics applications.

Variations from these software applications or other requirements listed above shall only be allowed if requested in writing by the Surveyor and approved by the County.

The Surveyor shall perform Quality Control/Quality Assurance on all procedures, field surveys, data, and products prior to delivery to the County. If, at any time, during the course of reviewing a submittal of any item it becomes apparent to the County that the submittal contains errors, omissions, and inconsistencies, the County may cease its review and return the submittal to the Surveyor immediately for appropriate action by the Surveyor. A submittal returned to the Surveyor for this reason is not a submittal for purposes of the submission schedule.

The Standards for services that are not boundary-related but that relate to surveying for engineering projects may be determined by the project Engineer, construction specifications, or design specifications.

Specific Work To Be Performed from DNT to approximately 3,500 LF East of SH 289

1. The Surveyor shall establish approximately seven (7) Horizontal and Vertical Control Monuments, consisting of a 5/8" capped iron rod set in concrete, at approximately 2000' intervals. The monuments shall be set outside the future construction limits, when possible. GPS RTK will be utilized to establish the horizontal locations and differential leveling will be utilized to establish vertical values. A Horizontal and Vertical Data Sheet shall be produced for each Monument. Each data sheet shall contain Grid and Surface horizontal coordinates, a Surface Adjustment Factor, an elevation and a locative sketch. Engineer shall supply this data to the County.
2. Provide cross-sections of any existing public roadways in the corridor with shots being taken at the ROW, ditch line, edge of shoulder, edge of travel lane and centerline.
3. Provide structure details of all visible cross culverts including flow line elevations, inside top of slab elevations, top of road profile and structural dimensions, and downstream channel cross sections within the project limits.
4. Locate existing visible improvements within the project limits, including but not limited to, manholes, water valves, concrete, fences, buildings and other visible utilities.
5. Surveyor shall obtain Right-of-Entry permission prior to physically accessing any private property. Surveyor will utilize public records to determine ownership data

and secure permission to enter private property for purposes of performing Land Surveying. A right-of-entry (ROE) letter will be prepared on County letterhead and mailed to each property owner in the project limits. A written response will be requested either confirming or denying ROE. The Surveyor will make reasonable attempts to contact each landowner verbally prior to conducting any fieldwork if written correspondence is not successful. A log of all contact with landowners will be maintained.

6. Prepare a final design and topographic drawing in Microstation,GeoPak V8i showing all features located in the field, an ASCII coordinate file of the associated points located in the field and a hard copy of all field notes and field sketches.
7. Determine boundary lines and rights-of-way lines for approximately 23 parcels and/or rights-of-way that are within or adjacent to the technically preferred alignment.
8. Perform Aerial Mapping survey to produce a design grade topographic map supplemented with traditional land surveying methods within the obscured areas. The aerial survey will include a 700 foot wide path for topographic features, a 800 foot wide path for ortho photos, at a flight scale of 1"=180' (0.1' yield on vertical accuracy on solid surfaces), mapping at a 1"=50' scale with 1.0 foot contours and color ortho photos at 0.2' pixel resolution in Mr. Sid format.
9. All Surveying shall be performed under the direct supervision of a Professional Land Surveyor licensed and in good standing with the State of Texas.
10. All Aerial Mapping shall be performed under the direct supervision of a Certified Photogrammetrist certified and in good standing with the American Society of Photogrammetry and Remote Sensing.
11. This scope does NOT include the record research or abstracting of easements or other encumbrances (drainage easements, ingress-egress easements, gas leases, etc.) of properties located within the project limits or the location of such.

Deliverables for Task 3

1. ROE Contact Log, copies of ROE permission letters
2. DGN file containing planimetrics, contours, breaklines, and property lines and ownership information
3. Microstation GeoPak DTM file
4. ASCII file of points, field notes and field sketches
5. Control Monument Data Sheets
6. Mr. Sid Ortho Photos

TASK 4 – PROJECT MANAGEMENT/PROJECT ADMINISTRATION

The Engineer's project manager, in coordination with the County's Director of Engineering, will be responsible for directing and coordinating all activities and personnel associated with this project.

Schedule, Progress Reports, and Invoices

The Engineer will prepare a simple graphic milestone schedule indicating completion dates of major work items, deliverables, and reviews.

The Engineer will submit monthly progress reports to the County. Invoices for all work completed during the period will be submitted monthly to the County. Monthly progress reports will include verbal description of all activities ongoing or completed during the reporting period, activities planned for the following month, problems encountered and action required to remedy them. The progress report will include a tabulation of percent complete by task.

Progress Meetings

Attend an estimated six (6) project team meetings with Collin County. The purpose of these meetings is to discuss project status, plan upcoming events, and discuss and resolve any key project issues. Meeting minutes will be prepared and distributed for all meetings.

Miscellaneous Coordination Meetings

Attend miscellaneous coordination meetings with project stakeholders to include adjacent cities, utility companies, property owners, or Collin County Commissioners Court meetings or workshops. This has been estimated at a total of 12 meetings. Meeting minutes will be prepared and distributed for all meetings.

Subconsultant Management

The Engineer will prepare subcontracts for subconsultants, direct and monitor subconsultant activities, and review and recommend approval of subconsultant work and invoices.

Quality Assurance/Quality Control

The Engineer will provide continuous monitoring throughout the life of the project.

TASK 5 – GEOTECHNICAL

No geotechnical investigation will be required under this scope of work.

TASK 6 – PLANS, SPECIFICATIONS, AND ESTIMATES (PS&E)

The plans, specifications, and estimates (PS&E) scope shall be determined after the schematic has been prepared and approved and will be included in this contract as a supplemental agreement.