# Memorandum

**Date:** September 11, 2022
**Project:** Collin County FM 546 / CR 400 Corridor Study
**Subject:** **Amendment #3**
**From:** Brian Reinhardt – Contract PM
**To:** Tracy Homfeld, Bridell Miers

**Purpose**

The purpose is to present proposed Amendment #3 to BGE's contract for:

1) **Phase I Professional Services to develop Final Design Plans (PS&E)** from existing FM 546 east of Bridgefarmer Rd. in Lowry Crossing to US 380 east of Princeton. **Proposed fee $1,615,859.55**;
2) **Phase I Professional Services to extend limits of schematic design (planning) approximately 0.34 miles** back to FM 982/S 2nd St due to request of City of Princeton. Adds additional stakeholder coordination, utilities research and alternatives analysis. **Proposed fee $111,840.03**;
3) **Phase 2 Professional Services to add additional environmental and engineering tasks**, along with additional coordination with stakeholders (TxDOT, USACE, City of McKinney). **Proposed fee $715,867.00**

**Proposed Amendment #3 Total Fee: $2,443,566.58**

**Added Scope Detail included in Amendment #3:**

1. Phase I PS&E (Final Design) - Addition of Myrick Lane and Boorman Lane Plans, Specs, and Estimate (PS&E)

   - Includes development of signed and sealed construction plans and estimates (PS&E), utility coordination, minor survey, geotechnical services, lighting design, and signal warrant analysis and design
   - CR 400 has been removed and names of corridor changed for section east of FM 546. From FM 546 east to FM 982 will be named Myrick Lane. From FM 982 east and up to US 380 will be named Boorman Lane. These have been coordinated and approved by City of Lowry Crossing and City of Princeton.
   - Adds/transfers remaining Geotechnical Engineering Services from FM 546 / CR 400 Phase I Corridor Study to the final design stage.

2. Phase I Corridor Study Planning (East) extending of limits approximately 0.34 miles back to FM 982

   - Additional schematic design/analysis to extend limits 0.34 mi back to FM 982 at the request of City of Princeton.
   - Development of interim tie-in to existing FM 546 to stage construction and coordinate with TxDOT.
   - Additional stakeholder coordination.
   - Develop iterations of alternative layouts for US 380 alternatives near where FM 546 ties to US 380.
   - Additional traffic capacity analysis for added segment and intersection.
   - Additional drainage analysis and coordination with adjacent, new developments.
   - Additional SUE Level B, C, and D services for the extension of the project to FM 982.
   - Transfers remaining Geotechnical Engineering Services to Myrick Lane and Boorman Lane PS&E.
   - Contractually reallocates (moves) remaining monies from subs to BGE.

3. FM 546 Phase 2 (West) Corridor Planning Additional Scope

   - Adds additional environmental tasks identified through meeting with USACE (tree survey, grading mitigation calculations, wildlife crossing analysis).

- Adds additional alternatives analysis to tie to SP 399 Purple along with additional exhibits for coordination with TxDOT and City of McKinney.
- Adds additional existing topography processing to cover limits for analysis of direct connectors and additional alternatives.
- Adds corridor alternatives analysis for independent utility (if SP 399 is not built, making sure FM 546 can stand alone as an independent project). Includes additional public meeting exhibits and schematic design.
- Adds development of an implementation plan to analyze and recommend a logical timeline of long-term improvements with phased cost estimates at the interchange with SP 399.
- Adds evaluation of impacts to Spur 399's ramping configuration at different FM 546 intersection points.
- Adds development of conceptual alignments and evaluation of future intersecting arterials of City of McKinney's thoroughfare plan.
- Adds detailed VISSIM traffic analysis for the opening year and 20-year design year for the no-build and one build alternative for up to five (5) intersections.

**Associated Scopes and Fees are attached to this Memo.**

# Amendment #3

## 1. Phase 1 Professional Services Scope/Fee for Final Design (PS&E)

# EXHIBIT "A"

# SCOPE OF SERVICES

**Myrick Lane and Boorman Lane**
**Plans, Specifications and Estimate Preparation**

## PURPOSE

The Scope of Work to be performed by BGE, Inc. (the "ENGINEER") under this contract will consist of the preparation of final plans, specifications, and estimates (PS&E) for a 4-lane divided roadway and widening of existing FM 546 for the addition of left turn bay. The naming of Myrick Lane and Boorman Lane (the "Project") is noted below.

The Project length is approximately 2.2 miles between FM 546 and CR 456 at the following locations:

- Interim Intersection of Myrick Lane and FM 546
- Myrick Lane: Approximately 1.2 miles, from FM 546 to 3400 feet west of Beauchamp Blvd
- Boorman Lane: Approximately 1 mile, from FM 982 to 1400 feet south of CR 456

## DETAILS

- The ENGINEER will prepare plans, details, and compute quantities to include grading, paving, pedestrian facilities, drainage, removals, bridge, traffic control/construction sequencing, storm water pollution prevention plans, signing & pavement markings, illumination, warrant studies, signal design, utility investigation/coordination, and miscellaneous details.
- Design Criteria for the project shall comply with the latest version of Texas Department of Transportation (TxDOT) Roadway Design Manual, TxDOT Hydraulic Design Manual, the Texas Manual on Uniform Traffic Control Devices (TMUTCD), TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, and other State approved manuals. When design criteria are not identified in State manuals, the Engineer refer to the American Association of State Highways and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets.
- The general parameters for design shall include the following:
    a) This Project will be developed utilizing English units of measure and all final plan sheets will be half size (11"x17").
    b) Cross sections shall be created at 100-foot increments for the Project and all critical locations, including cross streets with construction beyond the radius return.
    c) Widen FM 546 to accommodate eastbound left turn lane at interim intersection with Myrick Lane.
    d) Interim intersection at FM 546 to accommodate left and right turn movements along westbound Myrick Lane.
    e) Add single left and right turn lanes along westbound Boorman Lane at the intersection of

FM 982.

f) Add continuous sidewalks at segments anticipated to be constructed by County.

- The work described in this scope of services will include the following major work tasks: Assembly and Review of Data; Roadway Design; Drainage Design; Traffic Design; Structural Design, Project Management, and Bid Phase Services; Special Services will include Survey and Geotechnical Services; Incremental Services will include Additional Survey, Utility Investigation (SUE), Traffic Signal Design, and Utility Coordination.
- Remaining Geotechnical Engineering Services initiated in the FM 546 / CR 400 Phase I Corridor Study are to continue and be completed as part of the Project.
- New pedestrian accommodations shall be designed in accordance with TxDOT standards, Texas Accessibility Standards, American with Disabilities Act (ADA) standards, and Public Right of Way Accessibility Guidelines (PROWAG). Identify existing ADA on Project, constructed by others, and tie with new sidewalk improvements. Any existing sidewalks or ADA ramps not incompliance shall be replaced.
- The ENGINEER will coordinate with and assist the COUNTY in preparing and distributing applications, letters or plan sets to TxDOT, City of Princeton, Texas Department of Licensing and Regulation (TDLR), and franchise utilities for review purposes.

## BASIC SERVICES

### 1. ASSEMBLY AND REVIEW OF DATA

**Collection of Data, Reports, and Maps**

The ENGINEER shall review all available documentation from the development of the FM 546 / CR 400 Phase I Project, including roll plots of design schematic, cross sections, drainage report, design criteria, utility conflict matrix, electronic design files, and calculations.

The determination of additional data requirements, availability, and sources will be coordinated with the COUNTY. Once the data needs and sources are identified, the ENGINEER will contact the appropriate agencies and organizations to obtain the data. Data to be collected will include, but not be limited to:

- Utility plans and documents from appropriate municipalities and utility companies.
- Readily available plan sets for crossing or abutting sections within the Project Limits at both partial design status and final.
- Readily available flood plain information and studies from the Federal Emergency Management Agency, FEMA, the Corps of Engineers and/or other governmental agencies.
- The ENGINEER will obtain electronic and/or hard copies from the COUNTY: GIS Data, drainage reports, mapping, survey, and improvement plans within the scoped area. The ENGINEER will acquire from the COUNTY any aerial mapping and soil data for the designated area.

**Field Reconnaissance**

The ENGINEER will perform a corridor site visit to obtain field notes and digital photos along the project corridor.

**Review of Data**

The ENGINEER will review the data collected and from this information will:

- Integrate additional data into the study file and evaluate tasks for supporting documentation.
- Develop base CAD files (Bentley ORD) that will be utilized for corridor evaluation including, but not limited to, existing utilities from visual analysis and additional SUE research; and FEMA flood plain limits converted from GIS;

**Preliminary Design Conference**

The ENGINEER will attend a Kick-Off Meeting to establish and agree on fundamental aspects, concepts, establish the basic features and design criteria for the project.

**Prepare and Distribute Applications, Letters and Plans**

The ENGINEER will assist the COUNTY in preparing and distributing applications, letters or plan sets to TxDOT, TDLR, and franchise utilities for review purposes. The following submittals are anticipated:

a) TxDOT– Complete Form 1058 Permit to Construct Access Driveway Facilities on Highway Right of Way. The ENGINEER will include a signed and sealed copy of the drawings relevant to the following intersections:
    1. FM 982 (Second Street) and Boorman Lane
    2. FM 546 and Myrick Lane
b) City of Princeton – Provide electronic copies of the 60%, 90%, and 100% design plans to City of Princeton for review.
c) TDLR – The ENGINEER will register the Project online using TDLR's Texas Architectural Barriers online System (TABS) and submit copy of plans to a RAS using the following steps:
    1. Select a Registered Accessibility Specialist (RAS)
    2. Complete an Owner Agent Designation form
    3. Register the project online using RAS information and Owner Agent Designation Form
    4. Complete Proof of Submission form in accordance with Texas Administrative Code Chapter 68, Rule 68.50
    5. Submit Proof of Submission form and relevant copy of the plans to selected RAS no later than the twentieth business day after the plans and specifications are issued
    6. Services completed during construction, including Request for Inspection form, are outside the scope of services of the Project and can be added via addendum in the future
d) Franchise Utilities – Provide electronic copies of the 60%, 90%, and 100% design plans

to franchise utilities for review.

**Roadway Design Criteria**

The ENGINEER shall apply appropriate Roadway Design Criteria based on TxDOT 4R guidelines for urban arterials and prepare a Design Criteria Tabulation for the project and will submit to the COUNTY for approval. The ENGINEER will use the design criteria to identify the maximum and minimum values for all design elements including drainage criteria and will identify the project preferred values.

## 2. ROADWAY DESIGN

### GENERAL

**Typical Sections**

The ENGINEER shall prepare the existing and proposed typical sections of the roadway and cross streets. The existing pavement structures shall be based on available as-built plan data provided by the COUNTY.

The cross sections will include the following:

- Myrick Lane
- Boorman Lane
- Dove Hill Trail/CR 452

**Miscellaneous Sheets**

- Title Sheet
- Index of Sheets
- Project Layout Sheets at 1” =500’ scale
- Survey Control Data Sheets
- General Notes
- Estimate & Quantity Summary
- Summary of Quantities

### TRAFFIC CONTROL

**Traffic Control Plan**

The ENGINEER shall prepare traffic control and sequence of construction plans at a scale of 1" = 100’. The TCP plan will show staged construction of the cross streets improvements to maintain local access. The plans shall identify work areas, temporary paving, temporary shoring, signing, detour alignments, barricades, temporary drainage, and other traffic control related items as required. A

narrative will be prepared and submitted to the COUNTY for review and incorporation into the plans. Traffic control will utilize TxDOT standard details and meet the requirements of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

- Develop Traffic Control Advance Warning Layout

  In conjunction with the Traffic Control Layouts, the ENGINEER shall develop an overall advance warning layout in conformance with TxDOT standard requirements.

- Develop Traffic Control Typical Sections

  In conjunction with the Traffic Control Layouts, the ENGINEER shall develop typical cross sections showing lane widths, edge conditions, channelization, and proposed construction area. Typical sections will be shown on the traffic control layouts where needed.

- Develop Sequence of Construction, Narrative, and General Notes

  The ENGINEER shall develop a sequence of construction for the proposed improvements including a written narrative and any applicable general notes.

- Traffic Control Layouts

  The ENGINEER shall prepare layouts (1" = 100') showing the travel lanes and construction area for each phase of construction. Included in the layouts will be temporary signing and striping, channelization devices, barricades, and applicable notes.

- Intersection Staging Plans

  The ENGINEER shall develop typical intersection staging plans for similar intersections. Develop custom intersection staging layouts only for special conditions.

- Driveway Staging Plans

  The ENGINEER shall develop a typical driveway staging plan for similar driveways. Develop custom driveway staging layouts only for special conditions.

- TCP Quantities Summary Sheet

  The ENGINEER shall develop TCP Quantity Summary Sheets

- Detour Plans

  No detour plans are anticipated for the Project, if they become necessary the design will be provided as Additional Services.

- Traffic Control Standard Details

  The ENGINEER will select standard details applicable to the traffic control as needed for construction and include in the plans for the 60%, 90%, and final submittals.

## ROADWAY DESIGN

### Horizontal Alignment Data Sheet

The ENGINEER shall provide plan sheets with all applicable horizontal alignment data along the project.

### Removal Sheets

The ENGINEER shall provide removal layouts showing items to be removed at a 1" = 100' scale on stacked plan layout sheets. Surface features to be removed including driveways, streets, storm sewer piping, storm sewer inlets, abandoned water mains and abandoned sanitary sewer mains will be identified with approximate quantities on the removal sheets. It is assumed the franchised utilities will either remove their own equipment or will abandon it in place. Information on abandoned water mains and sanitary sewer will be provided by others. The removal of buildings and building foundations located within the proposed ROW is assumed to be within the scope of this contract and will be identified for removal.

### Roadway Plan and Profiles

The ENGINEER shall develop the plan and profile sheets at a scale of 1" = 100' (on 11" x 17" sheets) for the Myrick Lane, Boorman Lane and cross streets for this project. The ENGINEER shall refine the vertical alignment for the roadway based upon the approved design criteria and design ultimate schematic. The horizontal curve data and vertical curve data shall be shown including "K" values. The vertical profiles shall use the approved design ultimate schematic as the starting profile, with minor adjustments as necessary.

The plan and profile sheets will include the following:

- Myrick Lane
- Boorman Lane
- Dove Hill Trail/CR 452

### Intersection Layout Sheets

The ENGINEER shall develop contour plans and intersection details for one intersection and two hammerhead turn arounds. Layouts will be at a scale of 1" = 40'. Proposed intersection is Dove Hill Trail/CR 452 at Boorman Lane. All other intersections are connections to existing intersections/roadways that The ENGINEER will not be responsible for reconstructing.

**Driveway Profiles / Details Summary**

The ENGINEER shall analyze up to fifteen driveways within the project and develop driveway profiles as needed to verify that driveways function as intended. No commercial driveways identified on project. Delineate the limits of construction outside of the right of way needed to secure an adequate driveway profile. Calculate and summarize driveway quantities.

Driveway details (dimensions, grades, and quantities) will be prepared in a tabular format.

**Miscellaneous Roadway Details**

Prepare necessary plan details to clarify the construction requirements of the paving facilities.

**Roadway Cross Sections**

The ENGINEER shall prepare proposed cross sections at a scale of 1" = 10' horizontal and 1" =10' vertical (on 11"X17" format) or appropriate scale for detail and review. Cross sections shall be created at all critical locations and on 100-foot increments for Myrick Lane, Boorman Lane and cross streets with construction beyond the radius return. Critical locations are identified as begin and end of each section and at bridge abutments.

The ENGINEER shall determine the quantities of cut and fill for each cross section and provide the earthwork quantities in a tabular format in the plans.

**Assembly of Roadway Standards**

The ENGINEER will select standard details applicable to the roadway design as needed for construction and include in the plans for the 60%, 90%, and final submittals.

**QUALITY CONTROL (ROADWAY)**

The ENGINEER will perform a Quality Control / Quality Assurance review based on the requirements in the *Project Quality Management Plan* (PQMP) including the following:

- QAQC will be performed prior to each submittal and the ENGINEER's QAQC review set will be made available for review along with each submittal.

## 3. DRAINAGE DESIGN

**HYDROLOGY**

The ENGINEER shall subdivide the overall drainage areas into sub-areas and calculate the discharge directed to each proposed culvert or inlet. Prepare drainage area map identifying major sub-areas. The ENGINEER shall prepare drainage area maps on standard 11" x 17" plan sheets.

- Offsite drainage area map for the site (Scale of 1" = 2000')
- Storm sewer inlet area maps. (Scale of 1" = 100')

The ENGINEER shall design storm sewer improvements for Myrick Lane and Boorman Lane. The runoff to each inlet will be calculated in accordance with COUNTY criteria using the appropriate design frequency and as defined in the TxDOT Hydraulic Design Manual and as shown on standard TxDOT runoff and inlet computation plan sheets.

## HYDRAULIC DESIGN

### Hydraulic Design for Culverts, Bridge Waterways & Storm Sewer

The ENGINEER will perform necessary hydraulic computations for the design of this project utilizing HEC-RAS, GEOPAK Drainage, HY-8, and/or other widely accepted hydraulic modeling software. Calculations will include culverts, bridge waterways, channels, storm sewers and inlets.

The ENGINEER will provide hydraulic calculations to the COUNTY by showing the necessary information in the final plan set.

### Bridge Hydraulic Reports

The ENGINEER shall utilize the hydrologic/hydraulic study prepared during the schematic phase and HEC-HMS (or best available) data to determine discharges at the proposed crossings for the following FEMA regulated waterways:

- East Fork Trinity River Tributary 1

The ENGINEER shall conduct a field investigation to document the creek characteristics in the vicinity of the proposed crossings. The hydrologic model will be developed with existing land use conditions and future developed conditions. It is assumed that no channel realignment design will be required.

The ENGINEER will develop a hydraulic model of the existing channels and conditions using the channel survey data and field observation notes. Calibrate the model using available FEMA maps and information. The ENGINEER shall develop a hydraulic model of the proposed crossing utilizing the existing hydraulic model and incorporating the proposed structure.

The ENGINEER shall analyze and check scour impacts in accordance with the TxDOT Scour Evaluation Guide, August 2020.The ENGINEER shall prepare the Hydraulic Report for East Fork Trinity River Tributary 1 in accordance to the COUNTY and STATE criteria comparing the existing creek conditions with the proposed roadway crossing. The ENGINEER shall prepare working maps, profiles, cross sections, and tables to be included with the hydraulic report.

## DRAINAGE STRUCTURE DESIGN

### Culvert Layouts

Prepare no more than five (5) non-bridge class culvert crossing layout sheets for each cross-drainage structure in accordance with State standard details, the TxDOT Hydraulic Design Manual and the hydraulic computations developed utilizing HY-8 or other approved method. Prepare layouts at 1" = 20' on 11"x17" plan sheets unless otherwise needed.

### Storm Sewer Plan & Profile Sheets

Prepare storm sewer plan sheets and profile sheets depicting storm sewer, inlets, and manholes necessary to drain the facility and convey the runoff to the designated discharge points. The storm sewer plan profiles will be consistent with the hydraulic computations developed using Geopak Drainage or other widely accepted method, and the TxDOT Hydraulic Design Manual. Inlets, manholes and junctions will be in accordance with TxDOT standard details. Prepare layouts at 1" = 100' on 11"x17" plan sheets unless otherwise needed.

### Miscellaneous Drainage Details

Prepare necessary plan details necessary to clarify the construction requirements of the drainage facilities and structural modifications to headwall design

### Assembly of Drainage Standards

The ENGINEER will select standard details applicable to the drainage design as needed for construction and include in the plans for the 60%, 90%, and final submittals.

## OPEN CHANNEL DESIGN

### Special Ditch/Channel Layout Sheets

No special ditch/channel layout sheets anticipated for this scope of work.

## STORM WATER POLLUTION PREVENTION PLAN (SW3P)

### SW3P Data Sheet

The ENGINEER shall prepare SW3P on standard TxDOT SW3P plan sheet.

### SW3P Layouts

The ENGINEER shall design a SW3P erosion control plan consistent with the project construction phases that will minimize sediment discharge from the project site through runoff. The ENGINEER shall prepare an erosion control plan at a 1" = 100' scale for each phase of construction.

**Post-Construction Plans (BMP Control for TNRCC Section 401)**

The ENGINEER will analyze/design the use of vegetative filter strips, grassy swales, special ditch grading, and other non-structural BMP controls within the proposed corridor. Any other BMP control designs, such as permanent detention and/or sedimentation ponds will be considered as additional services.

**Temporary Drainage**

The ENGINEER shall review the temporary drainage during phased construction by running cross sections at major phases of the TCP. The ENGINEER shall review drainage for positive flow and perform a low point review. Temporary drainage will not include hydrologic study but may include temporary pipes and ditch flow lines included in the phases of construction.

**QUALITY CONTROL (DRAINAGE)**

The ENGINEER will perform a Quality Control / Quality Assurance review based on the requirements in the *Project Quality Management Plan* (PQMP) including the following:

- QAQC will be performed prior to each submittal and the ENGINEER's QAQC review set will be provided with each submittal.

## 4. TRAFFIC DESIGN

**SIGNING AND PAVEMENT MARKINGS**

**Signing and Pavement Marking Layout**

The ENGINEER shall prepare a traffic signing and pavement marking layouts at a scale of 1" = 100' feet on a standard 11" x 17" plan sheets. The layouts will identify the locations of proposed signing and permanent pavement markings in accordance with applicable TxDOT standards and the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

**Summary Tables**

The ENGINEER shall prepare a small sign summary table utilizing TxDOT standard sheets.

**Assembly of Sign and Marking Standards**

The ENGINEER will select standard details applicable to the signing and marking design as needed for construction and include in the plans for the 60%, 90%, and final submittals.

**ILLUMINATION**

The ENGINEER will refer to TxDOT's Highway Illumination Manual and other deemed necessary State approved manuals for design of continuous lighting along Myrick Lane and Boorman Lane, and for the design of safety lighting at the following intersections.

- Myrick Lane at FM 546
- Boorman Lane at FM 982
- Boorman Lane at Dove Hill Trail/CR 452

The ENGINEER will prepare circuit wiring diagrams showing the number of luminaires on each circuit, electrical conductors, length of runs, and service pole assemblies. Photometrics are not included in the design. Design will be based off the City of Princeton plans.

**SIGNALIZATION**

No traffic signals are anticipated for the Project. If they become necessary as a result of Traffic Signal Warrant Analysis, the design will be provided as Incremental Services.

**Traffic Signal Warrant Analysis**

The ENGINEER shall perform a traffic signal warrant analysis for up to two (2) intersections. The analysis will be performed in accordance with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

**QUALITY CONTROL (TRAFFIC)**

The ENGINEER will perform a Quality Control / Quality Assurance review based on the requirements in the *Project Quality Management Plan* (PQMP) including the following:

- QAQC will be performed prior to each submittal and the ENGINEER's QAQC review set will be provided with each submittal.

## 5. STRUCTURAL DESIGN

**RETAINING WALLS**

No retaining walls are anticipated for the Project, if they become necessary the design will be provided as Additional Services.

**EAST FORK TRINITY RIVER TRIBUTARY 1**

The ENGINEER shall produce complete Bridge Layouts and Structural Details for the proposed East Fork Trinity River Tributary 1 Bridge. The structure is two parallel single span bridges approximately 130' long and 50' wide with no skew. It is assumed the structure will consist of an I-Girder superstructure supported by cast-in-place concrete abutments on a drilled shaft foundation.

**STRUCTURE**

The ENGINEER shall prepare structural details for bridge. The details shall include abutment details, span/unit details and I-girder details. TxDOT standards shall be used if possible. Prestressed concrete I-Girder units shall be designed to be continuous slab, with no integral concrete end diaphragms. The ENGINEER should size the bridge to meet drainage requirements.

**BRIDGE LAYOUTS**

The ENGINEER shall prepare bridge layouts in accordance with TxDOT's Bridge Division Manuals. The ENGINEER shall determine the location of each soil boring needed for foundation design in accordance with the TxDOT Geotechnical Manual.

**FOUNDATION DESIGN**

The ENGINEER shall develop the foundation design in accordance with the TxDOT's Bridge Division Geotechnical Manual.

**BRIDGE TOTAL QUANTITIES AND COST ESTIMATES**

The ENGINEER shall provide all of the bridge quantities by construction phase and the estimate of probable cost for the bridge.

**BEARING SEAT ELEVATIONS**

The ENGINEER shall provide bearing seat elevations for each beam.

**GENERAL GUIDELINES FOR BRIDGE DESIGN**

The ENGINEER shall make final design calculations and provide information to the COUNTY. The bridge designs shall be in accordance with TxDOT's Bridge Division manuals. TxDOT standard details will be used to the extent possible.

**BRIDGE CLASSIFICATION CULVERT LAYOUTS**

No bridge class culverts are anticipated for the Project, if they become necessary the design will be provided as Additional Services.

**QUALITY CONTROL (BRIDGE)**

The ENGINEER will perform a Quality Control / Quality Assurance review based on the requirements in the *Project Quality Management Plan* (PQMP) including the following:

- QAQC will be performed prior to each submittal and the ENGINEER's QAQC review set will be provided with each submittal.

## 6. PROJECT MANAGEMENT

### Project Coordination and Resolution Meetings

The ENGINEER shall prepare for and attend the below listed meetings with the COUNTY with up to two (2) team members. Meetings will include the following:

- Design Kickoff Meeting
- 30% Design Status and Coordination Meeting
- 60% Comment Review Resolution Meeting
- 90% Comment Review Resolution Meeting
- Project Coordination Meetings with stakeholders (assume 18 meetings)

### PS&E Package Coordination

The ENGINEER shall manage the assembly of the PS&E package to include the following:

- Plan assembly with sheet numbers.
- Coordination with subconsultants for deliverables.
- Printing of complete PS&E submittals for delivery to the COUNTY.
- Develop cost estimate to be provided at the 30%, 60%, 90% and final submittal.

### Project Quality Management Plan (PQMP)

The ENGINEER shall develop a project management plan that is to be approved by the COUNTY.

### Stakeholder Coordination

The ENGINEER shall coordinate with the following stakeholders:

- City of Princeton
- Lowry Crossing
- Collin County
- Developers along Myrick Lane and Boorman Lane
    a) (list current developers/# of them).
- Oncor
- TxDOT

**Project Administration**

The ENGINEER's project manager will be responsible for directing and coordinating all activities and personnel associated with delivering this project. The project manager will prepare project correspondence and monthly progress reports, coordinate with sub consultants, and maintain routine project record keeping.

**BID PREPARATION**

The ENGINEER shall provide the following related to bid preparation of roadway elements including:

- Construction timeline will be prepared using Microsoft Project or similar scheduling software at the 90% and final submittal.
- Roadway General Notes and Special Specifications for the Project at the 90% and final submittal.
- Standard Specifications, Bid Forms and Contract Documents for the Project at the 90% and final submittal. Sections to be included are: Advertisement for Bids, Instructions to Bidders, Governing Specifications and Special Provisions, General Notes, Bid Form, Base Bid Schedule, Construction Agreement, Texas Statutory Payment and Performance Bond, Performance Bond and Maintenance Bond.

**Invoicing**

The ENGINEER shall prepare monthly invoices for the project including a progress report reflecting the overall % complete for the project, and any outstanding issues that need to be addressed.

## 7. BID PHASE SERVICES

**Bid Package Preparation**

The ENGINEER will prepare and furnish final construction plans and bid documents to prospective bidders and keep record of recipients. Documents will be provided in electronic format for distribution to proposed bidders. The cost for bid package reproduction and delivery will be determined by reproduction cost plus shipping and handling, and will be the responsibility of prospective bidders.

The ENGINEER will coordinate bid opening date, time, and location with the COUNTY. The ENGINEER will prepare final Invitation to Bid and provide necessary documents to the COUNTY required in advertising the Invitation to Bid.

**Pre-Bid Conference**

The ENGINEER will prepare a pre-bid agenda and attend pre-bid conference if requested by the COUNTY.

**Bid Document Interpretations and Addenda**

The ENGINEER will assist the COUNTY in responding to prospective bidder inquiries and preparing and issuing addenda as necessary in coordination with the COUNTY.

**Bid Opening and Tabulation**

The ENGINEER will attend the bid opening and assist the COUNTY in evaluating bids for responsiveness and completeness. ENGINEER will prepare a preliminary tabulation spreadsheet summarizing each bid.

**Recommendation of Contract Award**

The ENGINEER will finalize tabulation spreadsheet and include a summary of any discrepancies found between original bids submitted. ENGINEER will prepare a formal recommendation to select Contractor for construction of project and submit to COUNTY through a Notice of Award.

**Issue Construction Contract Documents**

The ENGINEER will incorporate addenda, contractor bond information and contractor bid information into a conformed set of contract documents. The ENGINEER will assist the COUNTY in assembling, delivering, and executing contract documents for construction; and prepare a Notice to Proceed.

## SPECIAL SERVICES

### 1. SS1. SURVEY

The survey performed for the referenced project will consist of four mobilizations for additional survey needs for design of PS&E. Any additional survey needs will be handled under incremental services on an as needed basis.

**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.

The North American Datum of 1983 (NAD83), Texas Coordinate System of 1983 (State Plane Coordinates), with an applied combined scale factor utilized by TxDOT for Collin County, 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. Project control set during the planning phase of this project through agreement no. 2019-210 will be utilized for this contract.

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 (Bentley ORD) 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.

**Deliverables for Survey and Task**

- 2D topographic data in Bentley ORD format.
- 3D Digital Terrain Model (DTM) in Bentley ORD format.
- Horizontal and Vertical Control Sheets.

## 2. SS2. GEOTECHNICAL SERVICES

The geotechnical investigation performed for the referenced project will consist of field and laboratory investigations, engineering analysis, and a report prepared by a Licensed Professional Engineer.

Remaining Geotechnical Engineering Services scoped in the FM 546 / CR 400 Phase I Corridor Study are to continue and be completed as part of the Project.

**Field Investigation**

The field investigation will consist of drilling bridge borings. One bridge boring will be drilled on each end of the proposed bridge near the proposed abutment and spaced no greater than 300 ft apart for longer bridges. One boring will be drilled on each side of the proposed culvert boxes; boring depths planned to be 25 feet per boring. Spacing and depths will follow TxDOT's Geotechnical Manual and

may be adjusted by the Geotechnical Engineer's recommendations. A boring plan will be developed and submitted to the COUNTY for review and approval.

The bridge borings will be drilled until 20 feet of unweathered rock is penetrated. Unweathered rock is anticipated to be encountered at average depths of 40 feet below the existing ground surface. Therefore, it is anticipated that the test borings will be drilled to depths of 60 feet below the existing ground surface. If unweathered rock is encountered at average depths of greater than 40 feet, additional drilling footage will be required in order to penetrate 20 feet into unweathered rock.

Subsurface soil samples will be secured with thin walled tube and/or split spoon samples depending on soil type and consistency. Rock encountered within the bridge borings will be continuously rock cored and will also be evaluated using the Texas Department of Transportation Penetrometer (TxDOT Cone). In addition, TxDOT cone testing will be performed on 5-foot intervals for the overburden soils for the bridge borings. All samples will be properly logged, packaged, sealed, and placed in a core box for transportation to the laboratory. The test borings will be backfilled with soil cuttings and the pavement will be patched upon completion.

The ENGINEER will assist the COUNTY in obtaining the right-of-entry to all of the properties and assumes that the boring locations will be accessible to our conventional truck mounted drilling equipment during normal working hours. Should unusual soil conditions be encountered, we will provide the COUNTY with a recommendation and cost estimate to explore these conditions. Tree clearing will be performed through contractor obtained by Terracon.

The ENGINEER will contact Dig Tess to have them locate underground utilities. However, the ENGINEER is not responsible for damage to underground utilities that are not identified prior to drilling.

**Laboratory Investigation**

Laboratory tests will be conducted to classify the soil and to evaluate the volume change potential and strength of the soil and rock present at the site. Per TxDOT standards, Atterberg limits, sieve analysis and moisture contents will be performed on every stratum within each of the pavement borings. The volume change potential of the soils will also be evaluated by LL/PI properties. The strength of the soil will be estimated using hand penetrometer tests and unconfined compressive strength tests. Unconfined compressive strength testing will also be performed on the rock cores. Sulfate testing will be performed at 0 to 2 feet and 2 to 4 feet per TxDOT standards. Lime / PI series tests will also be performed on selected clay samples. CU triaxial testing and one-dimensional consolidation testing may be performed for the slope stability and settlement analyses of the proposed embankments.

**Engineering Analyses**

Results of field and laboratory work will be presented in an engineering report. The report will include our recommendations to guide design and construction of the new roadway and will include the following:

- Generalized soils stratigraphy and groundwater levels. Results of classification and TCP testing with WinCore format boring logs.
- Site Condition.
- Site Geology.
- Visually classify the soil samples by an engineer in the laboratory.
- Straight shaft pier recommendations for the design of the bridges.
- Gradation test results for scour analyses.
- Pavement subgrade stabilization recommendations.
- Concrete pavement section recommendations based upon design traffic data provided by others.
- Comments on the presence and effect of expansive soils on pavement construction will be provided. Alternative methods of reducing any anticipated shrink/swell movements associated with expansive clays will be included for pavement construction, if required.
- Slope stability analyses for proposed embankments.
- Embankment fill and compaction recommendations.

## INCREMENTAL SERVICES

The following incremental services are considered supplemental to basic or special services as described above and are to be billed by the ENGINEER on a time and materials basis as outlined below not to exceed an overall amount. Prior to any incremental services being performed, the ENGINEER shall prepare for the COUNTY a fee proposal based on pre-negotiated rates. The ENGINEER shall not begin any work until written authorization has been provided by the COUNTY.

### 1. IS1. SUBSURFACE UTILITY ENGINEERING (SUE)

**Assumptions**

The following assumptions were made for the preparation of this Scope of Services. If these assumptions do not prove correct, a modification to the scope and budget for this project may be required.

- This proposal and fee are based on the assumption that crews will be able to proceed unimpeded. Down time or additional mobilization or demobilization caused by restricted access, project changes, weather or other factors that are outside of the ENGINEER's control may be charged per the attached payment schedule.
- The ENGINEER will not perform any work outside of the scope of services herein without written authorization.
- Subsurface Utility Engineering services include comprehensive record research/collection of all known existing utility systems, survey of all visible utility surface features, and field designating using various geophysical equipment for detecting underground utilities. The lowest confidence level of data collected is record information and the highest confidence level is utilities found via excavation. All of the collected information is analyzed and combined to prepare a detailed utility map showing utilities of record that could not be found, active/inactive utilities, utilities that were found using geophysical equipment and precise utility locations that were uncovered.
- The accuracy of depth readings of utilities taken from electromagnetic geophysical equipment depends greatly on soil type, soil moisture content, depth of utility, proximity to other utilities, material of the conduit, etc. It is because of this that the equipment manufactures do not warrant and/or guarantee the accuracy of the equipment's depth readings. The only method of ensuring an accurate depth is to expose the utility for measurement.
- Suitability maps show GPR effectiveness is low in the project area. The ENGINEER will utilize GPR during the utility investigation and will note on the deliverables whether the radar had success detecting known utilities or not.
- The ENGINEER may utilize the following geophysical equipment on the project:

    - Radiodetection RD8100
    - Vivax-Metrotech VM-810
    - Sensit Ultra-Trac APL
    - IDS Opera DUO
    - Tonable rodder

- Sonde

- All equipment may not be used on each site as equipment is selected based upon geophysical application necessary to find a target utility
- Normal traffic control, for Subsurface Utility Engineering services, is considered standard placement of traffic cones, freestanding warning signage and vehicle-mounted traffic directional sign. Traffic control requiring lane closures, traffic detouring, flag persons, police, etc., is considered special traffic control. This service will be subcontracted to an approved subcontractor and billed to the Client at cost plus 10%.
- Sanitary and Storm Drain systems will be shown as QL-C based on surveyed invert data.
- It is assumed that no contaminated materials are encountered. If contaminated materials or soils are encountered the COUNTY will be notified immediately and any remediation will be the COUNTY's responsibility and cost.
- Paint markings placed on the ground are to be used for design purposes only and not for construction purposes. The use of QL-B information provided does not relieve any contractor or the COUNTY from the duty to comply with applicable utility damage prevention laws and regulations, including, but not limited to, giving notification to utility owners or the Texas One Call System before excavation.
- Non-metallic piping, inactive electric, and/or communication lines may or may not be found by electromagnetic, sonic, or acoustical designating practices. The ENGINEER does not warrant and/or guarantee that all existing utilities will be found.
- All work will be performed during daytime hours.

The ENGINEER will provide all the following Subsurface Utility Engineering (SUE) services to the standard of care applicable in the SUE profession. The services meet the standard guidelines of ASCE C-I 38-02 circular for "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data". Irrigation systems and electrical wiring for landscape lighting are excluded from the scope of this proposal.

**Quality Level A (QL-A) Test Hole Services**

Test Hole services to locate accurate horizontal and vertical positions of subsurface utilities by excavating a test hole using vacuum excavation techniques and equipment that is non-destructive to utilities. In performing test-hole services, SUE provider will:

- Provide up to forty (40) test holes.
- Test hole locations will be chosen by the ENGINEER.
- The ENGINEER will use designating equipment to lay out the test hole locations.
- The test holes will be surveyed by ARS.
- Provide all equipment, personnel and supplies required to perform locating services.
- Excavate test hole to expose the utility to be measured in such a manner that ensures the safety of the excavation and the integrity of the utility to be measured. In performing such excavations, the ENGINEER shall comply with applicable utility damage prevention laws. Excavations will be

performed using specially developed vacuum excavation equipment that is non-destructive to existing facilities.

- Furnish and install survey markers directly above the centerline of utility structure.
- Investigate, evaluate, measure and record:

  - Actual depth to top of utility referenced to a survey marker installed directly above the centerline of the exposed utility structure.
  - Outside diameter of utility and configuration of non-encased, multi conduit systems.

- Backfill around the exposed facility using the excavated materials compacted in six-inch lifts.
- In grass and landscape areas, restoration shall be as reasonably possible to the condition that existed prior to excavation.
- Any permitting fees will be invoiced to the COUNTY at cost plus 10%.

All areas where test holes are required shall be accessible by standard driving with vacuum excavation vehicle plus the range of a 15-ft hose.

**Quality Level B (QL-B) Services**

Designate utilities which mean to indicate the horizontal location of underground utilities by the application and interpretation of appropriate non-destructive surface geophysical techniques and reference to established survey control. Designate (Quality Level B) Services are inclusive of Quality levels C and D. Quality Level D – Existing Records: Utilities are plotted from review of available existing records. Quality Level C – Surface Visible Feature Survey: Quality level "D" information from existing records is correlated with surveyed surface-visible features.

The Engineer shall:

- Compile "As Built" information from plans, plats and other location data as provided by the utility owners.
- Coordinate with utility owner when utility owner's policy is to designate their own facilities at no cost for preliminary survey purposes. The Engineer shall examine utility owner's work to ensure accuracy and completeness.
- Designate, record, and mark the horizontal location of the existing utility facilities and their service laterals to existing buildings using non-destructive surface geophysical techniques. No storm sewer facilities are to be designated unless authorized by the County. A non-water base paint, utilizing the American Public Works Association (APWA) color code scheme, must be used on all surface markings of underground utilities.
- Correlate utility owner records with designating data and resolve discrepancies using professional judgment. A color-coded composite utility facilities plan with utility locate (test hole) locations, shall be prepared and delivered to the County. It is understood by both the Engineer and the County that the line sizes of designated utility facilities detailed on the deliverable are from the best available records and that an actual line size is normally determined from a test hole vacuum excavation. A note must be placed on the designate deliverable only that states "line sizes are from best available records". All above ground appurtenance locations must be included in the deliverable to the County. This information shall be provided in the latest version of Microstation.

The electronic file will be delivered to the County. A hard copy is required and must be signed, sealed, and dated by the Engineer. The designated utility information must be over laid on the design plans.

- Determine and inform the County of the approximate utility depths at critical locations as determined by the County. This depth indication is understood by both the Engineer and the County to be approximate only and is not intended to be used preparing the right of way and construction plans.
- Provide a monthly summary of work completed and in process with adequate detail to verify compliance with agreed work schedule.
- Clearly identify all utilities that were discovered from quality levels C and D investigation but cannot be depicted in quality B standards. The utilities must have a unique line style and symbology in the designate (Quality Level B) deliverable.
- Comply with all applicable County policy and procedural manuals.

**SUE DELIVERABLES**

A SUE CAD file depicting the QL-A test hole locations will be prepared for this project as well as a file depicting QL-B, QL-C, and QL-D. A Test Hole Report and a data summary form will be prepared. The Test Hole Report will be signed and sealed by a Registered Professional Engineer. The utilities will be referenced by the type of utility, color coded to American Public Works Association (APWA) standards. A color-coded composite utility facilities plan with utility locate (test hole) locations, shall be prepared and included in the design plan set.

All electronic project files created, and/or modified will be transmitted via email, or delivered on a CD if requested by the COUNTY. All CAD files will be created in AutoCAD / Civil 3D 2015 or Bentley ORD format.

**ESTIMATED FEES**

The ENGINEER will provide the services as described above on a **time and materials** fee basis based on the payment schedule in Exhibit "C". The estimate of services needed on the project are **not to exceed** $149,375.78.

Local Mobilization/Demobilization Fee Applies at the rate of once per project assignment. Minor/Standard Traffic Control is included (consists of warning signs and cones). Lane Closures requiring Flashing Arrow Board(s) is additional. Complex or Specialized Traffic Control is additional.

It is the client's responsibility to provide a dump site or a vacuum box/containment vessel for removal of Hydro Vac spoils if no dump site is provided by Client.

Paved areas may require coring to perform vacuum excavation services. In such cases the ENGINEER will provide a Core Rig and Operator. Core rig rate includes materials & equipment to replace and set core (keyhole) following vacuum excavation completion.

**SPECIAL NOTES FOR HYDRO EXCAVATION SERVICES**

Hydro Vac Services will require metered water recharge fees and authorized spoils disposal locations. All excavated material remains the exclusive property of the client or project owner upon whose land, easement or ROW wherein the excavations are performed. The project owner understands and acknowledges that Hydro Excavation indicates and includes the use of water to aid in the vacuum excavation process and that the resulting excavated materials may be oversaturated with water as a result of the hydro vac process.

If the project requires backfilling with material other than the material excavated via the hydro vac process, such as flowable fill or select backfill, the project owner will be required to provide a spoils box, vacuum box, or stockpiling location within or reasonably close to the project site for the purpose of holding the hydro vac excavated materials. BGE can provide a vacuum box/containment vessel from a third-party environmental services company for removal of Hydro Vac spoils if no dump site is provided by Client. BGE will request a fee proposal from environmental services company and the cost of vac box and spoils disposal will be passed through to client at cost plus 10% based on the fee proposal provided by the environmental services company.

The project owner is required to disclose any known or suspected information regarding the project site and its underlying soil conditions such as; chemical, petrochemical, hydrocarbon, asbestos, naturally occurring radioactive materials (NORM) or any other known or suspected contamination within the project site.

When performing hydro excavation in known, suspected or encountered contamination areas, the ENGINEER staff shall don additional Personal Protective Equipment (PPE). All costs associated with the use of additional PPE dictated by the site conditions and deemed reasonable and prudent, including wash-down, decontamination or disposal of said PPE, shall be charged to the client/project owner as a direct pass through cost. Examples of additional PPE may include but not be limited to; dust masks, respirators, face shields, protective coveralls, protective gloves and rubber boots.

**Pothole or Test Hole Option:**

Potholes are strictly the excavation and exposure of the subject facility with a measurement of depth and notation of facility size, type and composition painted on the ground and/or provided in a non-certified report. This report will be provided by Vac Crew onsite upon completion of potholes and typically is handwritten.

Test holes provide the same level of information as pot holes, and are surveyed for a precision x,y & z coordinate and are provided in a test hole report, signed and sealed by an Engineer. Test Holes require Survey and Engineer review. Vac Crew, Survey and Engineer fees will be in accordance with the rates shown in Exhibit “C”.

**2. IS2. UTILITY COORDINATION**

**Utility Coordination**

The ENGINEER shall assist the COUNTY in planning, coordinating, and attend up to ten (10) utility coordination meetings with the identified affected utility companies within the limits of the project. These meetings will establish the preliminary schedule for the respective utility adjustments performed by others. The ENGINEER will provide up to two (2) team members at each meeting. Provide status updates on design progress, schedule, 3relocation needs, and meeting minutes. Provide 60%, 90% and 100% design plans to the franchise utilities for review.

Design Exhibits – Prepare any necessary design exhibits in CAD or PDF which may provide clarification and/or assist franchise utilities with understanding project impacts or relocation needs.

Site Visits – Perform up to three (3) site visits with the COUNTY and/or impacted franchise utility representatives.

**Utility Agreements**

The COUNTY shall prepare and obtain all necessary Utility Agreements for the project. The ENGINEER shall aid the COUNTY in production of exhibits and estimates for the utility agreements.

**ESTIMATED FEES**

The ENGINEER will provide the services as described above on a **time and materials** fee basis based on the payment schedule in Exhibit "C". The estimate of services needed on the project are **not to exceed** $46,100.

**3. IS3. SURVEY**

Additional survey may be requested due to site changes on a periodic basis. The work performed under incremental services for survey will follow the general standards and deliverables specified under special services survey.

**ESTIMATED FEES**

The ENGINEER will provide the services as described above on a **time and materials** fee basis based on the payment schedule in Exhibit "C". The estimate of services needed on the project are **not to exceed** $12,100.00.

Local Mobilization/Demobilization Fee Applies at the rate of once per project assignment. Minor/Standard Traffic Control is included (consists of warning signs and cones). Lane Closures requiring Flashing Arrow Board(s) is additional. Complex or Specialized Traffic Control is additional.

## 4. IS4. TRAFFIC SIGNAL DESIGN

Based upon the results of the Traffic Signal Warrant Studies, the ENGINEER shall identify and prepare Traffic Signal Plans for all warranted traffic signals. Traffic Signal Plans will be signed and sealed by a Texas Registered Professional Engineer.

**Traffic Signal Layout**

The ENGINEER shall prepare traffic signal layouts for all warranted traffic signals on standard 11" x 17" plan sheets. The layouts will identify the locations of proposed traffic signal equipment including poles, signal heads, APS units, vehicle detection, conduit, ground boxes, luminaires, controller cabinet, electric service meter, power source, and signs in accordance with applicable TxDOT standards and the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

**Traffic Signal Details**

The ENGINEER shall prepare traffic signal details for all warranted traffic signals on standard 11" x 17" plan sheets. The detail sheets will include schedule of conduit and cables, cable termination details, phasing diagram, APS message information, pole and signal head placement details, electrical service details, street name sign details, and vehicle detection details.

**Assembly of Traffic Signal Standards**

The ENGINEER will select standard details applicable to the traffic signal design as needed for construction and include in the plans for the 60%, 90%, and final submittals.

**ESTIMATED FEES**

The ENGINEER will provide the services as described above on a **time and materials** fee basis based on the payment schedule in Exhibit "C". The estimate of services needed on the project are **not to exceed** $49,960.

## ADDITIONAL SERVICES

The following additional services are beyond the scope of services described above. However, the ENGINEER can provide the additional services, if required, upon the County's written request. Any additional amounts paid to the ENGINEER as a result of any material change to the scope of the project shall be agreed upon under a separate contract.

The additional services include, but are not limited to, the following:

Additional Engineering and Construction Services

- Signal Design
- Shop Drawing Review
- Construction Phase Services

# EXHIBIT "B"

## FINAL DESIGN COMPLETION SCHEDULE

**Refer to the attached schedule for deliverable/milestone dates**

### 1. Preliminary Design Coordination Review

- Plan and Profile sheets of 30% design
    a) Cover Sheet/Index of Sheets
    b) Project Layouts
    c) Typical Sections
    d) Preliminary Sequence of Work and Traffic Control Plans in roll plot format
    e) Horizontal Alignment Data
    f) Roadway Plans & Profiles
    g) Cross Street Plans & Profiles
    h) Drainage Area Maps
    i) Culvert Plans & Profiles
    j) Bridge Layouts
    k) Existing Utility Plans
    l) Preliminary Cross Sections
- Electronic Files of the submittal package in pdf format
- Attend design coordination / review meeting with the COUNTY.

### 2. 60% Design Submittal

- 3 sets of 11" x 17" plan sets with 30% Design Comments addressed
- Plan and Profile sheets of 60% design
    a) Update Title Sheet with Index of Sheets including Standards
    b) Final Project Layouts
    c) Final Existing and Proposed Typical Sections
    d) Preliminary Summary Sheets
    e) Preliminary Traffic Control Plans on 11" x 17" sheets
    f) Survey Control Data Sheets & Right of Way Marker Sheets
    g) Horizontal Alignment Data
    h) Plan and Profile Sheets for all Alignments
    i) Preliminary Intersection Layouts
    j) Miscellaneous Roadway Details
    k) Preliminary Signing & Pavement Marking Layouts
    l) Preliminary Storm Sewer Plans
    m) Storm Sewer Computations
    n) Final Drainage Area Maps
    o) Final Culvert Plans & Profiles
    p) Final Culvert Computations

q) Drainage Details
r) Final Bridge Layouts
s) Preliminary Bridge Details
t) Preliminary SW3P Layouts
u) Removal Plans
v) Final Existing Utility Plans
w) Cross Sections (1 set of 11" x 17" cross sections)

- Estimate of construction cost
- ENGINEER's internal QAQC marked-up set
- Electronic Files of the submittal package in pdf format

**3. 90% Design Submittal**

- 3 sets of 11" x 17" complete plan set with 60% Comments addressed
- 1 set of 11" x 17" cross sections
- Estimate of construction cost
- Preliminary Specification, Bid Form, General Notes and Contract Document
- Construction Schedule
- ENGINEER's internal QAQC marked-up set
- Electronic Files of the submittal package in pdf format

**4. Final Submittal**

- Six (6) Paper sets of 11" x 17" plan sheets with 90% Comments addressed
- PDF Portfolio of 11" x 17" signed and sealed
- Final Estimate of construction cost Final Construction Schedule
- Final Specification, Bid Form, General Notes and Contract Document
- ENGINEER'S internal QAQC mark-up set
- CD of Final drawings including GPK files for the COUNTY
- 1 set of 11" X 17" final cross sections (Paper)
- PDF of Final Cross Sections

**5. Calculations**

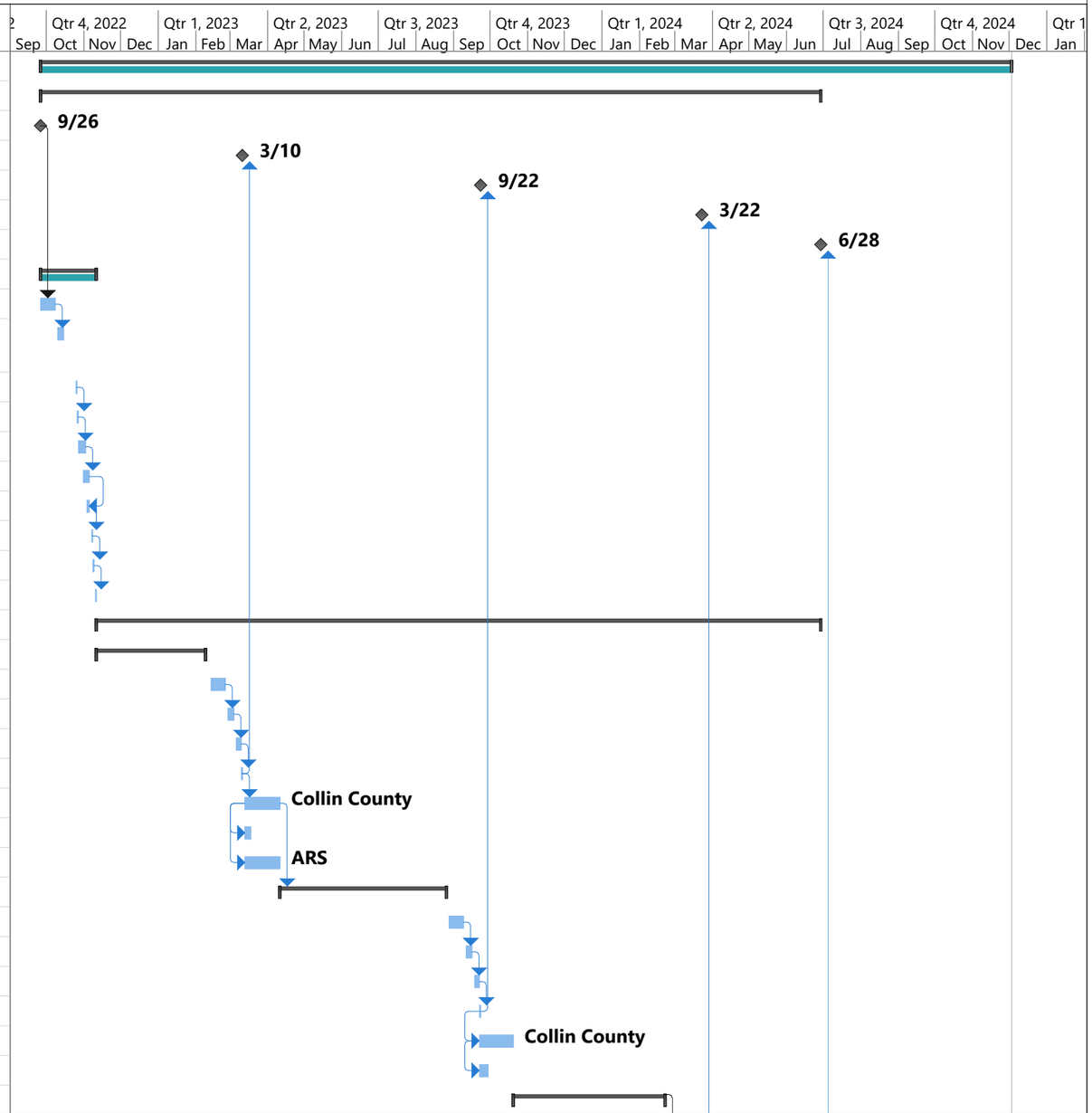
The ENGINEER shall develop and maintain a 3-ring binder with all quantity and design calculations.

[INSERT PROJECT DESIGN SCHEDULE]

Prime Provider: BGE, Inc.

# EXHIBIT B - Work Schedule

| ID | Task Name | Duration | Start | Finish | Predecesso | Resource Names |
|---|---|---|---|---|---|---|
| 1 | **New FM Road - PS&E** | **554 days** | **Mon 9/26/22** | **Mon 12/2/24** | | |
| 2 | **Milestones** | **444 days** | **Mon 9/26/22** | **Fri 6/28/24** | | |
| 3 | Notice to Proceed | 0 days | Mon 9/26/22 | Mon 9/26/22 | | |
| 4 | 30% Plans Submittal (Preliminary) | 0 days | Fri 3/10/23 | Fri 3/10/23 | 36 | |
| 5 | 60% Plans Submittal (Plans Adequate) | 0 days | Fri 9/22/23 | Fri 9/22/23 | 60 | |
| 6 | 95% Plans Submittal (Pre-Final) | 0 days | Fri 3/22/24 | Fri 3/22/24 | 84 | |
| 7 | 100% Plans Submittal (Final) | 0 days | Fri 6/28/24 | Fri 6/28/24 | 95 | |
| 8 | **Assembly and Review of Data** | **34 days** | **Mon 9/26/22** | **Thu 11/10/22** | | |
| 9 | Gather Existing Data | 2 wks | Mon 9/26/22 | Fri 10/7/22 | 3 | |
| 10 | Right of Entry for Geotech, Survey, and SUE | 1 wk | Mon 10/10/22 | Fri 10/14/22 | 9 | |
| 11 | Field Visit | 1 day | Tue 10/25/22 | Tue 10/25/22 | | |
| 12 | Kick-Off Meeting with County | 1 day | Wed 10/26/22 | Wed 10/26/22 | 11 | |
| 13 | Supplemental Survey | 4 days | Thu 10/27/22 | Tue 11/1/22 | 12 | |
| 14 | Review/Modify Alignments | 5 days | Mon 10/31/22 | Fri 11/4/22 | 13FS-2 da | |
| 15 | Develop Roadway Design Criteria | 2 days | Thu 11/3/22 | Fri 11/4/22 | 14FF | |
| 16 | Kick- Off Meeting with Subs | 1 day | Mon 11/7/22 | Mon 11/7/22 | 15 | |
| 17 | Kick-Off Meeting with Internal Disciplin | 1 day | Tue 11/8/22 | Tue 11/8/22 | 16 | |
| 18 | Design Concept Conference (DCC) | 1 day | Thu 11/10/22 | Thu 11/10/22 | 17FS+1 da | |
| 19 | **PS&E Development** | **410 days** | **Fri 11/11/22** | **Fri 6/28/24** | | |
| 20 | **30% Plan Preparation** | **59 days** | **Fri 11/11/22** | **Wed 2/8/23** | | |
| 33 | BGE Internal QA/QC | 2 wks | Mon 2/13/23 | Fri 2/24/23 | | |
| 34 | Address Comments | 1 wk | Mon 2/27/23 | Fri 3/3/23 | 33 | |
| 35 | Plan Production | 4 days | Mon 3/6/23 | Thu 3/9/23 | 34 | |
| 36 | 30% Submittal | 1 day | Fri 3/10/23 | Fri 3/10/23 | 35 | |
| 37 | 30% Collin County Review | 4 wks | Mon 3/13/23 | Mon 4/10/23 | 36 | Collin County |
| 38 | Supplemental Survey | 1 wk | Mon 3/13/23 | Fri 3/17/23 | 37SS | |
| 39 | SUE Investigation | 4 wks | Mon 3/13/23 | Mon 4/10/23 | 37SS | ARS |
| 40 | **60% Plan Preparation** | **97 days** | **Tue 4/11/23** | **Fri 8/25/23** | **37** | |
| 57 | BGE Internal QA/QC | 1.8 wks | Mon 8/28/23 | Fri 9/8/23 | 56 | |
| 58 | Address Comments | 1 wk | Mon 9/11/23 | Fri 9/15/23 | 57 | |
| 59 | Plan Production | 4 days | Mon 9/18/23 | Thu 9/21/23 | 58 | |
| 60 | 60% Submittal | 1 day | Fri 9/22/23 | Fri 9/22/23 | 59 | |
| 61 | 60% Collin County Review | 4 wks | Fri 9/22/23 | Thu 10/19/23 | 60SS | Collin County |
| 62 | Supplemental Survey | 1 wk | Fri 9/22/23 | Thu 9/28/23 | 61SS | |
| 63 | **90% Plan Preparation** | **84 days** | **Fri 10/20/23** | **Wed 2/21/24** | | |



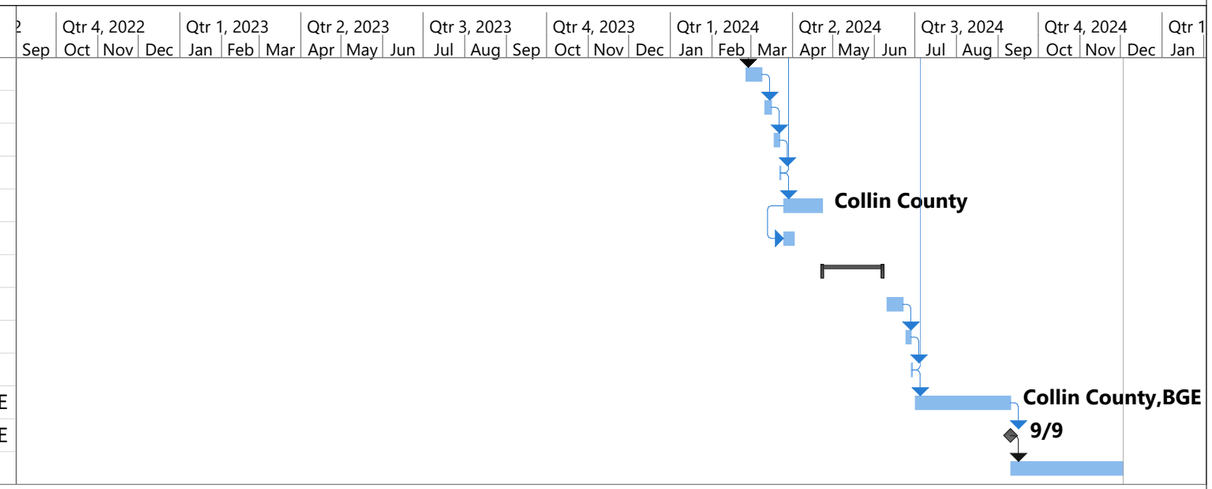

Project: Myrick/Boorman PS&E
County: Collin
Date: Wed 8/24/22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Task | Project Summary | Manual Task | Start-only | Deadline |
| Split | Inactive Task | Duration-only | Finish-only | Progress |
| Milestone | Inactive Milestone | Manual Summary Rollup | External Tasks | Manual Progress |
| Summary | Inactive Summary | Manual Summary | External Milestone | |

Prime Provider: BGE, Inc.

# EXHIBIT B - Work Schedule

| ID | Task Name | Duration | Start | Finish | Predecesso | Resource Names |
|---|---|---|---|---|---|---|
| 81 | BGE Internal QA/QC | 2 wks | Mon 2/26/24 | Fri 3/8/24 | 63 | |
| 82 | Address Comments | 1 wk | Mon 3/11/24 | Fri 3/15/24 | 81 | |
| 83 | Plan Production | 4 days | Mon 3/18/24 | Thu 3/21/24 | 82 | |
| 84 | 90% Submittal | 1 day | Fri 3/22/24 | Fri 3/22/24 | 83 | |
| 85 | 90% Collin County Review | 4 wks | Mon 3/25/24 | Mon 4/22/24 | 84 | Collin County |
| 86 | Supplemental Survey | 1 wk | Mon 3/25/24 | Mon 4/1/24 | 85SS | |
| 87 | **100% Plan Preparation** | **32 days** | **Tue 4/23/24** | **Thu 6/6/24** | | |
| 93 | BGE Internal QA/QC | 2 wks | Mon 6/10/24 | Fri 6/21/24 | | |
| 94 | Plan Production | 4 days | Mon 6/24/24 | Thu 6/27/24 | 93 | |
| 95 | 100% Submittal | 1 day | Fri 6/28/24 | Fri 6/28/24 | 94 | |
| 96 | Plan Processing | 2.5 mons | Mon 7/1/24 | Mon 9/9/24 | 95 | Collin County,BGE |
| 97 | Letting | 0 days | Mon 9/9/24 | Mon 9/9/24 | 96 | Collin County,BGE |
| 98 | Post Letting Support | 12 wks | Tue 9/10/24 | Mon 12/2/24 | 97 | |




Project: Myrick/Boorman PS&E
County: Collin
Date: Wed 8/24/22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Task | Project Summary | Manual Task | Start-only | Deadline |
| Split | Inactive Task | Duration-only | Finish-only | Progress |
| Milestone | Inactive Milestone | Manual Summary Rollup | External Tasks | Manual Progress |
| Summary | Inactive Summary | Manual Summary | External Milestone | |

## EXHIBIT "C"

## PAYMENT SCHEDULE

Invoices will be transmitted to the County along with progress reports on a monthly basis based on a percentage of completion up to that time, and payments to the Engineer will be made as follows:

- A derivation of the total contract fee amount is attached.

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| SUMMARY | | | | |
|---|---|---|---|---|
| | Consultant | | | Total |
| | BGE, Inc. | ARS Engineers, Inc. | Terracon | |
| 1. ASSEMBLY AND REVIEW OF DATA | $ 39,680.00 | | | $ 39,680.00 |
| 2. ROADWAY DESIGN | $ 433,815.00 | | | $ 433,815.00 |
| 3. DRAINAGE DESIGN | $ 273,625.00 | | | $ 273,625.00 |
| 4. TRAFFIC DESIGN | $ 72,150.00 | | | $ 72,150.00 |
| 5. STRUCTURAL DESIGN | $ 147,790.00 | | | $ 147,790.00 |
| 6. PROJECT MANAGEMENT | $ 204,000.00 | | | $ 204,000.00 |
| 7. BID PHASE SERVICES | $ 23,800.00 | | | $ 23,800.00 |
| Basic Services Labor Cost | $ 1,194,860.00 | | | $ 1,194,860.00 |
| Basic Direct Expenses | $ - | | | $ - |
| Basic Subtotal | $ 1,194,860.00 | $ - | $ - | $ 1,194,860.00 |
| SS1. SURVEY | $ 19,000.00 | | | $ 19,000.00 |
| SS2. GEOTECHNICAL SERVICES | $ 3,500.00 | | $ 40,142.85 | $ 43,642.85 |
| DIRECT EXPENSES | | | $ 100,820.92 | |
| Special Services Labor Cost | $ 22,500.00 | | $ 40,142.85 | $ 62,642.85 |
| Special Direct Expenses | $ - | | $100,820.92 | $ 100,820.92 |
| Special Services Subtotal | $ 22,500.00 | $ - | $ 140,963.77 | $ 163,463.77 |
| **Basic and Special Services (Lump Sum) Total** | **$ 1,217,360.00** | **$ -** | **$ 140,963.77** | **$ 1,358,323.77** |
| | | | | |
| IS1. SUBSURFACE UTILITY ENGINEERING (SUE) | $ 11,500.00 | $ 11,291.78 | | $ 22,791.78 |
| DIRECT EXPENSES | $ 33,000.00 | $ 93,584.00 | | |
| IS2. UTILITY COORDINATION | $ 46,100.00 | | | $ 46,100.00 |
| IS3. SURVEY | $ 12,100.00 | | | $ 12,100.00 |
| IS4. TRAFFIC SIGNAL DESIGN | $ 49,960.00 | | | $ 49,960.00 |
| Total Incremental Services Labor Cost | $ 119,660.00 | $ 11,291.78 | | $ 130,951.78 |
| Total Incremental Services Direct Expenses | $ 33,000.00 | $ 93,584.00 | | $ 126,584.00 |
| **Incremental Services (Time and Materials) Subtotal** | **$ 152,660.00** | **$ 104,875.78** | **$ -** | **$ 257,535.78** |
| | | | | |
| **Grand Total** | **$ 1,370,020.00** | **$ 104,875.78** | **$ 140,963.77** | **$ 1,615,859.55** |
| **Percent of Total Fee** | **84.79%** | **6.49%** | **8.72%** | |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. ASSEMBLY AND REVIEW OF DATA** | | | | | | | | | | | |
| Collection of Data, Reports, and Maps | | 4 | | 12 | 16 | 16 | | 8 | **56** | | **$9,720.00** |
| Review of Data | | 4 | 8 | 12 | 40 | 24 | | 24 | **112** | | **$19,160.00** |
| Prepare and Distribute Applications, Letters and Plans | | | 4 | 12 | 12 | | | | **28** | | **$5,400.00** |
| Roadway Design Criteria | | 4 | | 8 | 16 | | | | **28** | | **$5,400.00** |
| **Total Hours** | | 12 | 12 | 44 | 84 | 40 | 0 | 32 | **224** | | |
| **Total Cost** | | $3,000.00 | $2,700.00 | $8,800.00 | $14,700.00 | $6,000.00 | $0.00 | $4,480.00 | | | **$39,680.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2. ROADWAY DESIGN** | | | | | | | | | | | |
| GENERAL | | | | | | | | | | | |
| Typical Sections (Existing and Proposed) | **8** | 2 | | | 8 | 16 | 80 | 40 | **146** | **18.3** | **$19,900.00** |
| Miscellaneous Sheets | | | | | | | | | | | |
| Title Sheet | **1** | 1 | | | 1 | | | 2 | **4** | **4.0** | **$705.00** |
| Index of Sheets | **1** | 1 | | | 4 | | | 9 | **14** | **14.0** | **$2,210.00** |
| Project Layout Sheets | **2** | 1 | | | 4 | 24 | 8 | 8 | **45** | **22.5** | **$6,670.00** |
| Survey Control Data Sheets | **3** | 1 | | | | | | 4 | **5** | **1.7** | **$810.00** |
| General Notes | **10** | | | | | | | 5 | **5** | **0.5** | **$700.00** |
| Estimate & Quantity Summary Sheet | **2** | | | | | | | 16 | **16** | **8.0** | **$2,240.00** |
| Summary of Quantities Sheet | **5** | | | | | | | 32 | **32** | **6.4** | **$4,480.00** |
| TRAFFIC CONTROL PLAN | | | | | | | | | | | |
| Traffic Control Advance Warning Layout | **2** | 1 | | | 8 | 16 | 24 | 4 | **53** | **26.5** | **$7,610.00** |
| Traffic Control Typical Sections | **8** | 1 | | | 2 | 8 | 10 | 4 | **25** | **3.1** | **$3,610.00** |
| Sequence of Construction, Narrative, and General Notes | **2** | 4 | | | 16 | 40 | | 4 | **64** | **32.0** | **$10,360.00** |
| Traffic Control Layouts | **25** | 8 | | | 40 | 100 | 140 | 60 | **348** | **13.9** | **$49,900.00** |
| Intersection Staging Plans | **3** | 1 | | | 2 | 12 | 16 | 4 | **35** | **11.7** | **$4,960.00** |
| Driveway Staging Plans | **1** | 1 | | | 2 | 12 | 16 | 4 | **35** | **35.0** | **$4,960.00** |
| Traffic Control Standard Details | **N/A** | 4 | | | 8 | | | 8 | **20** | **N/A** | **$3,520.00** |
| ROADWAY DESIGN | | | | | | | | | | | |
| Horizontal Alignment Data Sheet | **2** | 1 | | | 2 | 8 | 16 | 4 | **31** | **15.5** | **$4,360.00** |
| Removal Sheets | **7** | 2 | | | 8 | 32 | 60 | 16 | **118** | **16.9** | **$16,440.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Plan and Profile Sheets (1"=100' Scale) | | | | | | | | | | | |
| Myrick Lane and Boorman Lane | **14** | 8 | | | 80 | 160 | 240 | 80 | **568** | **40.6** | **$81,200.00** |
| Dove Hill Trail/CR 452 | **1** | 1 | | | 2 | 12 | 24 | 4 | **43** | **43.0** | **$5,960.00** |
| Intersection Layout Sheets (1"=40' Scale) | **1** | 1 | | | 4 | 8 | 20 | 8 | **41** | **41.0** | **$5,770.00** |
| Driveway Profiles / Details Summary (up to 15 driveways) | **2** | 1 | | | 4 | 16 | 40 | 8 | **69** | **34.5** | **$9,470.00** |
| Miscellaneous Roadway Details | **1** | 1 | | | 8 | 12 | 8 | 2 | **31** | **31.0** | **$4,730.00** |
| Roadway Cross Sections (100' intervals) | **58** | 8 | | | 32 | 180 | 400 | 40 | **660** | **11.4** | **$90,200.00** |
| Assembly of Roadway Standards | **N/A** | 4 | | | 16 | | | 8 | **28** | **N/A** | **$4,920.00** |
| PS&E Package Coordination | | | | | | | | | | | |
| Plan assembly with sheet numbers & printing | **167** | 4 | | | 30 | | | 60 | **94** | **0.6** | **$14,650.00** |
| TCP Quantities | | 2 | | | 8 | 16 | 24 | 4 | **54** | | **$7,860.00** |
| Earthwork Quantities | | 2 | | | 8 | 24 | 80 | 8 | **122** | | **$16,620.00** |
| Roadway Quantities | | 2 | | | 8 | 40 | 60 | | **110** | | **$15,400.00** |
| QUALITY CONTROL (ROADWAY) | | | | | | | | | | | |
| QAQC will be performed prior to each submittal | | 16 | 96 | 40 | | | | | **152** | | **$33,600.00** |
| | | | | | | | | | | | |
| **2. ROADWAY DESIGN Total Hours** | | 79 | 96 | 40 | 305 | 736 | 1266 | 446 | **2968** | | |
| **2. ROADWAY DESIGN Total Cost** | | $19,750.00 | $21,600.00 | $8,000.00 | $53,375.00 | $110,400.00 | $158,250.00 | $62,440.00 | | | **$433,815.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **3. DRAINAGE DESIGN** | | | | | | | | | | | |
| HYDROLOGY | | | | | | | | | | | |
| Offsite drainage area map (1"=2000' Scale) | **5** | 1 | | 2 | 20 | | 40 | | **63** | **12.6** | **$9,150.00** |
| Storm sewer inlet area maps (1"=500' Scale) | **12** | 1 | | 2 | 30 | | 60 | | **93** | **7.8** | **$13,400.00** |
| HYDRAULICS | | | | | | | | | | | |
| Hydraulic Design for Culverts & Storm Sewer | | | | | | | | | | | |
| Hydraulic Design for five (5) Culverts | **5** | 2 | | 6 | 24 | | 100 | | **132** | **26.4** | **$18,400.00** |
| Hydraulic Design for Storm Sewer | **12** | 2 | | 5 | 24 | | 240 | | **271** | **22.6** | **$35,700.00** |
| DRAINAGE STRUCTURE DESIGN | | | | | | | | | | | |
| Culvert Layout (1"=20' Scale) | **5** | 2 | | 10 | 24 | | 50 | 80 | **166** | **33.2** | **$24,150.00** |
| Storm Sewer Plan & Profile Sheets (1"=100' Scale) | **12** | 6 | | 16 | 24 | | 40 | 60 | **146** | **12.2** | **$22,300.00** |
| Miscellaneous Drainage Details | **8** | 2 | | 10 | 12 | | 30 | 40 | **94** | **11.8** | **$13,950.00** |
| Assembly of Drainage Standards | **6** | 1 | | 2 | 10 | | 15 | 30 | **58** | **9.7** | **$8,475.00** |
| OPEN CHANNEL DESIGN | | | | | | | | | | | |
| East Fork Trinity River Tributary 1 Layout Sheets (1"=50') | **5** | 2 | | 5 | 15 | | 20 | 30 | **72** | **14.4** | **$10,825.00** |
| HYDRAULIC REPORT | | | | | | | | | | | |
| Update Hydraulic Report | | 2 | | 4 | 20 | | 40 | | **66** | | **$9,800.00** |
| Scour Analysis | | 1 | | 2 | 10 | | 20 | | **33** | | **$4,900.00** |
| STORM WATER POLLUTION PREVENTION PLAN (SW3P) | | | | | | | | | | | |
| SW3P Data Sheet | **12** | 6 | | 12 | 20 | | 40 | 20 | **98** | **8.2** | **$15,200.00** |
| SW3P Layouts (1"=100' Scale) (each phase) | **12** | 6 | | 12 | 20 | | 40 | 20 | **98** | **8.2** | **$15,200.00** |
| Temporary Drainage | **4** | 2 | | 5 | 15 | | 20 | 10 | **52** | **13.0** | **$8,025.00** |
| PS&E Package Coordination | | | | | | | | | | | |
| Plan assembly with sheet numbers & printing | **95** | 3 | | | 20 | | | 40 | **63** | **0.7** | **$9,850.00** |
| SW3P Quantities | | 2 | | | 6 | | 20 | | **28** | | **$4,050.00** |
| Culvert Quantities | | 2 | | | 6 | | 16 | | **24** | | **$3,550.00** |
| Storm Sewer Quantities | | 2 | | | 8 | | 24 | | **34** | | **$4,900.00** |
| QUALITY CONTROL (DRAINAGE) | | | | | | | | | | | |
| QAQC will be performed prior to each submittal | **1** | 20 | 128 | 40 | | | | | **188** | **188.0** | **$41,800.00** |
| | | | | | | | | | | | |
| **3. DRAINAGE DESIGN Total Hours** | | 65 | 128 | 133 | 308 | 0 | 815 | 330 | **1779** | | |
| **3. DRAINAGE DESIGN Total Cost** | | $16,250.00 | $28,800.00 | $26,600.00 | $53,900.00 | $0.00 | $101,875.00 | $46,200.00 | | | **$273,625.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager | QA/QC Manager | Senior Engineer | Project Engineer | Design Engineer | Engineer-in-Training | CADD Operator | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $250.00 | $225.00 | $200.00 | $175.00 | $150.00 | $125.00 | $140.00 | | | |
| **4. TRAFFIC DESIGN** | | | | | | | | | | | |
| SIGNING AND PAVEMENT MARKINGS | | | | | | | | | | | |
| Signing and Pavement Marking Layout (1"=200' Scale) | **11** | 8 | | | 40 | | 80 | 8 | **136** | **12.4** | **$20,120.00** |
| Assembly of Sign and Marking Standards | **8** | 2 | | | 4 | | 8 | 2 | **16** | **2.0** | **$2,480.00** |
| ILLUMINATION | | | | | | | | | | | |
| Design Safety Lighting (at 3 Intersections) | **3** | 4 | | | 16 | | 20 | 2 | **42** | **14.0** | **$6,580.00** |
| Design Continuous Lighting | | 6 | | | 30 | | 60 | 8 | **104** | | **$15,370.00** |
| Assembly of Illumination Standards | | | | | 4 | | 8 | 2 | **14** | | **$1,980.00** |
| TRAFFIC SIGNALS | | | | | | | | | | | |
| Perform Warrant Studies (at 2 intersections) | | 1 | | | 4 | | 12 | | **17** | | **$2,450.00** |
| PS&E Package Coordination | | | | | | | | | | | |
| Plan assembly with sheet numbers & printing | **19** | 2 | | | 4 | | | 8 | **14** | **0.7** | **$2,320.00** |
| Traffic Quantities | | 2 | | | 6 | | 12 | | **20** | | **$3,050.00** |
| QUALITY CONTROL (TRAFFIC) | | | | | | | | | | | |
| QAQC will be performed prior to each submittal | | 12 | 48 | 20 | | | | | **80** | | **$17,800.00** |
| | | | | | | | | | | | |
| **4. TRAFFIC DESIGN Total Hours** | | 37 | 48 | 20 | 108 | 0 | 200 | 30 | **443** | | |
| **4. TRAFFIC DESIGN Total Cost** | | $9,250.00 | $10,800.00 | $4,000.00 | $18,900.00 | $0.00 | $25,000.00 | $4,200.00 | | | **$72,150.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **5. STRUCTURE DESIGN** | | | | | | | | | | | |
| EAST FORK TRINITY RIVER TRIBUTARY 1 | | | | | | | | | | | |
| Bridge Layouts (1"=40' Scale) | **2** | | | 10 | | 10 | 30 | 40 | **90** | **45.0** | **$12,850.00** |
| Bridge Typical Sections | **2** | | | | | 10 | 30 | 40 | **80** | **40.0** | **$10,850.00** |
| Prepare Foundation Plans | **2** | | | | | 10 | 30 | 40 | **80** | **40.0** | **$10,850.00** |
| Prepare Framing Plan | **2** | | | | | 10 | 40 | 50 | **100** | **50.0** | **$13,500.00** |
| Prepare Slab Plan | **2** | | | | | 10 | 40 | 50 | **100** | **50.0** | **$13,500.00** |
| Prepare Abutment Details | **4** | | | | | 10 | 40 | 50 | **100** | **25.0** | **$13,500.00** |
| Prepare Beam Design Sheet (IGND) | | | | | | 20 | 30 | 10 | **60** | | **$8,150.00** |
| PS&E Package Coordination | | | | | | | | | | | |
| Plan assembly with sheet numbers & printing | **14** | 1 | | | 4 | | | 6 | **11** | **0.8** | **$1,790.00** |
| Bridge Quantities | | | | | | 12 | 40 | | **52** | | **$6,800.00** |
| QUALITY CONTROL (BRIDGE) | | | | | | | | | | | |
| QAQC will be performed prior to each submittal | | 16 | 160 | 80 | | | | | **256** | | **$56,000.00** |
| | | | | | | | | | | | |
| **5. STRUCTURE DESIGN Total Hours** | | 17 | 160 | 90 | 4 | 92 | 280 | 286 | **929** | | |
| **5. STRUCTURE DESIGN Total Cost** | | $4,250.00 | $36,000.00 | $18,000.00 | $700.00 | $13,800.00 | $35,000.00 | $40,040.00 | | | **$147,790.00** |

**Myrick Lane and Boorman Lane**
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**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **6. PROJECT MANAGEMENT** | | | | | | | | | | | |
| Project Coordination and Resolution Meetings | | | | | | | | | | | |
| Design Kickoff Meeting | **N/A** | 8 | | | 16 | 16 | | | **40** | **N/A** | **$7,200.00** |
| 30% Design Status and Coordination Meeting | **N/A** | 4 | | | 14 | 16 | | | **34** | **N/A** | **$5,850.00** |
| 60% Comment Review Resolution Meeting | **N/A** | 4 | | | 12 | 16 | | | **32** | **N/A** | **$5,500.00** |
| 95% Comment Review Resolution Meeting | **N/A** | 4 | | | 10 | 16 | | | **30** | **N/A** | **$5,150.00** |
| Stakeholder Coordination Meetings (assume 18 meetings) | **N/A** | 36 | | | 72 | | | | **108** | **N/A** | **$21,600.00** |
| PS&E Package Coordination | | | | | | | | | | | |
| Coordination with subconsultants for deliverables | | 16 | | | 40 | | | 40 | **96** | | **$16,600.00** |
| Develop Cost Estimate at each submittal | | 16 | | | 48 | | | | **64** | | **$12,400.00** |
| Develop Project Quality Management Plan (PQMP) | | 8 | 8 | | | | | | **16** | | **$3,800.00** |
| Project Administration (Assume 18 months) | | 72 | | | 72 | | | | **144** | | **$30,600.00** |
| Stakeholder Coordination (additional coordination outside of meetings) | | 72 | | | 72 | | | | **144** | | **$30,600.00** |
| Bid Preparation | | | | | | | | | | | |
| Construction time line | | | | | 24 | | | | **24** | | **$4,200.00** |
| Bidding Documents | | 20 | 20 | 60 | | | | | **100** | | **$21,500.00** |
| Governing Specifications | | 20 | 20 | 80 | | | | | **120** | | **$25,500.00** |
| Invoicing (Assume 18 months) | | 54 | | | | | | | **54** | | **$13,500.00** |
| | | | | | | | | | | | |
| **6. PROJECT MANAGEMENT Total Hours** | | 334 | 48 | 140 | 380 | 64 | 0 | 40 | **1006** | | |
| **6. PROJECT MANAGEMENT Total Cost** | | $83,500.00 | $10,800.00 | $28,000.00 | $66,500.00 | $9,600.00 | $0.00 | $5,600.00 | | | **$204,000.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **7. BID PHASE SERVICES** | | | | | | | | | | | |
| Bid Package preparation | | 8 | | | 16 | | | | **24** | | **$4,800.00** |
| Prebid Conference | | 8 | | | 16 | | | | **24** | | **$4,800.00** |
| Bid Document Interpretations and Addenda | | 12 | | | 12 | | 24 | 10 | **58** | | **$9,500.00** |
| Bid Opening and Tabulation | | 4 | | | 8 | | 16 | | **28** | | **$4,400.00** |
| Recommendation of Contract Award | | 4 | | | 4 | | | | **8** | | **$1,700.00** |
| Issue Construction Contract Documents | | 8 | | | 8 | | | | **16** | | **$3,400.00** |
| | | | | | | | | | | | |
| **7. BID PHASE SERVICES Total Hours** | | 36 | 0 | 0 | 48 | 0 | 40 | 10 | **134** | | |
| **7. BID PHASE SERVICES Total Cost** | | $9,000.00 | $0.00 | $0.00 | $8,400.00 | $0.00 | $5,000.00 | $1,400.00 | | | **$23,800.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SS2. GEOTECHNICAL SERVICES** | | | | | | | | | | | |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
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**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Investigation | | | | | | | | | | | |
| Coordination of Field Investigation Activities | | 4 | | | | | | | **4** | | **$1,000.00** |
| Laboratory Investigation | | | | | | | | | | | |
| Review of Laboratory Investigation Activites | | 2 | | | | | | | **2** | | **$500.00** |
| Engineering Analysis | | | | | | | | | | | |
| Review and Coordination of Geotechnical Report | | 8 | | | | | | | **8** | | **$2,000.00** |
| | | | | | | | | | | | |
| **SS2. GEOTECHNICAL SERVICES Total Hours** | | 14 | 0 | 0 | 0 | 0 | 0 | 0 | **14** | | |
| **SS2. GEOTECHNICAL SERVICES Total Cost** | | $3,500.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | | | **$3,500.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **IS2. UTILITY COORDINATION** | | | | | | | | | | | |
| Utility Coordination | | | | | | | | | | | |
| Assist in planning/coordinating | | | | | 24 | | 112 | | **136** | | **$18,200.00** |
| Develop and maintain Utility Conflict Matrix | | | | | 12 | | 24 | | **36** | | **$5,100.00** |
| Attend 10 utility coordination meetings | | | | | 10 | | 10 | | **20** | | **$3,000.00** |
| Provide status updates on design progress schedule and relocation need. Develop design exhibits as needed. | | | | | 24 | | 96 | | **120** | | **$16,200.00** |
| Perform up to three (3) field visits | | | | | 12 | | 12 | | **24** | | **$3,600.00** |
| | | | | | | | | | | | |
| **IS2. UTILITY COORDINATION Total Hours** | | 0 | 0 | 0 | 82 | 0 | 254 | 0 | **336** | | |
| **IS2. UTILITY COORDINATION Total Cost** | | $0.00 | $0.00 | $0.00 | $14,350.00 | $0.00 | $31,750.00 | $0.00 | | | **$46,100.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager $250.00 | QA/QC Manager $225.00 | Senior Engineer $200.00 | Project Engineer $175.00 | Design Engineer $150.00 | Engineer-in-Training $125.00 | CADD Operator $140.00 | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **IS4. TRAFFIC SIGNAL DESIGN** | | | | | | | | | | | |
| TRAFFIC SIGNAL DESIGN | | | | | | | | | | | |
| Traffic Signal Layout | | 4 | | | 30 | | 60 | 2 | **96** | | **$14,030.00** |
| Traffic Signal Details | | 4 | | | 30 | | 60 | 2 | **96** | | **$14,030.00** |
| Assembly of Traffic Signal Standards | | 2 | | | 4 | | 8 | 2 | **16** | | **$2,480.00** |
| PS&E Package Coordination | | | | | | | | | | | |
| Plan assembly with sheet numbers & printing | | 2 | | | 4 | | 4 | 8 | **18** | | **$2,820.00** |
| Traffic Quantities | | 2 | | | 8 | | 20 | | **30** | | **$4,400.00** |
| General Notes | | 2 | | | 4 | | | | **6** | | **$1,200.00** |
| QUALITY CONTROL (TRAFFIC) | | | | | | | | | | | |
| QAQC will be performed prior to each submittal | | 12 | 20 | | 20 | | | | **52** | | **$11,000.00** |
| | | | | | | | | | | | |
| **IS4. TRAFFIC SIGNAL DESIGN Total Hours** | | 28 | 20 | 0 | 100 | 0 | 152 | 14 | **314** | | |
| **IS4. TRAFFIC SIGNAL DESIGN Total Cost** | | $7,000.00 | $4,500.00 | $0.00 | $17,500.00 | $0.00 | $19,000.00 | $1,960.00 | | | **$49,960.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Hours** | | 622 | 512 | 467 | 1419 | 932 | 3007 | 1188 | **8147** | | |
| **Total Costs** | | $155,500.00 | $115,200.00 | $93,400.00 | $248,325.00 | $139,800.00 | $375,875.00 | $166,320.00 | | | **$1,294,420.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager | QA/QC Manager | Senior Engineer | Project Engineer | Design Engineer | Engineer-in-Training | CADD Operator | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $250.00 | $225.00 | $200.00 | $175.00 | $150.00 | $125.00 | $140.00 | | | |
| **BASIC DIRECT EXPENSES** | | | | | | | | | | | |

| | | Unit | Rate | Quantity | Totals |
|---|---|---|---|---|---|
| 8.5" x 11" Copies (b&w) | | EA | $0.10 | | $0.00 |
| 11" x 17" Copies (b&w) | | EA | $0.20 | | $0.00 |
| 11"x17" Copies (color) | | EA | $1.25 | | $0.00 |
| COLOR Roll Plots | | SF | $3.20 | | $0.00 |
| Binding | | EA | $20.00 | | $0.00 |
| USB Thumb Drive | | EA | $15.00 | | $0.00 |
| Postage ( express mail) | | EA | $2.00 | | $0.00 |
| Car Mileage | | MI | $0.58 | | $0.00 |
| Miscellaneous Supplies (w/approval from County PM) | | EA | $100.00 | | $0.00 |
| Toll Charges (each) | | EA | $5.00 | | $0.00 |
| | | | | | $0.00 |
| | | | | | $0.00 |
| | | | | | $0.00 |
| | | | | | |
| **TOTAL BASIC DIRECT EXPENSES** | | | | | **$0.00** |

| Summary | |
|---|---|
| 1. ASSEMBLY AND REVIEW OF DATA | $39,680.00 |
| 2. ROADWAY DESIGN | $433,815.00 |
| 3. DRAINAGE DESIGN | $273,625.00 |
| 4. TRAFFIC DESIGN | $72,150.00 |
| 5. STRUCTURAL DESIGN | $147,790.00 |
| 6. PROJECT MANAGEMENT | $204,000.00 |
| 7. BID PHASE SERVICES | $23,800.00 |
| **Basic Labor Costs** | **$1,194,860.00** |
| **Basic Direct Expenses Costs** | **$0.00** |
| **Basic Total Costs** | **$1,194,860.00** |
| SS2. GEOTECHNICAL SERVICES | $3,500.00 |
| **Special Services Labor Costs** | **$3,500.00** |
| **Special Services Expenses Costs** | **$0.00** |
| **Special Services Total Costs** | **$3,500.00** |
| IS2. UTILITY COORDINATION | $46,100.00 |
| IS4. TRAFFIC SIGNAL DESIGN | $49,960.00 |
| **Incremental Services Labor Costs** | **$96,060.00** |
| **Incremental Services Expenses Costs** | **$0.00** |
| **Incremental Services Total Costs** | **$96,060.00** |
| **BGE, Inc - Total** | **$1,294,420.00** |
| | |
| | |
| **BGE, Inc - Total** | **$1,294,420.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager | QA/QC Manager | RPLS | Survey Tech | Records Research | Survey Crew (2 man) | CADD Operator | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $250.00 | $225.00 | $200.00 | $175.00 | $150.00 | $125.00 | $140.00 | | | |
| **SS1. SURVEY** | | | | | | | | | | | |
| Field surveying | | | | | | | | | | | |
| Provide detailed topographic survey in areas where development has changed | **N/A** | | | 5 | | | 44 | | **49** | **N/A** | **$6,500.00** |
| Provide data for bore holes and power line sags | **N/A** | | | 1 | | | 16 | | **17** | **N/A** | **$2,200.00** |
| Provide 2D topographic data | **N/A** | | | 2 | 12 | | | | **14** | **N/A** | **$2,500.00** |
| Provide 3D Digital Terrain Model (DTM) | **N/A** | | | 4 | 40 | | | | **44** | **N/A** | **$7,800.00** |
| | | | | | | | | | | | |
| **SS1. SURVEY Total Hours** | | 0 | 0 | 12 | 52 | 0 | 60 | 0 | **124** | | |
| **SS1. SURVEY Total Cost** | | $0.00 | $0.00 | $2,400.00 | $9,100.00 | $0.00 | $7,500.00 | $0.00 | | | **$19,000.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **IS3. SURVEY** | | | | | | | | | | | |
| Field surveying | | | | | | | | | | | |
| Provide detailed topographic survey in areas where development has changed | **N/A** | | | | | | 32 | | **32** | **N/A** | **$4,000.00** |
| Provide data for bore holes and power line sags | **N/A** | | | | | | | | **0** | **N/A** | **$0.00** |
| Provide 2D topographic data | **N/A** | | | 3 | 9 | | | | **12** | **N/A** | **$2,175.00** |
| Provide 3D Digital Terrain Model (DTM) | **N/A** | | | 6 | 27 | | | | **33** | **N/A** | **$5,925.00** |
| | | | | | | | | | | | |
| **IS3. SURVEY Total Hours** | | 0 | 0 | 9 | 36 | 0 | 32 | 0 | **77** | | |
| **IS3. SURVEY Total Cost** | | $0.00 | $0.00 | $1,800.00 | $6,300.00 | $0.00 | $4,000.00 | $0.00 | | | **$12,100.00** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Hours** | | 0 | 0 | 21 | 88 | 0 | 92 | 0 | **201** | | |
| **Total Costs** | | $0.00 | $0.00 | $4,200.00 | $15,400.00 | $0.00 | $11,500.00 | $0.00 | | | **$31,100.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager | QA/QC Manager | RPLS | Survey Tech | Records Research | Survey Crew (2 man) | CADD Operator | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $250.00 | $225.00 | $200.00 | $175.00 | $150.00 | $125.00 | $140.00 | | | |
| **SPECIAL SERVICES EXPENSES** | | | | | | | | | | | |
| | | **Unit** | **Rate** | **Quantity** | **Totals** | | | | | | |
| Utility Vehicle UTV | | DAY | $125.00 | | $0.00 | | | | | | |
| GPS Unit | | HOURS | $25.00 | | $0.00 | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **TOTAL SPECIAL SERVICES EXPENSES** | | | | | **$0.00** | | | | | | |
| **INCREMENTAL SERVICES EXPENSES** | | | | | | | | | | | |
| | | **Unit** | **Rate** | **Quantity** | **Totals** | | | | | | |
| Utility Vehicle UTV | | DAY | $125.00 | | $0.00 | | | | | | |
| GPS Unit | | HOURS | $25.00 | | $0.00 | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **TOTAL INCREMENTAL SERVICES EXPENSES** | | | | | **$0.00** | | | | | | |

| Summary | |
|---|---|
| SS1. SURVEY | $19,000.00 |
| **Special Services Labor Costs** | **$19,000.00** |
| **Special Services Expenses Costs** | **$0.00** |
| **Special Services Total Costs** | **$19,000.00** |
| IS3. SURVEY | $12,100.00 |
| **Incremental Services Labor Costs** | **$12,100.00** |
| **Incremental Services Expenses Costs** | **$0.00** |
| **Incremental Services Total Costs** | **$12,100.00** |
| **BGE, Inc - Total** | **$31,100.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Project Manager | QA/QC Manager | Senior Engineer | Project Engineer | Design Engineer | Engineer-in-Training | CADD Operator | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $250.00 | $225.00 | $200.00 | $175.00 | $150.00 | $125.00 | $140.00 | | | |
| **IS1. SUBSURFACE UTILITY ENGINEERING (SUE)** | | | | | | | | | | | |
| Quality Level B (QL B) Services | | | | | | | | | | | |
| Project Coordination and Management | | 10 | | | | | | | **10** | **#DIV/0!** | **$2,500.00** |
| Data Processing | | | | | | | | | | | |
| QA/QC | | | 10 | | | | | | **10** | **#DIV/0!** | **$2,250.00** |
| Quality Level C/D Services (In addition to Level B services) | | | | | 10 | | 40 | | **50** | **#DIV/0!** | **$6,750.00** |
| | | | | | | | | | | | |
| **IS1. SUBSURFACE UTILITY ENGINEERING (SUE) Total Hours** | | 10 | 10 | 0 | 10 | 0 | 40 | 0 | **70** | | |
| **IS1. SUBSURFACE UTILITY ENGINEERING (SUE) Total Cost** | | $2,500.00 | $2,250.00 | $0.00 | $1,750.00 | $0.00 | $5,000.00 | $0.00 | | | **$11,500.00** |

| BASIC DIRECT EXPENSES | | | | | |
|---|---|---|---|---|---|
| | | **Unit** | **Rate** | **Quantity** | **Totals** |
| SUE Quality Level B (Includes labor and equipment for field designating, engineering, surveying, CADD, and limited Traffic Control.) | | LF | $1.65 | 20000 | $33,000.00 |
| | | | | | |
| | | | | | |
| **TOTAL BASIC DIRECT EXPENSES** | | | | | **$33,000.00** |

| Summary | |
|---|---|
| IS1. SUBSURFACE UTILITY ENGINEERING (SUE) | $11,500.00 |
| **Incremental Services Labor Costs** | **$11,500.00** |
| **Incremental Services Expenses Costs** | **$33,000.00** |
| **Incremental Services Total Costs** | **$44,500.00** |
| **BGE, Inc - Total** | **$44,500.00** |

**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.** **Sub-Consultant: ARS Engineers, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| Task Description | No. of Sheets | Utilities (Project Manager) | Project Engineer | Design Engineer | Engineer-In-Training | Sr. CAD Operator | Utilities Coordinator | Admin/ Clerical | Total Labor Hours | Hours / Sheet | Total Labor Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $186.74 | $159.61 | $142.65 | $91.68 | $103.74 | $149.62 | $72.62 | | | |
| **IS1. SUBSURFACE UTILITY ENGINEERING (SUE)** | | | | | | | | | | | |
| Utility Quality Levels | | | | | | | | | | | |
| Project Management, Coordination, & QA/QC | **N/A** | 16 | 6 | | | 16 | | 6 | **44** | **N/A** | **$6,041.06** |
| Digtess Ticket Preparation & Coordination w/ Utility Site Rep's | **N/A** | | | | | | 24 | | **24** | **N/A** | **$3,590.88** |
| Subsurface Utility Locate (Test Hole) Service (Quality Level A) | | | | | | | | | | | |
| Develop SUE Level A Test Hole Data Sheets | **N/A** | | | | | 16 | | | **16** | **N/A** | **$1,659.84** |
| **IS1. SUBSURFACE UTILITY ENGINEERING (SUE) Total Hours** | | 16 | 6 | 0 | 0 | 32 | 24 | 6 | **84** | | |
| **IS1. SUBSURFACE UTILITY ENGINEERING (SUE) Total Cost** | | $2,987.84 | $957.66 | $0.00 | $0.00 | $3,319.68 | $3,590.88 | $435.72 | | | **$11,291.78** |

| BASIC DIRECT EXPENSES | | | | | |
|---|---|---|---|---|---|
| | | **Unit** | **Rate** | **Quantity** | **Totals** |
| Mileage | | EA | $0.56 | 500 | $280.00 |
| Photocopies B/W (8.5"x11") | | EA | $0.10 | 100 | $10.00 |
| Photocopies B/W (11"X17") | | EA | $0.20 | 100 | $20.00 |
| SUE Mobilization/Demobilization (Compensation for 5 mobilizations. Vacuum excavation truck (non-local)) | | MILE | $5.10 | 70 | $357.00 |
| SUE Quality Level C (To be completed by BGE) | | LF | $0.70 | 0 | $0.00 |
| SUE Quality Level B (Includes labor and equipment for field designating, engineering, surveying, CADD, and limited Traffic Control.) | | LF | $1.80 | 4000 | $7,200.00 |
| SUE (QL A - Utility Locate, Test Holes) (Includes labor and equipment for field location, vacuum excavation, engineering, surveying, CADD, and limited Traffic Control.) | | | | | |
| Level A: 0 to 4 ft | | EA | $1,200.00 | 15 | $18,000.00 |
| Level A: 4 to 8 ft | | EA | $1,500.00 | 15 | $22,500.00 |
| Level A: 8 to 12 ft | | EA | $1,900.00 | 5 | $9,500.00 |
| Level A: 13 to 18 ft | | EA | $2,400.00 | 5 | $12,000.00 |
| 2-Man Designating Crew | | HR | $186.95 | 60 | $11,217.00 |
| Traffic Control | | EA | $2,500.00 | 5 | $12,500.00 |
| | | | | | |
| **TOTAL BASIC DIRECT EXPENSES** | | | | | **$93,584.00** |

| Summary | |
|---|---|
| IS1. SUBSURFACE UTILITY ENGINEERING (SUE) | $11,291.78 |
| **Incremental Services Labor Costs** | **$11,291.78** |
| **Incremental Services Expenses Costs** | **$93,584.00** |
| **Incremental Services Total Costs** | **$104,875.78** |
| **ARS Engineers, Inc - Total** | **$104,875.78** |

**FIRM: Terracon Consultants, Inc.** **Myrick Lane and Boorman Lane, Collin County**

| TASK DESCRIPTION | PROJECT MANAGER | SENIOR ENGINEER | PROJECT ENGINEER | DESIGN ENGINEER | ENGINEER IN TRAINING | ADMIN / CLERICAL | TOTAL LABOR HRS. & COSTS | NO OF DWGS | LABOR HRS PER SHEET |
|---|---|---|---|---|---|---|---|---|---|
| **SS2. GEOTECHNICAL SERVICES** | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| **Data Collection and Field Reconnaissance.** | | | | | | | | | |
| **Design Criteria** | | | | | | | | | |
| **Preliminary Cost Estimates** | | | | | | | | | |
| **Design Concept Conference** | | | | | | | | | |
| **Geotechnical Borings and Investigations** | | | | | | | | | |
| Collection of Existing Data and Training Requirements | | | | | | | | | |
| Obtaining Permits | 2 | | 4 | | 6 | | 12 | | |
| Borehole Layout, Traffic Control Plan, Stake Borings and Utility Clearance | 2 | | 4 | | 8 | | 14 | | |
| Drilling Coordination and Logging | | | | | 84 | | 84 | | |
| Meetings/Communications/Project Management | 4 | | 6 | | 8 | | 18 | | |
| Review Samples, Field Logs & Assign Laboratory Testing | 2 | | 6 | | | | 8 | | |
| Boring Logs Preparation | | | | | 8 | | 8 | | |
| Review of Wincore Logs | 2 | | 4 | | | | 6 | | |
| Foundation Recommendations for Bridge | 2 | | 4 | | | | 6 | | |
| LPILE Parameters for Bridge | 2 | | 4 | | | | 6 | | |
| Settlements Analysis | 4 | | 8 | | | | 12 | | |
| Global Stability Analysis for Retaining Walls Associated with the Culvert Boxes | 4 | | 10 | | | | 14 | | |
| External Stability Analysis | 4 | | 8 | | | | 12 | | |
| Drainage Requirements | | | 2 | | | | 2 | | |
| Pavement - PVR Calculations | | | | | | | | | |
| Pavement - Depth of Coverage Recommendations | | | | | | | | | |
| Pavement - Flexible and Rigid Sections Recommendations | | | | | | | | | |
| Preparation of Draft Geotechnical Report | 16 | | 40 | | | 8 | 64 | | |
| Preparation of Final Geotechnical Report | 6 | | 8 | | | 4 | 18 | | |
| **Transfer of remaining labor from FM 546 / CR 400 Phase I Corridor Study** | | | | | | | $11,940.25 | | |
| | | | | | | | | | |
| HOURS SUB-TOTALS | 50 | 0 | 108 | 0 | 114 | 12 | 284 | | |
| CONTRACT RATE PER HOUR | $222.10 | | $150.73 | | | $68.23 | | | |
| TOTAL LABOR COSTS | $11,105.00 | $0.00 | $16,278.84 | $0.00 | $0.00 | $818.76 | $40,142.85 | | |
| % DISTRIBUTION OF STAFFING | 17.6% | 0.0% | 38.0% | 0.0% | 40.1% | 4.2% | | | |
| | | | | | | | | | |
| **SUBTOTAL LABOR** | | | | | | | **$40,142.85** | | |

EXHIBIT C - Fee Schedule

Method of Payment: Lump Sum with exception of Incremental Services

| FIELD AND LABORATORY | UNIT | RATE | QUANTITY | TOTAL |
|---|---|---|---|---|
| Direct Expenses | | | | |
| Mileage | mile | $0.580 | 360 | $208.80 |
| Mobilization of Drilling Rig | per mile | $4.50 | 360 | $1,620.00 |
| Tree Clearing and Mulching at the Site | day | $4,000.00 | 15 | $60,000.00 |
| Unit Costs | | | | |
| Standard Penetration Test (SPT) | LF | $30.00 | 30 | $900.00 |
| Unconfined Compressive Strength (Soil) | each | $60.00 | 42 | $2,520.00 |
| Unconfined Compressive Strength (Rock) | each | $70.00 | 12 | $840.00 |
| Soil Boring/Rock Coring with TCP ( < 60 ft.) | LF | $36.00 | 320 | $11,520.00 |
| Soil Boring/Rock Coring with TCP ( > 60 ft.) | LF | $40.00 | 20 | $800.00 |
| Daily Rig Mobilization/Demob Charges | day | $150.00 | 6 | $900.00 |
| Consolidation Test | each | $500.00 | 2 | $1,000.00 |
| Determining Moisture Content in Soil Materials | Each | $11.50 | 42 | $483.00 |
| Determining Liquid Limits of Soils | Each | $36.00 | 32 | $1,152.00 |
| Determining Plastic Limit of Soils | Each | $36.00 | 32 | $1,152.00 |
| Calculating the Plasticity Index of Soils | Each | $15.00 | 32 | $480.00 |
| Particle Size Analysis (Retained +40) | Each | $65.00 | 12 | $780.00 |
| Hydrometer Analyses | Hour | $114.22 | 10 | $1,142.20 |
| Consolidated Undrained (CU) Triaxial Compression Test for Undisturbed Soils- Single Stage | Each | $780.00 | | |
| Texas Cone Penetration | Each | $35.00 | | |
| Determining Sulfate Content in Soils - Colorimetric Method | Each | $75.00 | | |
| **Transfer of remaining expenses from FM 546 / CR 400 Phase I Corridor Study** | | | | $15,322.92 |
| **SUBTOTAL field and lab** | | | | **$100,820.92** |

**FIRM: Terracon Consultants, Inc.**
**Myrick Lane and Boorman Lane**
**Prime Provider: BGE, Inc.**
**Agreement No. 2019-210, Amendment # 3**
**Project Limits: FM 546 to CR 456**

| TOTAL LABOR COSTS | TOTAL EXPENSES | TOTAL COSTS |
|---|---|---|
| $40,142.85 | $100,820.92 | $140,963.77 |
| **$40,142.85** | **$ 100,820.92** | **$140,963.77** |

## EXHIBIT "D"

### INFORMATION TO BE PROVIDED BY THE COUNTY

The COUNTY will furnish the Engineer the following items upon request, if available no later than 30 days from Notice to Proceed (NTP):

- Assist the Engineer, as necessary, in order to obtain the required data and information from other local, regional, State and Federal agencies.
- Assist in Coordinating Right of Entry for all properties within or adjacent to project limits.
- Available existing and future right-of-way plans for entire project.
- Perform all requirements of ROW acquisition including appraisals, negotiations, eminent domain, relocation and property management.
- Assist the Engineer in negotiations with all local, state and federal agencies, utility companies and railroads for agreements and/or relocations required.
- Assist the Engineer in obtaining bid forms and associated contract documents.
- Assist the Engineer, as necessary, in order to obtain the following data:

    - Utility plans and documents from appropriate municipalities and utility companies.
    - Readily available plan sets for crossing sections and improvement plans within the Project Limits.
    - Readily available flood plain information, studies and models from the Federal Emergency Management Agency, FEMA, the Corps of Engineers and/or other governmental agencies.
    - Readily available GIS Data
    - Readily available drainage reports
    - Readily available aerial mapping and soil data for the designated area.
    - Prior environmental studies and reports

# Amendment #3

## 2. Phase 1 Professional Services
## Revised Scope/Fee for Planning

Agreement No. 2019-210
Amendment 3

**EXHIBIT "A"**

**SCOPE OF SERVICES**

**FM 546 / CR 400 Phase I Corridor Study**
**Corridor Alignment Analysis, Public/Stakeholder Involvement, Schematic Design, Traffic Analysis, Geotechnical Investigation, Subsurface Utility Engineering (SUE), Aerial LiDAR/Ortho-Photogrammetry, Field Surveying, and Right-of-Way (ROW) Mapping**

**Limits:**
**From Bridgefarmer Road in Lowry Crossing, TX to CR 400 in Princeton, TX**
**From FM 982 to Baron Drive in Princeton, TX at intersection with US 380**

## PURPOSE

The Scope of Work to be performed by BGE, Inc. (the "ENGINEER") under this contract will determine a feasible alignment for a 6-lane major thoroughfare, with a minimum of 120 feet of ROW at the following locations:

- Approximately 2 miles, from Bridgefarmer Road to CR 400
- Approximately 1.1 mile, from FM 982/S 2nd Street to Baron Drive
- At intersection with US 380

FM 546 / CR 400 Phase I Corridor Study (the "Project") will consist of a feasibility study and be further defined by a design schematic. The Project will include alignment analysis, public/stakeholder involvement, schematic design, intersection and multilane highway traffic analysis, geotechnical investigations, SUE, Aerial LiDAR/Ortho-Photogrammetry, field surveying, and full ROW mapping. Collin County (the "COUNTY") serves as the owner of the Project. The Aerial LiDAR and Ortho-Photogrammetry shall be flown for the entire limits of the corridor (including west of Bridgefarmer Road to just south of McKinney National Airport) to reduce mobilization costs and delays.

## DETAILS

- The initial phase of the Project will consist of a corridor refinement study, utilizing public/stakeholder outreach to assist in the identification of a recommended alternative from Bridgefarmer Road to CR 400. The recommended alternative shall be submitted for approval and will be followed by detailed schematic design to a level adequate to develop the final footprint for ROW acquisition.
- TxDOT's Project CSJ # 1013-01-040 has been created by TxDOT for FM 546 Phase II, from Airport Drive in McKinney, TX to the intersection of FM 546 and CR 393 in Lowry Crossing, TX. An interim design shall be considered for the Project at intersection of existing FM 546 and CR 393.
- Design Criteria for the project shall comply with AASHTO Policy on Geometric Design of Highways and Streets.

- This Project will be developed utilizing English units of measure and all final schematic exhibits will be provided in roll format.
- Remaining Geotechnical Engineering Services are to continue as part of Myrick Lane and Boorman Lane PS&E.

The work described in this scope of services will include the following major work tasks: Assembly and Review of Data; Corridor Typical Section Evaluation; Corridor Alternatives Analysis; Schematic Development; Hydrologic and Hydraulic Investigation; Public/Stakeholder Involvement; Project Management; Survey and Right-of-Way; Utility Investigation (SUE); Aerial Photography and LiDAR Acquisition; Geotechnical Investigation; and 3D Visualization Services.

- For the purpose of this contract, "Stakeholders" refers to, but is not limited to, the following:

    - Federal, state and local public officials
    - TxDOT
    - City of Lowry Crossing
    - City of Princeton
    - NCTCOG
    - NTMWD
    - USACE
    - Civic and community leaders
    - Advisory committees
    - Interest groups

## BASIC SERVICES

### BS1. ASSEMBLY AND REVIEW OF DATA

A. Collection of Data, Reports, and Maps

The determination of data requirements, availability, and sources will be coordinated with the COUNTY. Once the data needs and sources are identified, the ENGINEER will contact the appropriate agencies and organizations to obtain the data. Data to be collected will include, but not be limited to:

- Previous studies, exhibits, designs, and reports.
- COUNTY, state and city planning documents (zoning information, thoroughfare maps, preliminary plats, design schematics).
- Utility plans and documents from appropriate municipalities and utility companies.
- Readily available plan sets for crossing or abutting sections within the Project limits.
- Readily available flood plain information and studies from the Federal Emergency Management Agency (FEMA), the Corps of Engineers and/or other governmental agencies.
- The ENGINEER will obtain electronic and/or hard copies from the COUNTY: GIS Data, drainage reports, mapping, survey, and improvement plans within the scoped area. The ENGINEER will acquire from the COUNTY any aerial mapping and soil data for the designated area.

- The ENGINEER will acquire from the COUNTY and NCTCOG any traffic/travel demand numbers for the corridor to be used in LOS analysis.
- Obtain desktop level environmental constraints mapping from NCTCOG based on existing environmental databases.

B. Field Reconnaissance

The ENGINEER will perform a corridor site visit to obtain field notes and digital photos along the project corridor.

C. Review of Data/Base File Creation

The ENGINEER will review the data collected and from this information will:

- Integrate additional data into the study file as it becomes available.
- Develop base CAD files (Bentley PowerGeopak V8i) that will be utilized for corridor evaluation including, but not limited to, existing utilities from visual analysis and additional SUE research; FEMA flood plain limits converted from GIS; and parcels and right-of-way converted from the latest Collin County Appraisal District GIS database.

Note: The entire limits of this project will be flown for aerial photogrammetry and LiDAR. A high-level 3D topographic existing ground surface will be created for use in the corridor evaluation process and to develop conceptual profile alignments and geometrics. Upon approval of a recommended alignment, detailed topography and 3D existing ground surface will be processed in detail (from the obtained LiDAR point cloud) to create design-level survey and will be augmented with field survey to fill void areas as needed.

D. Preliminary Design Conference

The ENGINEER shall prepare and submit a Design Summary Report (DSR) to the COUNTY for review and approval. Additionally, the ENGINEER will attend a Kick-Off Meeting to establish and agree on fundamental aspects, concepts, establish the basic features and design criteria for the project.

**Task BS1 Deliverables**

1. Field Notes and Site Photographs
2. Design Summary Report (DSR)

**BS2. CORRIDOR TYPICAL SECTION EVALUATION**

The ENGINEER will determine the existing typical section along FM 546 and cross streets. Existing conditions will be considered in preparation of an ultimate typical section based on a 6-lane urban major thoroughfare. The ENGINEER will prepare and analyze an interim typical section (4-lane) as deemed appropriate and in coordination with the most recent traffic analysis within and surrounding the corridor.

The ENGINEER will analyze typical sections at special cases, including at locations that may:

- Be adjacent to and connecting with projects by others,
- Accommodate sidewalk and shared use path on FM 546 in accordance with TxDOT guidelines, and
- Require retaining wall on one or both sides of the corridor.

The COUNTY will provide selection and approval of any alternate design criteria and typical corridor section.

**Task BS2 Deliverables**

1. Ultimate typical sections for the corridor.
2. Interim typical sections will be included as part of the schematic.

**BS3. CORRIDOR ALTERNATIVES ANALYSIS**

The ENGINEER will utilize previously developed alternative alignments and develop additional alignments based on input from project stakeholders and property owners (coordination covered in BS7). Up to five (5) alignment alternatives will be developed to a 30% schematic design level from 0.18 mile east of Bridgefarmer Road to 0.19 mile south of CR 400. The currently identified alignment will be refined based on the latest data collected in BS1.

Alternate corridor evaluation will include the following:

1. Identification of impacts in each of the following categories:
    a. Enhanced Mobility and Safety
        i. Accessibility
        ii. Safety
    b. Cost Effectiveness
        i. Construction Cost
        ii. ROW Acquisition Impact
        iii. Utility and Infrastructure
    c. Engineering Feasibility
        i. Compatibility with Other Projects
    d. Input from Project Stakeholders and Property Owners
2. Preparation of an Alternatives Comparison Scoring Matrix for each impact (shown above) to assist in documenting the recommended alternative to move further into design.

A. Lowry Crossing Alignment Analysis just east of S. Bridgefarmer Road

The ENGINEER will develop up to three (3) additional alternative alignments in coordination with stakeholders and property owners for this new location alignment from Bridgefarmer Road to CR 400. No alternative alignments are anticipated for CR 452.

This segment requires early attention to begin coordination with identified stakeholders and property owners to build consensus on a single, recommended alignment alternative. Alignments will be developed

to a 30% conceptual planning level of effort and will include a drainage analysis. Horizontal alignments will be refined and used to create conceptual vertical alignments for each option. Additionally, generic templates will be developed in Bentley's OpenRoads (SS4) software and used to create a proposed, conceptual 3D design model for use in conceptual cost estimate development (earthwork, pavement quantities, etc.). Superelevation will be considered, if required, as part of the conceptual effort for each alternative.

B. Development of Comparison Scoring Matrix

Develop a matrix-based scoring tool to be used to compare alternatives within Lowry Crossing. Items to be considered include, but are not limited to, public/stakeholder input, safety, mobility, etc. Alternatives will be scored, and the recommended alternative identified through the scoring matrix effort.

C. Public Meetings

For public involvement and meeting related tasks, see section BS7. The ENGINEER will provide a response to any stakeholder comments to the COUNTY, including engineering backup figures and/or exhibits. No public hearings are anticipated for this project.

D. Corridor Presentation

The ENGINEER will prepare up to two (2) technical PowerPoint presentations and present a refined corridor alignment for COUNTY approval.

E. Conceptual Alternative Alignments and Scenarios at US 380

The ENGINEER will develop up to fifteen (11) scenarios at end of project with consideration of the interchange of the corridor at US 380 as follows:

- Up to Eight (8) Conceptual Alternative Alignments considering a 70-mph design speed for US 380 for Comparison Purposes – Plan Only
- Up to Three (3) Conceptual Alternative Alignments considering a 60-mph design speed for US 380 for Comparison Purposes – Plan Only

The alternative alignments will be developed at the request of COUNTY and may include revised design speeds, reduced ROW widths, intersection adjustments, or cost comparisons. Alternatives will be provided in KMZ format to COUNTY for review and consideration.

**Task BS3 Deliverables**

1. Preliminary Corridor Exhibit Maps
2. Technical Presentation of Alternate Corridors
3. Final Corridor Exhibit Maps
4. All design files and deliverable in electronic format (PDF, DOC, DGN, DWG, KMZ, etc.)

**BS4. SCHEMATIC DEVELOPMENT**

The ENGINEER will utilize the recommended corridor alignment from Task BS3 to develop a detailed design schematic for the ultimate build-out of CR 400 and CR 452 (in coordination with the COUNTY). No grade separations are anticipated or included as part of this scope of work.

The ENGINEER will prepare a schematic layout to a scale of 1" = 100' depicting the proposed improvements for the project. The schematic shall include: the location of intersections, retaining walls, bridge, driveways; the geometric typical sections (pavement cross slopes, lane and shoulder widths, slope rates for fills and cuts); culvert crossings; vertical and horizontal geometry; the degree of horizontal curves and vertical curve data, including "K" values; the lane lines and/or arrows indicating the number of lanes; the existing and proposed ROW limits; the existing and proposed drainage and construction easements; the direction of traffic flow on all roadways; the geometrics of speed change (acceleration, deceleration) lanes; removal items, and major utility conflicts. The schematic will be prepared using the English system of units. 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).

In preparing the schematic, the ENGINEER will:

A. General

1. Further develop typical roadway sections prepared in Section BS2 for proposed CR 400 and CR 452 facilities, major cross streets, and other locations with specific design features (retaining walls (if needed), and intersections). Typical sections for future cross streets will be based on best-available data provided by the COUNTY.
2. Produce plan and profile schematic exhibits on roll plots at a scale of 1" = 100' showing proposed features, existing features, title block, and legend.
3. Develop a 3D corridor model of the proposed facility and provide design of roadway templates and end conditions throughout the corridor according to the proposed design.
4. Evaluate potential utility conflicts based on Level C/D/B/A SUE data and label crossings on the schematic.
5. Capacity Analysis
    a. Multilane Highway - ENGINEER will perform capacity analysis for the Build-Out and Horizon Year scenarios using HCS7.
    b. Intersections – ENGINEER will perform capacity analysis for the Build-Out and Horizon Year scenarios using Synchro 11 for up to three (3) intersections.
    c. Technical Memo – ENGINEER will create a technical memo deliverable to document the methodology and results of the capacity analyses.
    d. "Build Out Year" refers to the year when construction for the project would be complete. "Horizon Year" refers to 20 years after the project has been constructed.
6. The ENGINEER shall develop a preliminary temporary t-intersection at the future intersection of existing FM 546 and the Project using the following assumptions:
    a. Temporary widening along FM 546 to consider a left turn eastbound lane.

b. Assume one side of the typical section will be built first and used as a two-way section.

7. Conceptual Traffic Control Plan:

- Alternative Analysis. The ENGINEER shall consider the requirements for construction staging and traffic control throughout the development of schematic design to ensure that the proposed design can be constructed. The ENGINEER shall provide construction phasing assumptions to the County as requested. A comparative assessment will be provided for up to two (2) TCP alternatives.
- Quantity and Cost Estimate. The ENGINEER shall prepare a preliminary planning-level cost estimate for the Preliminary Traffic Control Plan.

B. Intersections

The ENGINEER will evaluate, in detail, the following intersections within the corridor:

1. Interim and Ultimate Section at The Crossings Drive
2. Interim and Ultimate Section at CR 393
3. Interim and Ultimate Section at Bridgefarmer Road
4. Interim and Ultimate Section at FM 982 and

Smaller intersections will be analyzed to tie correctly horizontally and vertically as part of the intersection analysis:

1. Up to two (2) proposed roadways found through data collection and in coordination with stakeholders.

At each location the ENGINEER will:

1. Design preliminary horizontal alignments for intersections based on the approved corridor alignment. Any proposed deviation from this approved alignment will require COUNTY approval and re-design of a non-approved alignment is not included in this scope of services.
2. Design of preliminary profiles for intersections based on preliminary horizontal alignments.
3. Show preliminary location of cross culverts including preliminary sizing. Studied floodplain areas within the project corridor will be displayed based on available GIS data.
4. Identify major utility locations based on Level C/D/B/A subsurface utility engineering (SUE).
5. Design and show preliminary pavement markings, if necessary.
6. Determine existing and proposed right-of-way including any necessary easements based on proposed geometric design. Property boundaries will be developed once a recommended alternative corridor is selected to move forward into schematic design.

C. Project Delivery

The schematics will be provided to the County for review at the following stages of completion:

1. Concept (30%) – Plan view only

2. Preliminary (60%) – Plan and Profiles Developed; Cross Sections; Cost Estimate
3. Pre-Final (90%)
    a. Plan and Profile Layout
    b. Cross Sections
    c. Cost Estimate
    d. Draft Capacity Analysis Technical Memo
    e. Draft TCP Narrative and Construction Sequence
4. Final (100%)
    a. Plan and Profile Layout
    b. Cross Sections
    c. Cost Estimate
    d. Capacity Analysis Technical Memo
    e. TCP Narrative and Construction Sequence
    f. Utility Conflicts Exhibit

Prior to each submission, the ENGINEER will:

1. Log any previous County or stakeholder comments in a Comment Response Log spreadsheet and provide a resolution for each comment.
2. Provide a Quality Control (QC) review of plans, calculations, documents, and other supporting design data, if requested by the COUNTY.
3. Provide a Quality Assurance (QA) audit of the QC review to assure all comments were addressed and/or resolved, if requested by the COUNTY.
4. Coordinate production of the milestone deliverables including printing, compiling electronic files, and preparation of a transmittal letter.

D. Project Update Presentations

The ENGINEER will prepare and present up to two (2) technical PowerPoint presentations during the schematic design providing a briefing on project schedule, design development, and future tasks.

**Task BS4 Deliverables**

1. Concept Schematic (30%)
2. Preliminary Schematic, Cross Sections, and Estimate (60%)
3. Pre-Final Schematic, Cross Sections, Draft Capacity Analysis Technical Memo, Draft TCP Narrative and Estimate (90%)
4. Final Schematic, Cross Sections, Capacity Analysis Technical Memo, TCP Narrative, and Estimate (100%)
5. QA/QC Documentation for each milestone deliverable, if requested
6. Technical PowerPoint Presentations
7. Final Electronic Design Files placed on USB thumb drive or uploaded via a cloud storage service such as OneDrive

**BS5. HYDROLOGIC AND HYDRAULIC INVESTIGATION**

The ENGINEER shall perform drainage tasks to determine the approximate size and type of cross drainage structures. Cross drainage analysis will include a comparison of existing and future land use in the watershed and the cross-drainage structures needed for both conditions. Drainage tasks will be performed in accordance with Collin County and TxDOT requirements.

Scour analysis will not be provided as part of this work. Scour countermeasures will be approximated for inclusion in the opinion of probable construction cost. Driveway culverts and cross street culverts will not be designed as part of this work but will be considered in the opinion of probable construction cost.

The following drainage tasks will be performed in the preparation of the schematic layout:

A. Minor Cross Drainage - Estimate 9 Minor Drainage Crossings

1. Drainage Area Mapping
   Delineate drainage area boundaries based on Collin County GIS data, North Central Texas Council of Governments (NCTCOG) contour maps, Texas Natural Resources Information System (TNRIS) Lidar, United States Geological Survey (USGS) contour maps, or other suitable topographic maps, if available. A drainage area map will be presented on 11”x17” plan sheets at maximum 1" = 200' scale with topographic data shown and labeled.

2. Calculate Discharges
   Determine conveyance paths, channel slopes, time of concentration, Natural Resources Conservation Service (NRCS) curve numbers and other factors as required to determine frequency-discharge relationships using hydrologic models. Determine preliminary design flows for the crossings based on the design frequency and a check of the 100-year event using the appropriate hydrologic method. Previous studies, including local studies, shall be obtained and considered during the hydrologic analysis. The results of the hydrologic calculations will be tabulated and presented on 11”x17” Hydrologic and Hydraulic Data Sheets.

3. Size and Locate 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. Evaluate existing cross culverts for extension. HY-8 culvert analysis software will be used to size minor culvert crossings. The results of the hydraulic calculations will be tabulated and presented on 11”x17” Hydrologic and Hydraulic Data Sheets. Culvert layouts will be provided for minor cross drainage structures. The ENGINEER will provide opinion of probable construction costs.

B. Major Cross Drainage - 1 Crossing (East Fork Trinity River Tributary 1)

1. Obtain and Review Available FEMA Data and Reports
   The ENGINEER will obtain available Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), Letters of Map Revisions (LOMR), and electronic data readily available from FEMA for East Fork Trinity River.

2. Drainage Area Mapping
   Delineate drainage area boundaries based on Collin County GIS data, NCTCOG contour maps, TNRIS Lidar, USGS contour maps, or other suitable topographic maps, if available. A drainage area map will be presented on 11”x17” plan sheets at maximum 1" = 200' scale with topographic data shown and labeled.

3. Calculate Discharges
   Determine conveyance paths, channel slopes, time of concentration, NRCS curve numbers and other factors as required to determine frequency-discharge relationships using hydrologic models. Determine preliminary design flows for the crossings based on the design frequency and a check of the 100-year event using the appropriate hydrologic method. Previous studies, including FEMA and local studies, shall be obtained and considered during the hydrologic analysis. The results of the hydrologic calculations will be tabulated and presented on 11”x17” Hydrologic and Hydraulic Data Sheets.

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, TxDOT, and FEMA requirements. All relevant conveyance features, (channels, culverts, slab bridges, encroachments) will be included in the hydraulic analysis using HEC-RAS.

5. Develop Alternative Drainage Schemes (up to two)
   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. Determine optimum drainage scheme to be used for schematic design. An alternatives analysis will be performed to determine if cross drainage structures should be bridge-class culverts or span bridges. The ENGINEER will develop preliminary layouts for all bridge-class culverts and span bridges on the plan and profile of the schematic. The ENGINEER will provide opinion of probable construction costs. The ENGINEER will provide bridge and bridge class culvert layouts.

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. Size and Locate Major 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. HEC-RAS will be used to size major culvert crossings. The results of the hydraulic calculations will be tabulated and presented on 11”x17” Hydrologic and Hydraulic Data Sheets. Culvert layouts will be provided for major cross drainage structures. The ENGINEER will provide opinion of probable construction costs.

8. Coordination with adjacent projects
   ENGINEER shall coordinate with adjacent stakeholders, review adjacent proposed or future flows, and adjust drainage design to accommodate adjacent project at the following locations:

   a. Crossing for East Fork Trinity River Tributary

   b. Flows received from up to three (3) adjacent developments

C. Closed Storm Sewer

The ENGINEER will provide an approximation of trunk size and inlet spacing for the closed storm sewer system and ensure adequate drainage to an outfall location can be obtained. The ENGINEER will determine ROW and easement needs and include the system in the opinion of probable construction cost.

The ENGINEER shall consider an open drainage system and tie-in to the closed storm sewer for the preliminary temporary t-intersection at the future intersection of existing FM 546 and the Project discussed in BS4.

D. Drainage Design Technical Summary Report

Upon completion of the hydraulic analyses and alternative evaluations of potential improvements for the project drainage system, the ENGINEER shall prepare a Drainage Design Technical Summary Report. A preliminary report will be submitted with the 60% schematic deliverable and the final report will be submitted with the 100% schematic submittal. The report shall include the following sections:

1. INTRODUCTION: location, study objectives, general stream and watershed information, and other pertinent facts.
2. HYDROLOGY: watershed description, soil and land use information, source of hydrologic data and methodology/models used to develop flow data, pertinent input data and parameters for hydrologic analyses; summary table of results for full range of peak discharges for 10-, 25-, 50-, 100-, 200-, and 500-year events.
3. HYDRAULICS: overview of hydraulic modeling process, including data sources, specific model uses, descriptions of existing drainage structures, discussion of design alternatives and the results of respective hydraulic modeling for the scenarios evaluated; hydraulic model output data including existing, hydraulic data sheet, and proposed conditions summary tables; summary of assumptions made in preliminary closed storm sewer design.
4. SUMMARY OF CONCLUSIONS/RECOMMENDATIONS: summary of study objectives, alternatives being considered, opinions of probable costs, and identification of preferred design alternatives.
5. PHOTOGRAPHS, FIGURES AND APPENDICES: all items necessary to support the analysis.
6. ELECTRONIC DATA: computer files of hydrologic and hydraulic modeling with appropriate labeling of location, project reference, and submittal date.
7. FINALIZED DOCUMENT: one (1) copy of final report with CD (CD to include a PDF of the entire report).

**Task BS5 Deliverables**

1. Plan and Profile depictions of drainage structures on Schematic
2. Drainage Area Map Sheets
3. Hydrologic and Hydraulic Data Sheets - minor drainage structures
4. Hydrologic and Hydraulic Data Sheets - major drainage structures
5. Bridge and Culvert Layouts
6. Preliminary Drainage Report
7. Final Drainage Report
8. Opinion of Probable Construction Costs

## BS6. SOCIAL, ECONOMIC AND ENVIRONMENTAL STUDIES

Not Applicable: Social, Economic, and Environmental Studies are excluded from this contract.

## BS7. PUBLIC/STAKEHOLDER INVOLVEMENT

A. Public Involvement Plan

The project team will develop a comprehensive Public Involvement Plan (PIP) that will include communications with stakeholders. Key items will include:

Public and Stakeholder Definitions

- Outreach Timeline
- Goals
- Stakeholder Meetings Methodology
- Public Meetings Methodology
- Quality Assurance Protocols

Note: The alignment within City of Princeton is controlled by the beginning and end limits, which are being developed by others. No public involvement is anticipated at this time. However, some design coordination effort with the City of Princeton is expected.

B. Public Involvement Management

This task provides for the monthly management of tasks and activities, as well as internal project team meetings. In addition, the project team will utilize www.publicinput.com for public and stakeholder involvement management. The system will track stakeholder progress from kick-off through the end and assist with identifying and managing stakeholder input throughout the corridor area.

The task includes the utilization of Facebook and Twitter ad space for up to 20,000 residents along the corridor. Each ad placement is approximately $300. For each public meeting as well as general information updates, we estimate the number of ad placements to be six.

C. Stakeholder Coordination/Involvement

The project team will work with identified stakeholders to ensure that the right participants are at the table and to conduct a series of policy briefings and technical briefings. The task is divided into two approaches:

1. **Stage A:** Policy briefings will be conducted with the elected/public officials, while technical briefings will be conducted with county, city and state staff as needed. It is estimated that each stakeholder meeting will not exceed 12 participants.

   The following stakeholder meetings are identified:

   **City of Lowry Crossing and Collin County**
   Up to four Policy and four Technical Stakeholder Meetings throughout the Project.

   Representatives from the City of Princeton, TxDOT, USACE, NCTCOG and NTMWD will be invited to each of the above meetings, if applicable.

   The project team will coordinate these meetings, as well as RSVPs, identify appropriate venues, create sign-in sheets, take notes and develop summaries for each meeting.

2. **Stage B:** The project team will conduct two additional stakeholder meetings that bring the technical, policy and business stakeholders together for facilitated discussions to build consensus and identify appropriate project goals.

   The project team will coordinate these meetings, as well as RSVPs, identify appropriate venues, create sign-in sheets, take notes and develop summaries for each meeting, as well as assist with facilitation.

Additional Property Owner/Stakeholder Coordination: It is anticipated that the following, additional meetings may be needed to coordinate and gain consensus for the recommended alternative in the early stage of the project. Each will include time to prepare for and document each meeting.

- For our current, worst-case alignment scenario, there are forty-five (45) possible properties to be impacted along the corridor. It is assumed that we would plan for and attend up to fifteen (15) meetings with affected property owners along the corridor throughout the alignment analysis stage of the project.
- Prepare for and attend one (1) separate meeting with NCTCOG to discuss their Collin County Strategic Roadway Initiative, projected traffic volumes within the project limits, demographics, and development of traffic numbers for use in microsimulations for the corridor.
- Prepare for and attend up to one (1) meeting with bicycle groups that utilize the corridor. Identified are the following: Bike DFW, Plano Bicycle Association, and Shawnee Trail Cycling Club.
- We anticipate a need to hold one (1) separate meeting/work session with Lowry Crossing early in the project to discuss concerns, options, impacts, etc.
- We anticipate a need to hold one (1) meeting with the City of Princeton's consultant currently working on PS&E for an eastern segment of the corridor within the southern limits of Princeton.

An additional four (4) monthly coordination meetings are anticipate to discuss design updates with the consultant during the schematic phase.

Note: COUNTY may request virtual stakeholder coordination meetings in lieu of in-person meetings. Microsoft Teams, WebEx, or other COUNTY approved application will be used to host the meetings.

D. Public Meetings

The project will require up to two (2) public meetings. Public Involvement coordination for each meeting includes the development of the following:

- TxDOT Public Meeting Checklist – for general guidance/information only
- EO/PO Database
- APO Database
- Public Notice (English/Spanish, if necessary)
- Location Map
- Venue Coordination
- Newspaper Ad Placement and Schedule Matrix
- Public Meeting Materials
- Comment Cards (English/Spanish, if necessary)
- Sign-in Sheets
- Public Meeting Photography
- Public Meeting Registration
- Coordination of All Public Meeting Comments and Responses
- Public Meeting Summary

COUNTY may request virtual public meetings in lieu of in-person meetings. A virtual public meeting is a meeting that is held on-line, in which members of the public log-on to the meeting and participate via the internet. Notice of a virtual public meeting must also include the following:

- Clear instructions about how to log onto the virtual public meeting;
- An explanation of how the virtual public meeting will be conducted;
- An explanation that members of the public may contact COUNTY or project staff during business hours to ask questions about the project or access project materials; and
- An explanation that members of the public may submit public comments via email or letter.

The virtual public meeting must include the following:

- Presentation, which includes both audio and visual components
- Project website
- Email address, physical address and/or phone number as an alternate option to provide comments
- Timeframe to provide comments, if any

The presentation may be live or pre-recorded and uploaded for viewing at the time of the scheduled public meeting and thereafter. www.publicinput.com will be used in coordination with Facebook live, or another

COUNTY approved platform. Participants in a virtual public meeting may be asked to "sign-in" by entering their name and/or email address.

Public Hearings are excluded from this contract.

**Task BS7 Deliverables**

1. Stakeholder Meeting sign-in sheets, if applicable, and meeting minutes.
2. Public Meeting sign-in sheets, if applicable, comment sheets, project information handout and meeting minutes.

**BS8. PROJECT MANAGEMENT**

The ENGINEER'S project manager, in coordination with the COUNTY'S Director/Assistant Director of Engineering, will be responsible for directing and coordinating all activities and personnel associated with this project.

A. 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, problems encountered, and action required to remedy them. The progress report will include a tabulation of percent complete by task.

B. Progress/Coordination Meetings

Attend up to twenty-four (24) 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. The ENGINEER will develop up to twenty-four (24) exhibits of key project issues when necessary for Collin County's further coordination, review and consideration. Meeting minutes will be prepared by the ENGINEER and distributed for all meetings.

The ENGINEER will coordinate and hold up to twenty-four (24) internal monthly team meetings to coordinate critical path schedule items, outstanding tasks, and maintain a risk analysis for the project to keep the project on track and on budget.

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

**Task BS8 Deliverables**

1. Monthly Progress Reports and Invoices
2. Design Schedule
3. Meeting Sign-In Sheets and Minutes Meetings (up to 24)

## SPECIAL SERVICES

### SS1. SURVEY AND RIGHT-OF WAY

A. 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 Engineers and Land Surveyors (TBPELS), 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), with an applied combined scale factor utilized by TXDOT for Collin County, 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. The 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.

B. Survey Location

Survey will be performed along the approved corridor determined in **Task BS3**.

C. Specific Work to Be Performed (Survey)

1. The Surveyor shall establish Horizontal and Vertical Control Monuments, consisting of a 5/8" capped iron rod set in concrete, at approximately 2000-foot 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. The 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 84 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 1500-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 MrSID 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.

**Task SS1 Deliverables (Survey)**

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. MrSID Ortho Photos

D. Specific Work to Be Performed (Right-of-Way)

1. The Surveyor will prepare overall Parcel Exhibit Map. The Surveyor shall use the previously established Aerial mapping image as a backdrop for the new parcel configuration that comprises the length of the new Right-of-Way corridor. The overall Parcel Exhibit Map will show the new right-of-way lines, parcel boundaries, current ownership, bearings and distances and set or found monumentation for the new right-of-way corridor. Each 22"x 34" sheet will cover approximately 5,600 feet of length of the new right-of-way corridor.
2. The Surveyor will prepare up to 52 Parcel Exhibits. These will show the individual configurations that comprise the new right-of-way corridor. These will show new right-of-way lines, parcel boundaries, current ownership, bearings and distances and set or found monumentation. They will be reviewed by COUNTY and ENGINEER representatives for correctness and parcel configuration. These will include area designations for any determined prescriptive easement areas within the boundaries of the Parcel Exhibits and shown for appraisal purposes. There are approximately 45 Parcels that need Right-of-Entry permission within the Right-of-Way corridor. If Right-of-Entry cannot be obtained, the Surveyor will be unable to set the new Right-of-Way monuments on those Parcels. The Surveyor could prepare Parcel Exhibits omitting the new Right-

of-Way monumentation to be set. New Right-of-Way monuments can be set after Collin County obtains title to these parcels.

3. The Surveyor will prepare up to 52 Metes and Bounds descriptions that describe the Parcel boundaries. These will be signed and sealed by a Texas Registered Professional Land Surveyor and will become part of each Parcel Exhibit and suitable for acquisition purposes. These will be prepared after Parcel Exhibits have been reviewed and approved by others.
4. The Surveyor shall research public records to obtain names, physical addresses, mailing addresses, and telephone numbers, if available, of all property owners that adjoin and are within the ROW Mapping project limits. The surveyor shall fill out an Excel Spreadsheet with the found information. The Surveyor shall obtain copies of all parent tract recorded deeds and current subdivision plats within the project limits and obtain copies of all existing right-of-way deeds within the project limits.
5. ABSTRACT MAP (Working Sketch): The Surveyor shall create an Abstract Map (working sketch) of up to 100 properties for the ROW Mapping Project. The final MicroStation shall be a scale drawing prepared from record documents depicting the approximate locations of existing right-of-way lines, easement lines, and private property lines with relevant grantee names, recording data, and recording dates. The Abstract Map (working sketch) shall not depict right-of-way, easement, or private property lines resolved through found monumentation and evaluation by a Registered Professional Land Surveyor and will not be suitable as a land survey document for right-of-way or easement parcel document creation. Easement research shall span no earlier than 1945 (75 years).
6. All Surveying shall be performed under the direct supervision of a Texas Registered Professional Land Surveyor licensed and in good standing with the State of Texas.

**Task SS1 Deliverables (Right-of-Way)**

1. DGN files containing bearings, distances, monumentation of each parcel configuration (with easements) required to reproduce the overall Parcel Exhibit Maps.
2. Three (3) copies of signed and sealed Parcel Exhibits that include the associated Metes and Bounds for up to fifty-two (52) Parcels with PDF copies.
3. Two hard copies (22”x34” and 11”x17”) and PDF copies of the overall Parcel Exhibit Map.
4. Excel Spreadsheet that includes information of all property owners within the described limits.
5. An electronic file of the Abstract Map shall be provided in MicroStation V8i format.

**SS2. UTILITY INVESTIGATION (SUE)**

The ENGINEER shall complete a Quality Level B subsurface utility engineering (SUE) investigation (exclusive of Quality Levels C and D) for 200 LF at seven (7) locations within the full project limits, as requested by the ENGINEER, estimated at up to 1,320 LF of Quality Level B. The

ENGINEER shall complete twenty (20) Quality Level A test holes as needed at potential utility conflict locations as identified by others.

Subsurface Utility Engineering (SUE) includes utility investigations subsurface and above ground prepared in accordance with AASHTO standards [ASCE C-1 38-02 http://www.fhwa.dot.gov/programadmin/asce.cfm)] and Utility Quality Levels.

A. Utility Quality Levels

Utility Quality Levels are defined in cumulative order (least to greatest) as follows:

1. Quality Level D - Existing Records: Utilities are plotted from review of available existing records.
2. Quality Level C - Surface Visible Feature Survey: Quality level "D" information from existing records is correlated with surveyed surface-visible features. Includes Quality Level D information.
3. Quality Level B - Designate: Two-dimensional horizontal mapping. This information is obtained through the application and interpretation of appropriate non-destructive surface geophysical methods. Utility indications are referenced to established survey control. Incorporates quality levels C and D information to produce Quality Level B.
4. Quality Level A - Locate (Test Hole): Three-dimensional mapping and other characterization data. This information is obtained through exposing utility facilities through test holes and measuring and recording (to appropriate survey control) utility/environment data. Incorporates quality levels B, C and D information to produce Quality Level A.

B. Designate (Quality Level B)

Designate means to indicate the horizontal location of underground utilities by the application and interpretation of appropriate non-destructive surface geophysical techniques and reference to established survey control. Designate (Quality Level B) Services are inclusive of Quality levels C and D.

The ENGINEER shall:

1. As requested by the Client compile "As Built" information from plans, plats and other location data as provided by the utility owners.
2. Coordinate with utility owner when utility owner's policy is to designate their own facilities at no cost for preliminary survey purposes. The ENGINEER shall examine utility owner's work to ensure accuracy and completeness.
3. For the alignment options being considered, correlate utility owner records with designating data and resolve discrepancies using professional judgment. A color-coded composite utility facility plan with utility owner names, quality levels, line sizes and subsurface utility locate (test hole) locations, shall be prepared and delivered to the Client. It is understood by both the ENGINEER and the Client that the line sizes of designated utility facilities detailed on the deliverable are from the best available records and that an actual line size is normally determined from a test hole vacuum excavation. All above ground appurtenance locations must be included in the deliverable to the Client. This information shall be provided in the latest version of MicroStation or GeoPak used by the Client.
4. After a final alignment has been selected, designate, record, and mark the horizontal location of the existing utility facilities and their service laterals to existing buildings using non-destructive surface geophysical techniques.
5. Revise the utility facility plan by incorporating the Level B utility information collected along the selected final alignment. Clearly identify all utilities that were discovered from quality level B or what cannot be depicted in quality level B standards (levels C and D). These utilities must have a unique line style and symbology in the designate (Quality Level B) deliverable.

C. Subsurface Utility Locate (Test Hole) Service (Quality Level A)

Locate means to obtain precise horizontal and vertical position, material type, condition, size and other data that may be obtainable about the utility facility and its surrounding environment through exposure by non-destructive excavation techniques that ensures the integrity of the utility facility. Subsurface Utility Locate (Test Hole) Services (Quality Level A) are exclusive of Quality Levels B, C, and D.

The ENGINEER shall:

1. Review requested test hole locations and advise the COUNTY in the development of an appropriate locate (test hole) work plan relative to the existing utility infrastructure and proposed highway design elements.
2. Coordinate with utility owner inspectors as may be required by law or utility owner policy.
3. Neatly cut and remove existing pavement material, such that the cut not to exceed 0.10 square meters (1.076 square feet) unless unusual circumstances exist.
4. Measure and record the following data on an appropriately formatted test hole data sheet that has been sealed and dated by the ENGINEER:
   a. Elevation of top and/or bottom of utility tied to the datum of the furnished plan.
   b. Identify a minimum of two benchmarks utilized. Elevations shall be within an accuracy of 15mm (.591 inches) of utilized benchmarks.
   c. Elevation of existing grade over utility at test hole location.
   d. Horizontal location referenced to project coordinate datum.
   e. Outside diameter of pipe or width of duct banks and configuration of non-encased multi-conduit systems.
   f. Utility facility material(s).
   g. Utility facility condition.
   h. Pavement thickness and type.
   i. Coating/Wrapping information and condition.
   j. Unusual circumstances or field conditions.
5. Excavate test holes in such a manner as to prevent any damage to wrappings, coatings, cathodic protection or other protective coverings and features.
6. Be responsible for any damage to the utility during the locating process. In the event of damage, the ENGINEER shall stop work, notify the appropriate utility facility owner, the Client and appropriate regulatory agencies. The regulatory agencies include but are not limited to the Railroad Commission of Texas and the Texas Commission on Environmental Quality. The ENGINEER shall not resume work until the utility facility owner has determined the corrective action to be taken. The ENGINEER shall be liable for all costs involved in the repair or replacement of the utility facility.
7. Backfill all excavations with appropriate material, compact backfill by mechanical means, and restore pavement and surface material. The ENGINEER shall be responsible for the integrity of the backfill and surface restoration for a period of three years. Install a marker ribbon throughout the backfill.
8. Furnish and install a permanent above ground marker, as specified by the COUNTY, directly above center line of the utility facility.
9. Provide complete restoration of work site and landscape to equal or better condition than before excavation. If a work site and landscape is not appropriately restored, the ENGINEER shall return to correct the condition at no extra charge to the COUNTY.

10. Plot utility location position information to scale and provide a comprehensive utility plan sign and sealed by the responsible Engineer. This information shall be provided in the latest version of MicroStation or GeoPak format used by the COUNTY.
11. Return plans, profiles, and test hole data sheets to the County. If requested, conduct a review of the findings with the County.

**Task SS2 Deliverables**

The ENGINEER shall provide the following:

1. Utility Records/As-Builts obtained from utility owners.
2. Level C/D MicroStation File depicting utility line work for four alignments under consideration.
3. Level B MicroStation File depicting utility line work for final selected alignment.
4. PDF of SUE Level A Test Hole Data Sheets.
5. Utility Layout Sheets are not included in this scope.

## SS3. AERIAL PHOTOGRAPHY AND LIDAR ACQUISITION

A. Feasibility Study

The ENGINEER will provide aerial photography and LiDAR acquisition for approximately 2,083 acres as outlined in Exhibit 1 below. For feasibility study, the ENGINEER will deliver preliminary mapping to include a classified to bare-earth LiDAR point cloud in LAS format.

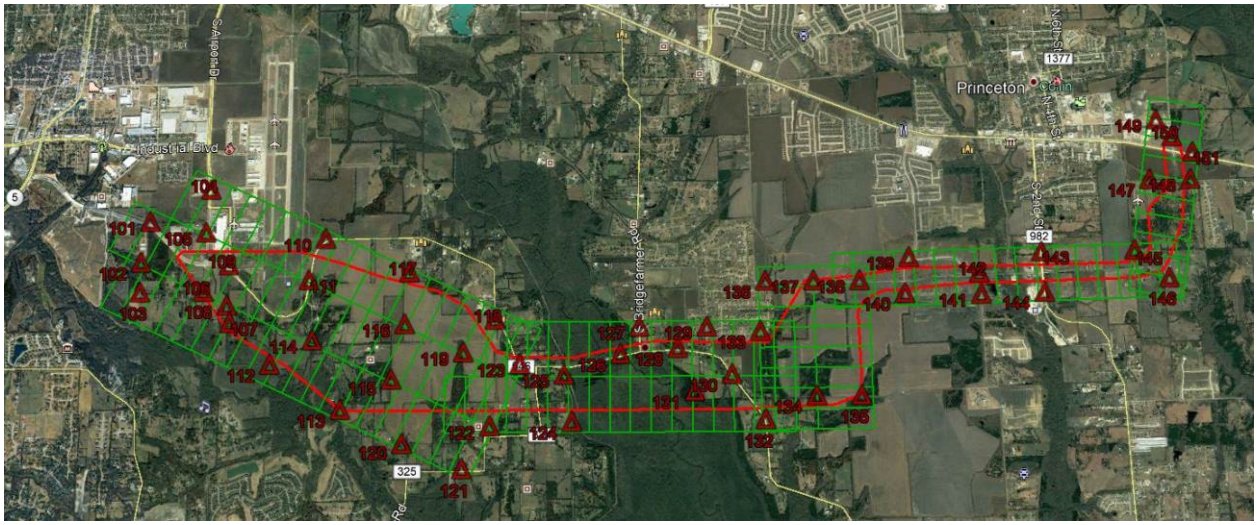


*Exhibit 1: Aerial Mapping Boundary*

Aerial photography will be captured using a large format metric digital camera at a flight height of 2,096-foot above ground level (AGL). This project will require approximately 9 flight lines with 150 digital frames. Aerial photography will be acquired during cloud/dust free conditions and will be 5cm or less ground sampling distance (GSD) - pixel resolution, suitable for 1" = 50' scale mapping.

The ENGINEER will acquire and process helicopter aerial LiDAR. LiDAR will be acquired at 1,000-foot AGL and will yield a point cloud with an average density of at least 20 points per square meter. Aerial LiDAR will have 0.15-foot vertical RMSE on hard surfaces. Aerial LiDAR data will be processed for a preliminary DEM that is classified to bare-earth and reduced to one point every 10 feet grid.

B. Design Schematic

Upon approval of the recommended alternative, the ENGINEER will perform digital mapping of the Project as shown in Exhibit 2 below. The corridor will have 1400-foot width (700 feet each side of centerline). Aerial mapping will use the previously acquired 5cm GSD imagery and helicopter LiDAR. Aerial photography and LiDAR will suitable for ASPRS Class I 1" = 50' scale mapping specifications and to generate 1-foot contours. Aerial mapping photogrammetry will hold to 0.167-foot vertical RMSE on hard surfaces in well-defined areas and 0.33-foot vertical RMSE on soft surfaces. Aerial LiDAR will hold a 0.15-foot vertical RMSE on hard surfaces and 0.33-foot on soft surfaces.


*Exhibit 2: Aerial Mapping Boundary east of Yellow Line for 1" = 100' scale 2D Planimetrics only*

**Task SS3 Deliverables**

1. Preliminary 3D LiDAR file in Power GeoPak V8i (SELECT series 4). Digital elevation model will be generated from LiDAR points and will not include breaklines.
2. 1" = 50' scale 2D planimetrics of the entire project area, in Power GeoPak V8i (SELECT series 4)
3. 3D DTM of entire project area, in Power GeoPak V8i (SELECT series 4)
4. 0.25-foot pixel resolution orthoimagery in MrSID format
5. TIN of entire project area, in GeoPak format
6. Processed and Classified LiDAR in .LAS format

**SS4. GEOTECHNICAL INVESTIGATION**

The geotechnical engineering services will consist of field and laboratory investigations, engineering analysis and development of a pavement geotechnical report prepared by a Licensed Professional Engineer.

NOTE: Geotechnical engineering services as outlined in this scope of work shall continue as part of the Myrick Lane and Boorman Lane project and as part of Amendment # 3 of the contract.

A. Field Investigation

The field investigation will consist of ten (10) pavement borings, spaced evenly along the proposed roadway alignment and drilled to 15 feet below proposed grade elevations. Spacing and depths will follow TxDOT's Geotechnical Manual and may be adjusted by the Geotechnical Engineer's recommendations. A boring and TCP plan will be developed and submitted to the COUNTY for review and approval.

The ENGINEER will assist the COUNTY in obtaining the right-of-entry of the properties and assumes that the boring locations will be accessible to a conventional truck mounted drilling equipment during normal working hours.

B. Laboratory Investigation

Laboratory tests will be conducted to classify the soil to evaluate the volume change potential and strength of the soil and rock present at the site per TxDOT standards, Atterberg limits, sieve analysis and moisture contents will be performed on every stratum within each of the pavement borings. The volume change potential of the soils will also be evaluated by swell tests. The strength of the soil will be estimated using hand penetrometer tests and unconfined compressive strength tests. Unconfined compressive strength testing will also be performed on the rock cores. Sulfate testing will be performed at 0 to 2 feet and 2 to 4 feet per TxDOT standards. Lime/PI series tests will also be performed on selected clay samples.

C. Geotechnical Report

Results and field and laboratory work will be presented in a geotechnical engineering report. The report will consist of recommendations to guide design and construction of the new roadway and shall include the following:

- Generalized soils stratigraphy and groundwater levels
- Results of classification and TCP testing with Wincore format boring logs
- Site Condition and Geology
- Visually classify the soil samples by an engineer in the laboratory
- Pavement PVR Calculations
- Recommended Depth of Pavement Coverage
- Recommendations for Flexible and Rigid Pavement Sections
- Comments on the presence and effect of expansive soils on pavement construction will be provided. Up to two (2) alternative methods of reducing any anticipated shrink/swell movements associated with expansive clays will be included for pavement construction, if required.

**Task SS4 Deliverables**

1. Draft Pavement Geotechnical Report
2. Final Pavement Geotechnical Report

## SS5. 3D VISUALIZATION SERVICES

The ENGINEER will develop and deliver a 3-D project model that shows a three-dimensional representation of the proposed designs superimposed on the surrounding existing conditions within the approximate Area of Modeling defined above. Model development services will be based on the tasks described below.

A. Modeling of Existing Conditions (Feasibility Study)

The 3-D project models will depict the existing conditions within the Area of Modeling by draping aerial photographs onto 3-D terrain surface models and simulating selected surface features. Modeling of existing conditions within the Areas of Modeling will include:

- Aerial photography draped onto the terrain surface models developed from the initial wide-area topographic data;
- Removal of "flattened" vehicles shown on aerial photography from the primary surface roads;
- Infill of areas underneath bridge structures that are obscured on aerial photography;
- Simplified three-dimensional representation of the existing corridor and associated bridge structures;
- Simplified and approximate representation of existing buildings located within the Area of Modeling, consisting of building footprints extruded to form shapes with generic facades and roofs;
- Approximation of existing trees and foliage within the Areas of Modeling based on visual inspection of aerial and street-level photography;
- Floating "billboard" labels identifying primary points of interest;
- Overlay of street name labels on primary roads.

Except as listed above, the 3-D project model will not include any other existing topographic features such as existing signs, signals, utility poles and cables, curbs, islands, lights, barriers, railings, or mailboxes.

B. Initial Modeling of Alignment Alternatives (Feasibility Study)

The 3-D project model will depict simplified representations of the proposed designs of CR 400 and CR 452 on up to four different alignments including:

- Simplified three-dimensional representation of the corridor alternatives including pavement textures, basic striping and markings, medians, curbs, gutters, and sidewalks;
- Simplified three-dimensional representation of bridge and causeway structures crossing the wetland area;

- Simplified traffic consisting of vehicles moving in both directions on each roadway at constant speeds and on non-conflicting paths, similar to the traffic that can be seen on the video found at https://www.mass.gov/north-washington-street-bridge-replacement

Except as listed above, the 3-D project model will not include driveway openings, roadside and way-finding signs, traffic signals, utility poles and cables, and other features not specifically described.

C. Modeling of Preferred Alternative (Design Schematic)

After detailed designs for the preferred alignment alternative have been developed the 3-D project model will be updated to depict a more detailed representation of the selected corridor, including:

- Updating the existing conditions to include more detailed survey data collected for the selected corridor;
- Removal of the representations of the rejected alternatives;
- Detailed three-dimensional representation of the roadway for the selected alignment including pavement textures, detailed striping and marking, medians, curbs and gutters, driveway openings, traffic signals, and other relevant roadway details;
- Detailed three-dimensional representation of the causeway and bridge structures used to cross the wetland area;
- Simplified traffic consisting of vehicles moving in both directions on each roadway at constant speeds and on non-conflicting paths, similar to the traffic that can be seen on the video found at https://www.mass.gov/north-washington-street-bridge-replacement;

D. Other / Miscellaneous (Feasibility Study and Design Schematic)

1. The 3-D project model will include the following features that can be used to facilitate review and presentation of the proposed improvements in both phases:

- Shortcuts to critical viewpoints;
- Up to ten camera animations along paths to be designated by the COUNTY, such as flyovers and drive-throughs.
- Predefined controls to easily show different view states such as Existing and Alternatives conditions.

2. The ENGINEER will also provide the following services related to usage of the 3-D project visualization model:

- Assistance in the development of a Virtual Tour hosted on the 123bim.com web collaboration systems using camera viewpoint locations selected by the COUNTY (for an example of a virtual tour see http://vtour.123bim.com/AAIY/);
- One hour of introductory training via web meeting to project team members on the use of the various 123BIM applications;
- One hour of assistance via web meeting for optimal use of the 3-D project model for specific public and stakeholder outreach events;

- Assistance in the development of "storyboard" videos with titles and captions developed from animated video clips exported from the 3-D project model, similar in quality to the example that may be seen at https://www.mass.gov/north-washington-street-bridge-replacement.

Note: The 123BIM.com subscription period will begin upon Commencement of Work.

**Task SS5 Deliverables**

1. Viewable and Downloadable 3D project model files via the 123BIM.com web collaboration service.

**EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)**
**BGE, Inc.**
**FM 546 / CR 400 Phase I Corridor Study**

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | |
|---|---|
| *Total BGE, Inc. Fee (Engineering/Survey/ROW/SUE)* | $224,850.07 |
| *Total Lamb-Star Engineering, L.P. Fee* | -$67,743.00 |
| *Total Gorrondona & Associates, Inc. Fee (Aerial LiDAR/Ortho-Photogrammetry)* | -$8,365.90 |
| *Total Terracon Consultants, Inc. Fee (Geotechnical Investigations)* | -$27,263.17 |
| *Total RDV Systems, Inc. Fee (3D Design/Visualization Services)* | -$3,326.46 |
| *Total Public Information Associates (PIA) Fee (Public/Stakeholder Involvement - Includes PublicInput.com)* | -$6,311.51 |
| ***Total BGE, Inc. Team Fee*** | **$111,840.03** |

| **Breakdown by Services** | **Totals** |
|---|---|
| Engineering/Stakeholder Involvement | $149,923.49 |
| Ground Survey & Aerial Photogrammetry/Flight (entire corridor) | -$5,655.64 |
| Utility Investigation/Coordination & SUE services | $7,944.00 |
| ROW Mapping (including fieldwork and abstracting) | -$9,782.19 |
| Geotechnical Services (including pavement design) | -$27,263.17 |
| 3D visualization/animation services | -$3,326.46 |
| **Total:** | **$111,840.03** |

**EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)**
**BGE, Inc.**
**FM 546 / CR 400 Phase I Corridor Study**

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | Sr. Project Manager | Subject Matter Expert/ Task Manager | Senior Engineer | Project Engineer | Design Engineer | EIT | Senior Civil Designer (20+ yrs) | Senior Env. Scientist | Clerical | Total Hours | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rate** | **$260.00** | **$245.00** | **$198.00** | **$135.00** | **$120.00** | **$110.00** | **$170.00** | **$170.00** | **$85.00** | | |
| **BASIC SERVICES** | | | | | | | | | | | |
| ***TASK BS1 - ASSEMBLY AND REVIEW OF DATA*** | | | | | | | | | | | |
| A. COLLECTION OF DATA, REPORTS, AND MAPS | | | | | | | | | | | |
| Data Collection (includes coordination with other Firms) | | | 1 | | | | | | | 1 | $ 198.00 |
| **TASK BS1 TOTALS (HOURS)** | **0** | **0** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **$ 198.00** |
| **TASK BS1 TOTALS (COST)** | **$0.00** | **$0.00** | **$198.00** | **$0.00** | **$0.00** | **$0.00** | **$0.00** | **$0.00** | **$0.00** | **$198.00** | **$ 198.00** |
| ***TASK BS2 - CORRIDOR TYPICAL SECTION EVALUATION*** | | | | | | | | | | | |
| A. CORRIDOR SECTION EVALUATION | | | | | | | | | | | |
| Development of Typical Sections (Interim and Ultimate) | | | 1 | 1 | 3 | | | | | 5 | $ 693.00 |
| **TASK BS2 TOTALS (HOURS)** | **0** | **0** | **1** | **1** | **3** | **0** | **0** | **0** | **0** | **5** | **$ 693.00** |
| **TASK BS2 TOTALS (COST)** | **$0.00** | **$0.00** | **$198.00** | **$135.00** | **$360.00** | **$0.00** | **$0.00** | **$0.00** | **$0.00** | **$693.00** | **$ 693.00** |
| ***TASK BS3 - CORRIDOR ALTERNATIVES ANALYSIS*** | | | | | | | | | | | |
| A. Lowry Crossing Alignment Analysis (3 Additional Alternatives) | | | | | | | | | | 0 | |
| Horizontal and Vertical Alignment Analysis | 1 | | 1 | 1 | | 2 | | | | 5 | $ 813.00 |
| Conceptual 3D modeling | | | | 1 | | 6 | 4 | | | 11 | $ 1,475.00 |
| Identification of Impacts | | | | 1 | | 2 | | | | 3 | $ 355.00 |
| Development of Cost Estimates | | | | 1 | | 4 | | | | 5 | $ 575.00 |
| B. Development of Comparison Scoring Matrix | | | | | | | | | | 0 | |
| Lowry Crossing Alignments | | | 1 | 1 | | 4 | | | | 6 | $ 773.00 |
| E. Conceptual Alternative Alignments | | | | | | | | | | 0 | |
| Plan View Only Alternatives at US 380 (Up to 11 Scenarios) | 4 | | 4 | 16 | 16 | | | | | 40 | $ 5,912.00 |
| **TASK BS3 TOTALS (HOURS)** | **5** | **0** | **6** | **21** | **16** | **18** | **4** | **0** | **0** | **70** | **$ 9,903.00** |
| ***TASK BS4 - SCHEMATIC DEVELOPMENT*** | | | | | | | | | | | |
| A. GENERAL | | | | | | | | | | | |
| Traffic Capacity Analysis | | | | | | | | | | | |
| Multilane Highway Analysis at Interim T-Intersection | | 4 | | 30 | | 100 | | | | 134 | $ 16,030.00 |
| Refinements to Accommodate Upcoming/Ongoing Improvements | 4 | | 12 | 16 | 8 | 32 | 8 | | | 80 | $ 11,416.00 |
| Review and Coordinate design for preliminary temporary t-intersection | | | 4 | 4 | | | | | | 8 | $ 1,332.00 |
| Project extension from FM 982 to 2300 ft east of FM 982 | | | | | | | | | | | |
| Schematic | | | | | | | | | | | |
| Project, Base and Sheet File Adjustments | 2 | 8 | 16 | 72 | | 48 | 4 | | | 150 | $ 21,328.00 |
| Develop Cross Sections | | | 2 | 8 | | 16 | 8 | | | 34 | $ 4,596.00 |
| Produce 90% and 100% Cross Sections | 2 | | 4 | 4 | | 22 | 6 | | | 38 | $ 5,292.00 |
| Adjust 3D Corridor Model | | | 4 | 16 | | 40 | 8 | | | 68 | $ 8,712.00 |
| Prepare for and Complete QAQC | 4 | 4 | 8 | 8 | | 20 | 4 | | | 48 | $ 7,564.00 |
| 3D Corridor Model Development (Bentley OpenRoads) | | | 6 | 8 | | 28 | 4 | | | 46 | $ 6,028.00 |
| Quantities and Estimate | | | 4 | 8 | | 16 | | | | 28 | $ 3,632.00 |
| ROW Development | 2 | | 4 | 8 | | 8 | | | | 22 | $ 3,272.00 |
| Address 90% and 100% Comments | | | | 8 | | 12 | 4 | | | 24 | $ 3,080.00 |
| **TASK BS4 TOTALS (COST)** | **$3,640.00** | **$3,920.00** | **$12,672.00** | **$25,650.00** | **$960.00** | **$37,620.00** | **$7,820.00** | **$0.00** | **$0.00** | **$92,282.00** | **$ 92,282.00** |

**EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)**
**BGE, Inc.**
**FM 546 / CR 400 Phase I Corridor Study**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***TASK BS5 - HYDROLOGIC AND HYDRAULIC INVESTIGATION*** | | | | | | | | | | | |
| 1 QA/QC | | | | | | | | | | | |
| 2 A-C. Hydrologic and Hydraulic Investigation | | | | | | | | | | | |
| Major Drainage - Previously under Lamb-Star's Effort | | | 24 | 24 | 36 | 58 | 16 | | | 158 | $ 21,412.00 |
| Review and Coordinate Drainage for Temp. T-Intersection | 2 | 2 | 8 | 8 | | | | | | 20 | $ 3,674.00 |
| Coordination with adjacent projects | | | | | | | | | | | |
| Crossing for East Fork Trinity River Tributary | 2 | 4 | 6 | 18 | 28 | | | | | 58 | $ 8,478.00 |
| Up to three (3) adjacent developments | 2 | 6 | 24 | 24 | 100 | | | | | 156 | $ 21,982.00 |
| 3 D. Drainage Design Technical Summary Report - Incorporate drainage exhibits | | | 8 | 24 | 24 | | | | | 56 | $ 7,704.00 |
| | | | | | | | | | | 0 | $ - |
| **TASK BS5 TOTALS (HOURS)** | **6** | **12** | **70** | **98** | **188** | **58** | **16** | **0** | **0** | **448** | **$ 63,250.00** |
| **TASK BS5 TOTALS (COST)** | **$1,560.00** | **$2,940.00** | **$13,860.00** | **$13,230.00** | **$22,560.00** | **$6,380.00** | **$2,720.00** | **$0.00** | **$0.00** | **$63,250.00** | **$ 63,250.00** |
| ***TASK BS7 - PUBLIC/STAKEHOLDER INVOLVEMENT*** | | | | | | | | | | | |
| C Stakeholder Involvement | | | | | | | | | | 0 | $ - |
| Additional Property Owner/Stakeholder Coordination | 22 | | 24 | 12 | 10 | | | | 6 | 74 | $ 13,802.00 |
| **TASK BS7 TOTALS (HOURS)** | **22** | **0** | **24** | **12** | **10** | **0** | **0** | **0** | **6** | **74** | **$ 13,802.00** |
| **TASK BS7 TOTALS (COST)** | **$5,720.00** | **$0.00** | **$4,752.00** | **$1,620.00** | **$1,200.00** | **$0.00** | **$0.00** | **$0.00** | **$510.00** | **$13,292.00** | **$ 13,802.00** |
| ***TASK BS8 - PROJECT MANAGEMENT*** | | | | | | | | | | | |
| A. SCHEDULE, PROGRESS REPORTS, AND INVOICES | | | | | | | | | | | |
| Schedule and Updates | 8 | 2 | 2 | | | | | | | 12 | $ 2,966.00 |
| Progress Reports | 2 | | 2 | | | | | | | 4 | $ 916.00 |
| Preparing Invoices | 12 | | 4 | | | | | | | 16 | $ 3,912.00 |
| B. PROGRESS/COORDINATION MEETINGS | | | | | | | | | | 0 | $ - |
| Prepare for and Attend Internal Coordination Meetings (6) | 12 | | 4 | | | | | | | 16 | $ 3,912.00 |
| Prepare subcontracts, direct & monitor sub activities, review sub work and invoices | | | 4 | | | | | | | 4 | $ 792.00 |
| **TASK BS8 TOTALS (HOURS)** | **58** | **2** | **44** | **20** | **0** | **36** | **0** | **0** | **10** | **170** | **$ 31,792.00** |
| **TASK BS8 TOTALS (COST)** | **$15,080.00** | **$490.00** | **$8,712.00** | **$2,700.00** | **$0.00** | **$3,960.00** | **$0.00** | **$0.00** | **$850.00** | **$30,942.00** | **$ 31,792.00** |
| | | | | | | | | | | | |
| **TOTAL BGE HOURS (BASIC SERVICES)** | **105** | **30** | **210** | **342** | **225** | **454** | **66** | **0** | **16** | **1,448** | **$ 211,920.00** |
| **TOTAL BGE LABOR COST (BASIC SERVICES)** | **$27,300.00** | **$7,350.00** | **$41,580.00** | **$46,170.00** | **$27,000.00** | **$49,940.00** | **$11,220.00** | **$0.00** | **$1,360.00** | **$210,560.00** | **$ 211,920.00** |
| | | | | | | | | | | | |
| ***Direct Expenses*** | | | | | | | **Unit** | **Quantity** | **Rate** | **Total** | **Total** |
| Adjustment for Unsued Expenses | | | | | | | | | | | $ (9,940.00) |
| ***Total BGE, Inc. BS Fee*** | | | | | | | | | | **$210,560.00** | **$ 201,980.00** |

# EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)
## BGE, Inc.
## FM 546 / CR 400 Phase I Corridor Study

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | RPLS Project Manager | QA/QC Manager | RPLS | Chief of Parties | Sr. Survey Tech | Survey Tech | Survey Crew | TOTAL LABOR HRS. & COSTS |
|---|---|---|---|---|---|---|---|---|
| ***TASK SS1 - SURVEYING AND ROW MAPPING*** | | | | | | | | |
| Field Surveying | | | | | | | | |
| Topo Survey | | | 2 | 1 | 8 | | 8 | 19 |
| HOURS SUB-TOTALS | | | 2 | 1 | 8 | | 8 | |
| CONTRACT RATE PER HOUR | $ 214.75 | $ 197.16 | $ 197.16 | $ 142.18 | $ 111.72 | $ 101.57 | $ 160.00 | |
| TOTAL LABOR COSTS | $0.00 | $0.00 | $394.32 | $142.18 | $893.76 | $0.00 | $1,280.00 | $2,710.26 |
| | | | | | | | | |
| **SUBTOTAL (SURVEYING)** | $0.00 | $0.00 | $394.32 | $142.18 | $893.76 | $0.00 | $1,280.00 | **$2,710.26** |
| | | | | | | | | |
| ***TASK SS1 - ROW MAPPING*** | | | | | | | | |
| Develop Right of Way Maps, Deed Descriptions and Plats | | | | | | | | |
| Parcel Plat & M&B (up to an additional 7 parcels) | 4 | 6 | 16 | | 16 | 40 | 62 | 144 |
| ROE Permission & Tracking (up to an additional 7 parcels) | | | 1 | | 8 | | | 9 |
| | | | | | | | | |
| HOURS SUB-TOTALS | 4 | 6 | 17 | | 24 | 40 | 62 | 153 |
| CONTRACT RATE PER HOUR | $ 214.75 | $ 197.16 | $ 197.16 | $ 142.18 | $ 111.72 | $ 101.57 | $ 160.00 | |
| TOTAL LABOR COSTS | $859.00 | $1,182.96 | $3,351.72 | $0.00 | $2,681.28 | $4,062.80 | $9,920.00 | $22,057.76 |
| | | | | | | | | |
| **SUBTOTAL (ROW MAPPING)** | $859.00 | $1,182.96 | $3,351.72 | $0.00 | $2,681.28 | $4,062.80 | $9,920.00 | **$22,057.76** |
| **Labor Totals** | | | | | | | | **$24,768.02** |
| **Direct Expenses** | | | | | | | | |
| **Task Description** | **Per Item Rate** | **Number of Items** | **Unit** | | | | | |
| Unused Expenses | | | | | | | | $ (9,841.95) |
| | | | | | | | | $ - |
| **Direct Expenses Totals** | | | | | | | | **$ (9,841.95)** |
| ***Total BGE, Inc. SS1 Fee*** | | | | | | | | **$14,926.07** |

# EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)
## BGE, Inc.
## FM 546 / CR 400 Phase I Corridor Study

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | Sr. Project Manager | Project Manager | Design Engineer | Engineer-In-Training | Designer | RPLS | Survey Tech. | SUE Field Manager | 2-Man Designating Crew | TOTAL LABOR HRS. & COSTS |
|---|---|---|---|---|---|---|---|---|---|---|
| **TASK SS2 - Utility Investigation (SUE)** | | | | | | | | | | |
| Utility Investigation (SUE) | | | | | | | | | | |
| A. Project Management, Coordination, & QA/QC | 1 | 2 | | 2 | | | | | | 5 |
| B. Digtess Ticket Preparation & Coordination w/ Utility Site Rep's | | | | | 4 | | | | | 4 |
| C. Records Research | | | | 4 | | | | | | 4 |
| D. Level C/D Linework | | | | 4 | 16 | | | | | 20 |
| E. Field Locating (For final selected alignment) | | | | | | | | | | 0 |
| F. Mapping of Level B Line Work | | 2 | 2 | | 4 | | 4 | | | 12 |
| G. Address QA/QC Comments, File Cleanup, Deliverables | | 1 | 2 | | 2 | | | 2 | | 7 |
| H. Conflict List | | 1 | | 2 | 2 | | | | | 5 |
| I. Oncor Coordination to discuss Proposed Alternatives | 1 | 6 | | 2 | | | | | | 9 |
| HOURS SUB-TOTALS | 2 | 12 | 4 | 14 | 28 | | 4 | 2 | | |
| CONTRACT RATE PER HOUR | $ 234.00 | $ 172.00 | $ 120.00 | $ 94.00 | $ 111.00 | $ 179.00 | $ 78.00 | $ 98.00 | $ 180.00 | 66 |
| TOTAL LABOR COSTS | $468.00 | $2,064.00 | $480.00 | $1,316.00 | $3,108.00 | $0.00 | $312.00 | $196.00 | $0.00 | $7,944.00 |
| | | | | | | | | | | |
| **SUBTOTAL - Utility Investigation (SUE)** | $468.00 | $2,064.00 | $480.00 | $1,316.00 | $3,108.00 | $0.00 | $312.00 | $196.00 | $0.00 | **$7,944.00** |

| **Direct Expenses** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Task Description** | **Per Item Rate** | **Number of Items** | **Unit** | | | | | | | |
| Mileage (miles) | $0.58 | 0 | EA | | | | | | | $ - |
| Photcopies B/W (8.5"x11") | $0.10 | | EA | | | | | | | $ - |
| Photcopies B/W (11"X17") | $0.20 | | EA | | | | | | | $ - |
| Toll Charges (each) | $10.00 | | EA | | | | | | | $ - |
| Abstractor Fee | $510.00 | | EA | | | | | | | $ - |
| Type II ROW & Control Monuments | $20.00 | | EA | | | | | | | $ - |
| | | | | | | | | | | $ - |
| | | | | | | | | | | $ - |
| **Direct Expenses Totals** | | | | | | | | | | **$ -** |
| | | | | | | | | | | |
| ***Total BGE, Inc. SS2 Fee*** | | | | | | | | | | **$7,944.00** |

# EXHIBIT "C" - FEE SCHEDULE
# LAMB-STAR ENGINEERING, L.P.
# FM 546 / CR 400 Phase I Corridor Study

| Task No. | Task Description | Labor (hours) | | | | | | | | | | | | Total Labor Cost | Task Sub Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Project Manager | Senior Design Engineer | Project Engineer | Design Engineer | Engineer-In-Training | Sr CAD Operator | RPLS Project Manager | RPLS Task Lead | GIS Technician | Survey Tech | Abstractor | Admin/ Clerical | | |
| | Rate | $225 | $200 | $175 | $150 | $120 | $135 | $181 | $164 | $120 | $115 | $90 | $105 | | |
| **BS5** | **Drainage** | **0** | **-27** | **-24** | **0** | **-26** | **11** | **0** | **0** | **0** | **0** | **0** | **0** | **$ (11,235.00)** | **$ (11,235.00)** |
| A.1 | Drainage Area Mapping | | | 2 | 4 | 4 | 2 | | | | | | | $ 1,700.00 | $ 1,700.00 |
| A.2 | Calculate Discharges | | 1 | 4 | 4 | 4 | | | | | | | | $ 1,980.00 | $ 1,980.00 |
| A.3 | Size Cross Drainage Structures (HY-8) | | 1 | 4 | 10 | 2 | | | | | | | | $ 2,640.00 | $ 2,640.00 |
| A.4 | Determine ROW and easement needs | | 1 | 4 | 4 | | 2 | | | | | | | $ 1,770.00 | $ 1,770.00 |
| A.5 | Provide information for Drainge Design Technical Summary Report | | | 2 | 8 | | 4 | | | | | | | $ 2,090.00 | $ 2,090.00 |
| A.6 | OPCC | | | 2 | 4 | 1 | | | | | | | | $ 1,070.00 | $ 1,070.00 |
| B | Major Drainage - Moved to under BGE's tasks | | -33 | -48 | -54 | -46 | -5 | | | | | | | $ (29,295.00) | $ (29,295.00) |
| C.1 | Develop approximate trunk size and inlet spacing (Approx 2400LF) | | 1 | 1 | 8 | 4 | 2 | | | | | | | $ 2,325.00 | $ 2,325.00 |
| C.2 | Determine ROW and easement needs for outfall | | 1 | 1 | 4 | 2 | 2 | | | | | | | $ 1,485.00 | $ 1,485.00 |
| C.3 | Provide information for Drainge Design Technical Summary Report | | 1 | 2 | 4 | 2 | 4 | | | | | | | $ 1,930.00 | $ 1,930.00 |
| C.4 | OPCC | | | 2 | 4 | 1 | | | | | | | | $ 1,070.00 | $ 1,070.00 |
| | | | | | | | | | | | | | | | |
| **BS3** | **Corridor Alternatives Analysis** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **$ -** | **$ (34,510.00)** |
| | Task Complete - Unused Labor | | | | | | | | | | | | | $ - | $ (34,510.00) |
| | | | | | | | | | | | | | | | |
| **SS1** | **ROW Base Map** | **0** | **0** | **0** | **0** | **0** | **0** | **-20** | **-37** | **0** | **-160** | **70** | **-2** | **$ (21,998.00)** | **$ (21,998.00)** |
| SS1.1 | Abstracting and Ownership List (Assuming 6 properties) | | | | | | | | | | | 70 | | $ 6,300.00 | $ 6,300.00 |
| SS1.2 | Task Complete - Unused Labor | | | | | | | -20 | -37 | | -160 | | -2 | $ (28,298.00) | $ (28,298.00) |
| | | | | | | | | | | | | | | | |
| ***Total Labor*** | | **0** | **-27** | **-24** | **0** | **-26** | **11** | **-20** | **-37** | **0** | **-160** | **70** | **-2** | **$ (33,233.00)** | **$ (67,743.00)** |

| | |
|---|---|
| ***Total Lamb-Star Engineering, L.P. Fee*** | **$ (67,743.00)** |

**EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)**
**GORRONDONA & ASSOCIATES, INC.**
**FM 546 / CR 400 Phase I Corridor Study**

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | PROJECT MANAGER | PROJECT COORD. AM | CERTIFIED PHOTO-GRAMMETRIST | ANALYTICAL TRIANGULATION SPECIALIST | AERIAL MAPPING TECHNICIAN | ORTHOPHOTO SPECIALIST | MAPPING EDITOR | AERIAL OFFICE TECHNICIAN | PROJECT COORD. AP | AERIAL PROCESSING TECHNICIAN | PROJECT COORD. HAL | HELICOPTER LIDAR PROC. TECH | PHOTO LAB SPECIALIST | PHOTO PROC. TECH. | ADMIN/ CLERICAL | TOTAL LABOR HRS. & COSTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Task Complete - Unused Labor*** | | | | | | | | | | | | | | | | ($8,365.90) |
| ***Direct Expenses*** | | | | | | | | | | | | | | | | |
| **Direct Expenses Totals** | | | | | | | | | | | | | | | | $ - |
| | | | | | | | | | | | | | | | | |
| ***Total Gorrondona & Associates, Inc Fee*** | | | | | | | | | | | | | | | | ($8,365.90) |

# EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)
## Terracon Consultants, Inc.
## FM 546 / CR 400 Phase I Corridor Study

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | PROJECT MANAGER | SENIOR ENGINEER | PROJECT ENGINEER | SENIOR ENGINEERING TECH | ADMIN / CLERICAL | TOTAL LABOR HRS. & COSTS |
|---|---|---|---|---|---|---|
| **SS4. Geotechnical Investigation** | | | | | | |
| **Transfer of remaining labor to Myrick Lane and Boorman Lane PS&E** | | | | | | -11940.25 |
| | | | | | | |
| **SUBTOTAL - LABOR** | | | | | | **($11,940.25)** |

# EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)
## Terracon Consultants, Inc.
## FM 546 / CR 400 Phase I Corridor Study

| Direct Expenses | UNIT | RATE | SS4 | | |
|---|---|---|---|---|---|
| Transfer of remaining expenses to Myrick Lane and Boorman Lane PS&E | | | | | ($15,322.92) |
| **SUBTOTAL Direct Expenses** | | | $ - | $ - | **($15,322.92)** |

| | |
|---|---|
| SUBTOTAL - LABOR | ($11,940.25) |
| SUBTOTAL Direct Expenses | ($15,322.92) |
| ***Total Terracon Consultants, Inc. Fee*** | **($27,263.17)** |

# EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)
## RDV Systems, Inc.
## FM 546 / CR 400 Phase I Corridor Study
## SS5 - 3D Visualization Services

| | Consultant Positions => | Sr. Modeling Engineer | Modeling Engineer(s) | Delivery Manager | Modeling Project Manager | TOTAL | |
|---|---|---|---|---|---|---|---|
| Task No. | Task Descriptions | *Hours* | *Hours* | *Hours* | *Hours* | *Hours* | *Cost* |
| | Task Complete - Unused Labor | | | | | | $ (3,326.46) |
| | *Total RDV Systems, Inc.* | | | $ | (3,326.46) | | |

# EXHIBIT "C" - FEE SCHEDULE (PHASE I - AMENDMENT 3)
## Public Information Associates
## FM 546 / CR 400 Phase I Corridor Study

| *From Bridgefarmer Rd in Lowry Crossing, TX to CR 400 in Princeton, TX; From 2300 ft east of FM 982 to Baron Drive; At Intersection with US 380* | PI Specialist (Partner) | PI Coordinator | PI Admin Support | Totals |
|---|---|---|---|---|
| **Rate** | **$155.00** | **$109.00** | **$54.00** | |
| **BASIC SERVICES** | | | | |
| ***TASK BS7 - PUBLIC/STAKEHOLDER INVOLVEMENT*** | | | | |
| A. Public Involvement Plan | | | | 0 |
| B. Public Involvement Management | 16 | 12 | 8 | 36 |
| C. Stakeholder Involvement | 20 | 20 | 10 | 50 |
| D. Public Meetings (2 Estimated) | | | | 0 |
| Public Hearing | | | | 0 |
| **TASK BS5 TOTALS (HOURS)** | **36** | **32** | **18** | **86** |
| **TASK BS5 TOTALS (COST)** | **$5,580.00** | **$3,488.00** | **$972.00** | **$10,040.00** |
| ***Reimbursable Direct Expenses*** | **Unit** | **Quantity** | **Rate** | **Total** |
| Unused Expenses | LS | 1 | ($16,351.51) | ($16,352) |
| **Total Reimbursable Direct Expenses** | | | | **($16,351.51)** |
| | | | | |
| ***Total Public Information Associates Fee*** | | | | **($6,311.51)** |

# FM 546 / CR 400 Phase I Corridor Study

| | Original | Amendment # 3 | | | | | | | Combined Total |
|---|---|---|---|---|---|---|---|---|---|
| | Total | BGE, Inc. | LSE | GAI | Terracon | RDV | PIA | Total | |
| **BASIC SERVICES** | | | | | | | | | |
| BS1 - Assembly and Review of Data | $ 31,132.00 | $ 198.00 | | | | | | $ 198.00 | $ 31,330.00 |
| BS2 - Corridor Typical Section Eval. | $ 3,802.00 | $ 693.00 | | | | | | $ 693.00 | $ 4,495.00 |
| BS3 - Corridor Alternatives Analysis | $ 140,887.00 | $ 9,903.00 | $ (34,510.00) | | | | | $ (24,607.00) | $ 116,280.00 |
| BS4 - Schematic Development | $ 289,638.00 | $ 92,282.00 | $ - | | | | | $ 92,282.00 | $ 381,920.00 |
| BS5 - H&H Investigation | $ 71,406.00 | $ 63,250.00 | $ (11,235.00) | | | | | $ 52,015.00 | $ 123,421.00 |
| BS7 - Public/Stakeholder Involvement | $ 121,337.00 | $ 13,802.00 | | | | | $ 10,040.00 | $ 23,842.00 | $ 145,179.00 |
| BS8 - Project Management | $ 96,272.00 | $ 31,792.00 | $ - | | | | | $ 31,792.00 | $ 128,064.00 |
| BS - Expenses | $ 47,684.50 | $ (9,940.00) | $ - | | | | $ (16,351.51) | $ (26,291.51) | $ 21,392.99 |
| **Subtotal** | **$ 802,158.50** | **$ 201,980.00** | **$ (45,745.00)** | **$ -** | **$ -** | **$ -** | **$ (6,311.51)** | **$149,923.49** | $ 952,081.99 |
| | | | | | | | | | |
| **SPECIAL SERVICES** | | | | | | | | | |
| SS1 - Surveying & ROW Mapping | $ 319,628.69 | $24,768.02 | $ (21,998.00) | | | | | $ 2,770.02 | $ 322,398.71 |
| SS2 - SUE | $ 41,116.00 | $7,944.00 | $ - | | | | | $ 7,944.00 | $ 49,060.00 |
| SS3 - Aerial and Lidar | $ 62,295.00 | | | $ (8,365.90) | | | | $ (8,365.90) | $ 53,929.10 |
| SS4 - Geotechnical Investigation | $ 21,234.02 | | | | ($11,940.25) | | | $ (11,940.25) | $ 9,293.77 |
| SS5 - 3D Visualization | $ 34,342.42 | | | | | $ (3,326.46) | | $ (3,326.46) | $ 31,015.96 |
| SS - Expenses | $ 113,764.30 | $ (9,841.95) | $ - | $ - | ($15,322.92) | $ - | | $ (25,164.87) | $ 88,599.43 |
| **Subtotal** | **$ 592,380.43** | **$ 22,870.07** | **$ (21,998.00)** | **$ (8,365.90)** | **$ (27,263.17)** | **$ (3,326.46)** | **$ -** | **$ (38,083.46)** | **$ 554,296.97** |
| **Total** | **$ 1,394,538.93** | **$ 224,850.07** | **$ (67,743.00)** | **$ (8,365.90)** | **$ (27,263.17)** | **$ (3,326.46)** | **$ (6,311.51)** | **$111,840.03** | **$ 1,506,378.96** |

# Amendment #3

## 3. Phase 2 Professional Services
## Revised Scope/Fee for Planning

Agreement No. 2019-210
Amendment 3

**EXHIBIT "A"**

SCOPE OF SERVICES

**FM 546 Phase II Study**
**Corridor Alignment Analysis, Public/Stakeholder Involvement, Schematic Design, NEPA/Environmental Assessment (EA), Traffic Analysis, Traffic Projections, Geotechnical Investigation, Subsurface Utility Engineering (SUE), Field Surveying, and Right-of-Way (ROW) Mapping**

**Limits:**
**South of McKinney National Airport (Airport Drive) to CR 393 in Lowry Crossing, TX**

## PURPOSE

The Scope of Work to be performed by BGE, Inc. (the "ENGINEER") under this contract will determine and environmentally clear a feasible alignment for an ultimate 6-lane major arterial, with a minimum of 120 feet of ROW. Limits are from the intersection of Airport Drive and Harry McKillop Blvd/Farm to Market (FM) 546 in McKinney, Texas to County Road (CR) 393 in Lowry Crossing, Texas.

FM 546 (the "Project") will include alignment analysis, public/stakeholder involvement, schematic design, NEPA/EA, traffic projections, traffic analysis, geotechnical investigations, SUE, field surveying, and ROW mapping. Collin County (the "COUNTY") serves as the owner of the Project. FM 546 is a State-owned facility. The existing corridor is currently anticipated to be taken off system and replaced with the recommended improvements identified in this Project. Coordination with and review by the Texas Department of Transportation (TxDOT) is required.

NOTES:

1. The project serves as a continuation of the FM 546 / CR 400 study (Phase I), from Bridgefarmer Road in Lowry Crossing, TX to US 380 at Boorman Lane in Princeton, TX. The project limits, from Bridgefarmer Road to CR 393, shall continue as part of the Project for inclusion in the Environmental Assessment (EA) and Design Schematic.
2. Control-Section-Job (CSJ) number 1013-01-04 has been issued by TxDOT for a new location non-freeway, from Airport Road to CR 393. The CSJ is needed for the EA and schematic development to allow TxDOT to review and approve the Project documents.
3. The western limit of the Project is impacted by two (2) build alternatives concurrently being studied by TxDOT for the Spur 399 Extension. TxDOT's alternatives are identified as the purple and orange alignments for alternatives west and east of McKinney National Airport, respectively. The alignments are noted under this contract as "Purple (West)" and "Orange (East)" alternatives. TxDOT's recommendation of either the Purple (West) or Orange (East) alternative is not anticipated to be final until 2023.
4. The Project's first public meeting occurred in April 2022. To maintain Project schedule, three (3) alignment alternatives were developed and studied for each Spur 399 alternative for a total of six (6) alignment alternatives. All six (6) alternatives were presented at the Project's first public meeting for public input and analyzed via an alternative comparison matrix.
5. To minimize schedule impacts to the Project, a single alternative will be recommended would connect to Orange (East). A second alternative will be recommended that would operate independent of Orange (East). The independent alignment will be further studied to tie to existing FM 546 and operate independently regardless of alternative chosen for Spur 399.
6. Develop an Implementation Plan that suggests a logical timeline of long-term improvements with

phased cost estimates.

7. Due to the anticipated increase of traffic on FM 546, one (1) additional alternative with direct connectors will be analyzed further once the recommended alternative has been identified.

The Aerial LiDAR and Ortho-Photogrammetry was flown for the entire limits of this project in Phase I to reduce mobilization costs and delays in Phase II. Only processing of the Aerial Lidar and Ortho-Photogrammetry for Phase II is needed and included as part of this contract.

**DETAILS**

- The initial phase of the Project will consist of an alternatives analysis, utilizing public/stakeholder outreach and alternatives comparison matrix to assist in the identification and selection of a recommended alternative to move directly into schematic design.
- Design Criteria for the project shall comply with TxDOT guidelines for multilane thoroughfares.
- This Project will be developed utilizing English units of measure and all final schematic exhibits will be provided in roll format.
- The work described in this scope of services will include the following major work tasks: Assembly and Review of Data; Corridor Section Evaluation; Diagrammatic Corridor Refinement; Schematic Development; Hydrologic and Hydraulic Investigation; Environmental Studies; Public Involvement; Project Management; Field Surveys, Right-of-Way Mapping, Geotechnical Investigations, Utility Investigation, and Traffic Projections.

- For the purpose of this contract, "Stakeholders" refers to, but is not limited, to the following:

    - COUNTY
    - Federal, state and local public officials
    - City of McKinney
    - City of Lowry Crossing
    - NCTCOG
    - NTMWD
    - Town of Fairview
    - TxDOT
    - USACE
    - Civic and Community leaders
    - Advisory committees
    - Interest Groups

**BASIC SERVICES**

**BS1. ASSEMBLY AND REVIEW OF DATA**

A. Collection of Data, Reports, and Maps

The determination of data requirements, availability, and sources will be coordinated with the COUNTY. Once the data needs and sources are identified, the ENGINEER will contact the appropriate agencies and organizations to obtain the data. Data to be collected will include, but not be limited to:

- Previous studies, exhibits, designs, and reports.
- Stakeholder planning documents (zoning information, thoroughfare maps, preliminary plats, design schematics).
- Utility plans and documents from appropriate municipalities and utility companies.
- Readily available plan sets for crossing or abutting sections within the Project limits.
- Readily available flood plain information and studies from the Federal Emergency Management Agency, FEMA, the Corps of Engineers and/or other governmental agencies.
- The ENGINEER will obtain electronic and/or hard copies from the COUNTY: GIS Data, drainage reports, mapping, survey, and improvement plans within the scoped area. The ENGINEER will acquire from the COUNTY any aerial mapping and soil data for the designated area.
- Obtain desktop level environmental constraints mapping from NCTCOG based on existing environmental databases.

B. Field Reconnaissance

The ENGINEER will perform a corridor site visit to obtain field notes and digital photos along the project corridor. This will include both environmental and engineering staff.

C. Review of Data/Base File Creation

The ENGINEER will review the data collected and from this information will:

- Develop base CAD files (MicroStation Select Series 10) that will be utilized for corridor

evaluation including, but not limited to, existing utilities from visual analysis and additional SUE research; FEMA flood plain limits converted from GIS; and parcels and right-of-way converted from the latest Collin County Appraisal District GIS database.

- Initial environmental constraints mapping will be utilized to refine corridor limits to minimize impacts to known environmentally sensitive areas.

Note: This project will use aerial LiDAR flown in Phase I to create a 3D topographic existing ground surface for use in the corridor evaluation process. The surface will be utilized to create conceptual profile alignments and geometrics to refine corridor location and limits. After the corridor evaluation is completed, the recommended corridor topo will be processed in detail to create design-level survey and will be augmented with field survey to fill void areas as needed.

D. Preliminary Design Conference

The ENGINEER shall prepare and submit a Design Summary Report (DSR) to the COUNTY for review and approval and attend a Kick-Off Meeting to establish and agree on fundamental aspects and concepts, and establish the basic features and design criteria for the project. This DSR will be submitted and coordinated with TxDOT Dallas District for their approval.

Task BS1 Deliverables

1. Field Notes and Site Photographs
2. Design Summary Report (DSR) in TxDOT Format

**BS2. CORRIDOR TYPICAL SECTION EVALUATION**

The ENGINEER will use typical sections developed in Phase I to prepare ultimate typical sections based on a 6-lane urban major thoroughfare. The ENGINEER will prepare and analyze an interim typical section (4-lane) as deemed appropriate and in coordination with the most recent traffic analysis within and surrounding the corridor. The ENGINEER will analyze and prepare interim and ultimate typical sections for the bridge improvements at Lavon Lake and for one direct connector alternative, if needed.

The COUNTY will provide selection and approval of any alternate design criteria and typical corridor section.

Task BS2 Deliverables

1. Ultimate and interim typical sections for the corridor.

**BS3. CORRIDOR ALTERNATIVES ANALYSIS**

The ENGINEER will utilize previously developed alternative alignments and develop additional alignments based on input from project stakeholders and property owners (coordination covered in BS7). Up to eight (8) alignment alternatives will be developed, including three (3) alignment alternatives for each of the Spur 399 alternatives (by others). Each alternative will be scored and inputted into an alternatives comparison matrix for further evaluation.

A recommended alignment will be determined that would connect to Orange (East). A second alignment will be developed to tie to existing FM 546 and operate without constructing the Spur 399 Extension, by others. The alignments for FM 546 Phase II will be further developed to schematic level.

An additional two (2) alternatives are reserved for alignment refinements following public meeting comments.

Alternate corridor evaluation will include the following:

1. Identification of impacts in each of the following categories:
    a. Enhanced Mobility and Safety
        i. Accessibility
        ii. Safety
    b. Cost-Benefit Ratio
        i. Construction Cost
        ii. ROW Acquisition Impact
        iii. Utility & Infrastructure
    c. Engineering Feasibility
        i. Compatibility with Other Projects
    d. Environmental Impacts
        i. Previous Public Input
        ii. Socio-Economic & Neighborhood Impacts
        iii. Noise Impacts
        iv. Natural Impacts
        v. Cultural Impacts
        vi. Stakeholder Input
        vii. Hazardous Materials
2. Preparation of Scoring Matrix for each impact (shown above)

A. McKinney National Airport/SP 399 Extension Analysis

Review the long-term improvements identified through the Spur 399 Extension, by others, and develop an alignment that connects to existing FM 546 and provides independent utility to the Project. The ROW footprint originally identified for Orange (East) shall be considered either fully or in part to minimize additional impacts to adjacent properties. The compatibility of alignments with known improvements will be analyzed.

The ENGINEER will develop a Draft and Final Implementation Plan at the interchange with Spur 399, in PowerPoint format, that suggests a logical timeline of long-term improvements and phased cost estimates.

The ENGINEER will coordinate and identify a recommended corridor alignment in coordination with City of McKinney, McKinney National Airport, TxDOT (and their Spur 399 consultant), Town of Fairview, and NCTCOG between Airport Road and the East Fork Trinity River bridge. Engineering analysis may include at grade and sub-grade options (cut/cover, open cut/walls, etc.) and will need to be coordinated with TxDOT's latest efforts to develop a SP 399 controlled access facility to either the west or east of the airport. The six (6) different alignment alternatives will include conceptual cost estimates and drainage analysis for each for input into a cost/benefit analysis. Horizontal alignments will be refined and conceptual vertical alignments created for each option. Additionally, templates will be developed in Bentley's OpenRoads (SS4) software and used to create a proposed, conceptual 3D design model for use in conceptual cost estimate development (earthwork, pavement quantities, etc.). Superelevation will be

considered, if required, as part of the conceptual effort for each alternative.

Should the Orange (East) alternative be selected as the recommended alignment for the Spur 399 Extension, the ENGINEER shall analyze a single interchange alternative that focuses on relieving congestion under long-term conditions. The ENGINEER shall develop a conceptual layout of a multi-level interchange including best locations for median openings, ingress/regress locations and cross street improvements. Reasonable impacts to the ramping configuration of Orange (East) shall be evaluated. Recommended improvements shall be developed and presented to the County, in KMZ for PDF format, for further discussion.

The ENGINEER shall develop up to two (2) conceptual arterial alignments in coordination with City staff that agree with future updates to the City of McKinney's Thoroughfare Plan. The operational efficiencies of these alignments shall be reviewed and considered in the comparison matrix for the Project.

The ENGINEER will coordinate, analyze and identify a recommended corridor alignment along the existing FM 546, from west of CR 324 to the East Fork Trinity River Tributary. Impacts to existing corridor and adjacent properties will be analyzed to the north, from the center and to the south.

B. Crossing of the East Fork Trinity River Tributary to Lake Lavon

The ENGINEER will develop up to two (2) alternative design options for a single alternative alignment, consisting of widening the existing bridge and proposing a new bridge structure and in coordination with TxDOT, City of McKinney, USACE, and/or NCTCOG. Options will take into account environmental, utility, hydraulic, geotechnical, structural, and traffic impacts. These alignments will be developed to a conceptual planning level of effort and include conceptual cost estimates and drainage analysis for input into a cost/benefit analysis. Horizontal alignments will be refined and conceptual vertical alignments created for each option. Additionally, templates will be developed in Bentley's OpenRoads (SS4) software or later and used to create a proposed, conceptual 3D design model for use in conceptual cost estimate development (earthwork, pavement quantities, etc.). Superelevation will be considered, if required, as part of the conceptual effort for each alternative.

The ENGINEER will analyze up to three (3) alternative designs within project limits for flood storage and mitigation in coordination with USACE at the Lake Lavon crossing. Fill within flood storage shall be broken down and mitigated within these three categories:

- Below 492' for water supply
- 492' to 503.5' for main flood storage
- Above 503.5' for surcharge

The ENGINEER shall develop a technical memorandum and shall include results in table format and statement verifying no net loss was found in any of the three categories or as a cumulative.

C. Development of Comparison Scoring Matrix

Develop a matrix-based scoring tool to be used to compare alternatives within each segment of alternative analysis that supports the NEPA (National Environmental Policy Act) process.

Items to be considered, but not limited to, cost, environmental impacts, public/stakeholder input, safety, mobility, cost/benefit, etc. Alternatives will be scored and the recommended alternative(s) identified through the scoring matrix effort.

D. Public Meeting & Hearing

For public involvement related tasks, see section BS7. The ENGINEER will provide a response to any stakeholder comments to the COUNTY, including engineering backup figures and/or exhibits.

The ENGINEER will provide a response to any stakeholder comments to the COUNTY, including engineering backup figures and/or exhibits.

E. Corridor Presentation

The ENGINEER will prepare up to two (2) technical PowerPoint presentations and present a refined corridor alignment for COUNTY approval.

F. Traffic Projections

The ENGINEER The Engineer will develop traffic projections along FM 546 from Bridgefarmer Road to proposed Spur 399 for the No Build scenario and up to three (3) Build Alternatives. The traffic projections will be developed for Average Daily Traffic, AM Peak Hour Traffic, and PM Peak Hour Traffic for the opening-year, design-year (opening year +20) and pavement design year (opening year + 30). The Engineer will request the consultant information packet from TxDOT's Transportation Planning and Programming (TPP) Division. The Engineer will use historical traffic count data to determine appropriate traffic growth factors using regression worksheets. The Engineer will develop the K-factor, AM and PM peak-hour directional distribution, and truck percentage based on historical information. The Engineer will obtain the regional travel demand model (TDM) from the North Central Texas Council of Governments (NCTCOG) to determine the growth rate for the FM 546 corridor. The Engineer will not run the TDM or update the network or demographics. The Engineer will determine population growth rate using the US Census data. The Engineer will follow TPP's Corridor Planning Standard Operating Procedures to develop traffic growth rates and balance projected volumes. The Engineer will prepare a Traffic Projections Methodology memo. The Engineer will address one round of comments on the memo. The Engineer will submit traffic projections and address one round of comments. The Engineer will prepare the Traffic Analysis for Highway Design (TAHD) table and coordinate with TPP regarding pavement design date in TAHD table.

G. Traffic Analysis

The ENGINEER shall analyze traffic using Synchro for the opening year and 20-year design year for the no-build and one build alternative for AM and PM peak hours. The Engineer shall analyze the following intersections:

- FM 546 and CR 393
- FM 546 and Bridgefarmer Road
- FM 546 and CR 324
- FM 546 and Spur 399
- FM 546 (proposed) and FM 546 (existing)

The Engineer shall analyze up to one (1) intersection using VISSIM for the opening year and 20-year design year for the no-build and one build alternative for AM and PM peak hours. The Engineer shall submit a traffic analysis memo and address up to two (2) rounds of comments.

Task BS3 Deliverables

1. Preliminary Corridor Exhibit Maps
2. Draft and Final Implementation Plan
3. Results of Comparison Scoring Matrices
4. Technical Report of Alternatives for flood storage and mitigation
5. Final Corridor Exhibit Maps
6. Traffic Projections Methodology Memo
7. Traffic Projections
8. Traffic Analysis for Highway Design (TAHD) table
9. Traffic Analysis Memo
10. All design files and deliverable in electronic format (PDF, DOC, DGN, DWG, etc.)

**BS4. SCHEMATIC DEVELOPMENT**

The ENGINEER will utilize the recommended corridor alignment from **Task BS3** to develop a detailed design schematic for the ultimate build-out of FM 546 (in coordination with the COUNTY and TxDOT).

The Engineer will prepare a schematic plan and profile layout to a scale of 1"=100' depicting the proposed improvements for the project. The schematic shall include: the location of intersections, grade separations, retaining walls, driveways; the geometric typical sections (pavement cross slopes, lane and shoulder widths, slope rates for fills and cuts); vertical and horizontal geometry; the degree of horizontal curves and vertical curve data, including "K" values, shall also be shown; the lane lines and/or arrows indicating the number of lanes; the existing and proposed ROW limits; the existing and proposed drainage and construction easements; the direction of traffic flow on all roadways; the geometrics of speed change (acceleration, deceleration, climbing) lanes; removal items, and major utility conflicts. The schematic will be prepared using the English system of units. 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).

In preparing the schematic, the ENGINEER will:

A. General

1. Develop typical roadway sections for proposed FM 546 facility, major cross streets, and other locations with specific design features (bridges, retaining walls, and intersections). Typical sections for future cross streets will be based on best-available data provided by the COUNTY.
2. Produce plan & profile schematic exhibits on roll plots at a scale of 1" = 100' showing proposed features, existing features, title block, and legend.
3. Develop a 3D corridor model of the proposed facility and provide design of roadway templates and end conditions throughout the corridor according to the proposed design.
4. Evaluate potential utility conflicts based on Level C/D/B/A SUE data and label crossings on the schematic.
5. The Engineer shall analyze the begin limits of the recommended alignment as follows:
    - Begin limits at INTERCHANGE with Spur 399 to consider Project as if Spur 399 were constructed first.
    - Begin limits at TIE-IN to existing FM 546 to provide an independent utility to the project. The Engineer shall take future Spur 399 design into consideration to maximize ROW and minimize impacts to adjacent properties.
    - The Engineer shall consider the requirements for construction staging and traffic control throughout the development of schematic design to verify the constructability of the proposed design. The Engineer shall provide construction phasing assumptions to the County as requested. A comparative assessment will be provided for up to two (2) TCP alternatives.
    - TCP Phasing Concept. The Engineer shall develop a TCP phasing concept. TCP Concept layout shall analyze the phasing and traffic detours anticipated to construct the proposed design of the schematic refinements in conjunction with the Geometric Schematic of the Preferred Alternative.
    - TCP Narrative and Typical Sections. The Engineer shall prepare a Preliminary Construction Narrative and Typical Sections in conjunction with the Geometric Schematic of the Preferred Alternative.
    - Quantity and Cost Estimate. The Engineer shall prepare a preliminary planning-level cost estimate for the Preliminary Traffic Control Plan.
6. The Engineer shall perform tasks associated with the retaining wall layouts to determine retaining wall lengths, types, and associated easements, ROW, and opinion of probably construction costs, Retaining wall structural design is not part of this work.
    - Preliminary retaining wall layouts; based on roadway geometrics and provided cross section data, the ENGINEER will develop preliminary layouts for all retaining walls on the plan and profile of the schematic.; Retaining wall elevations for construction documents will not be developed.
    - The Engineer shall prepare a Type and Cost Report. The report shall document the various retaining wall types available for use on the project along with developing preferred criteria for establishing a priority on retaining wall use versus acquiring additional ROW.

B. Intersections, Interchanges & Grade Separated Locations

The ENGINEER will evaluate, in detail, the following major intersections within the corridor:

a. FM 546 and proposed SP 399 South of Airport
    i. Include three-level interchange if necessary.
b. East Fork Trinity River (proposed waterway bridge widening/new location)
    i. Include Wildlife Crossing for Wildlife Management Purposes. Design Criteria will be coordinated with USACE.
c. Impacted intersections will be analyzed to tie correctly horizontally and vertically as part of the intersection analysis

d. Any proposed roadways found through data collection and in coordination with stakeholders

At each location the ENGINEER will:

1. Design preliminary horizontal alignments for the intersections and grade-separated locations based on the approved corridor alignment. Any proposed deviation from this approved alignment will require COUNTY approval and re-design of a non-approved alignment is not included in this scope of services.
2. Design of preliminary profiles for the intersections and grade-separated locations based on preliminary horizontal alignments and vertical clearance requirements.
3. Determine preliminary bridge configuration including overall length, span lengths, and an assumed structure depth. Bridge layouts will be prepared per TxDOT standards and will be based on needed span length, an assumed substructure depth, and proposed profile. Preliminary bridge layouts will be submitted with the schematic to TxDOT for review and approval.
4. Design preliminary locations and limits of retaining wall.
5. Show preliminary location of cross culverts including preliminary sizing. Studied floodplain areas within the project corridor will be displayed based on available GIS data.
6. Identify approximate major utility locations based on Level C/D/B subsurface utility engineering (SUE).
7. Design and show preliminary pavement markings.
8. Determine preliminary right-of-way including any necessary easements based on proposed geometric design. Surveyed property boundaries will be developed once a recommended alternative corridor is selected to move forward into schematic design. County Appraisal District GIS parcel data will be used in the alternatives analysis phase of the project and converted to Microstation DGN format.

C. Project Delivery

The schematics will be provided to the County and TxDOT for review at the following stages of completion:

1. Concept (30%) – Plan & Profile Layout
2. Preliminary (60%) – Plan & Profiles; Cross Sections; Cost Estimate
3. Pre-Final (90%)
    a. Plan and Profile Layout
    b. Cross Sections
    c. Cost Estimate
    d. Draft Level of Service Analysis Report
4. Final (100%) – Plan & Profiles; Cross Sections; Cost Estimate
    a. Plan and Profile Layout
    b. Cross Sections
    c. Cost Estimate
    d. Level of Service Analysis Report

Prior to each submission, the ENGINEER will:

1. Log any previous County or stakeholder comments in a Comment Response Log spreadsheet and provide a resolution for each comment.
2. Provide a Quality Control (QC) review of plans, calculations, documents, and other supporting design data, if requested by the COUNTY.
3. Provide a Quality Assurance (QA) audit of the QC review to assure all comments were addressed and/or resolved.
4. Coordinate production of the milestone deliverables including printing, compiling electronic files, and preparation of a transmittal letter.

D. Project Update Presentations

The ENGINEER will prepare and present up to two (2) technical PowerPoint presentations during the schematic design providing a briefing on project schedule, design development, and future tasks.

Task BS4 Deliverables

1. Design Schematic (30%)
2. Design Schematic, Cross Sections, and Estimate (60%)
3. Pre-Final Design Schematic, Cross Sections, Draft TCP Narrative/Construction Sequence, and Estimate (90%)
4. Final Design Schematic, Cross Sections, TCP Narrative/Construction Sequence, and Estimate (100%)
5. QA/QC Documentation for each milestone deliverable, if requested
6. Technical PowerPoint Presentations
7. Final Electronic Design Files placed on USB thumb drive

**BS5. HYDROLOGIC AND HYDRAULIC INVESTIGATION**

The Engineer shall perform drainage tasks to determine the approximate size and type of cross drainage structures. Cross drainage analysis will include a comparison of existing and future land use based on City of McKinney land uses in the watershed and the cross drainage structures needed for both conditions. Drainage tasks will be performed in accordance with Collin County and TxDOT requirements.

Drainage crossings will be classified as major or minor, as follows:
Major Crossing - A culvert that provides an opening of more than 100 SF in single or multiple installations. Culverts are classified as bridge class culverts when they provide an opening measured along the center of the roadway of more than 20 feet between extreme ends of the openings for single and multiple box culverts. All bridges will be classified as major drainage crossings. Major crossings should be analyzed using HEC-RAS.
Minor Crossing - Any drainage crossing not classified as major will be considered a minor drainage crossing and will be analyzed using HY-8 or similar culvert modeling software.

Scour analysis will not be provided as part of this work. Scour countermeasures will be approximated for inclusion in the opinion of probable construction cost. Driveway culverts and cross street culverts will not be designed as part of this work but will be considered in the opinion of probable construction cost.

The following drainage tasks will be performed in the preparation of the schematic layout:

A. Minor Cross Drainage - estimate 9 minor drainage crossings

1. Drainage Area Mapping
   Delineate drainage area boundaries based on Collin County GIS data, North Central Texas Council of Governments (NCTCOG) contour maps, Texas Natural Resources Information System (TNRIS) Lidar, United States Geological Survey (USGS) contour maps, or other suitable topographic maps, if available. A drainage area map exhibit will be presented on 11”x17” plan sheets at maximum 1" = 200' scale with topographic data shown and labeled and included in the Drainage Design Technical Summary Report.

2. Calculate Discharges
   Determine conveyance paths, channel slopes, time of concentration, Natural Resources Conservation Service (NRCS) curve numbers and other factors as required to determine frequency-discharge relationships using hydrologic models. Determine preliminary design flows for the crossings based on the design frequency and a check of the 100-yr event using the appropriate hydrologic method. Previous studies, including local studies, shall be obtained and considered during the hydrologic analysis. The results of the hydrologic calculations will be tabulated and presented in the Drainage Design Technical Summary Report.

3. Size & Locate 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. Evaluate existing cross culverts for extension. HY-8 culvert analysis software will be used to size minor culvert crossings. The results of the hydraulic calculations will be tabulated and presented in the Drainage Design Technical Summary Report. The Engineer will provide opinion of probable construction costs.

B. Major Cross Drainage - 1 crossing (East Fork Trinity River)

1. Obtain and Review Available FEMA Data & Reports
   The ENGINEER will obtain available Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), Letters of Map Revisions (LOMR), and electronic data readily available from FEMA for East Fork Trinity River.

2. Drainage Area Mapping
   Delineate drainage area boundaries based on Collin County GIS data, North Central Texas Council of Governments (NCTCOG) contour maps, Texas Natural Resources Information System (TNRIS) Lidar, United States Geological Survey (USGS) contour maps, or other suitable topographic maps, if available. A drainage area map will be included in the Drainage Design Technical Summary Report with topographic data shown and labeled.

3. Calculate Discharges
   Determine conveyance paths, channel slopes, time of concentration, Natural Resources Conservation Service (SCS) curve numbers and other factors as required to determine frequency-discharge relationships using hydrologic models. Determine preliminary design flows for the crossings based on the design frequency and a check of the 100-yr event using the appropriate hydrologic method. Previous studies, including FEMA and local studies, shall be obtained and considered during the hydrologic analysis. The results of the hydrologic calculations will be tabulated and presented in the Drainage Design Technical Summary Report.

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, TxDOT, and Federal Emergency Management Agency (FEMA) requirements. All relevant conveyance features, (channels, culverts, slab bridges, encroachments) will be included in the hydraulic analysis using HEC-RAS, Version 6.1.

5. Develop Alternative Drainage Schemes (up to 2)
   Based on the results of the discharge calculations and water surface profile models, develop alternative schemes to alleviate potential adverse drainage issues (if any) associated with the

roadway construction. Determine optimum drainage scheme to be used for schematic design. An alternatives analysis will be performed to determine if cross drainage structures should be bridge class culverts or span bridges. The Engineer will develop preliminary layouts for up to 2 bridge-class culverts and span bridges on the plan and profile of the schematic. The Engineer will provide opinion of probable construction costs.

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.

C. Closed Storm Sewer

The Engineer will provide an approximation of trunk size and inlet spacing for the closed storm sewer system and ensure adequate drainage to an outfall location can be obtained. The Engineer will determine ROW and easement needs and include the system in the opinion of probable construction cost. Summary of findings and associated exhibits shall be included as part of the drainage report.

D. Drainage Design Technical Summary Report

Upon completion of the hydraulic analyses and alternative evaluations of potential improvements for the project drainage system, the ENGINEER shall prepare a Drainage Design Technical Summary Report. A preliminary report will be submitted with the 60% schematic deliverable and the final report will be submitted with the 100% schematic submittal. The report shall include the following sections:

1. PROJECT FEATURES: location, study objectives, general stream and watershed information, and other pertinent facts.
2. HYDROLOGY: watershed description, soil and land use information, source of hydrologic data and methodology/models used to develop flow data, pertinent input data and parameters for hydrologic analyses; summary table of results for full range of peak discharges for 2-, 5-, 10-, 25-, 50-, 100-, yr events.
3. HYDRAULICS: overview of hydraulic modeling process, including data sources, specific model uses, descriptions of existing drainage structures, discussion of design alternatives and the results of respective hydraulic modeling for the scenarios evaluated; hydraulic model output data including existing, hydraulic data sheet, and proposed conditions summary tables; summary of assumptions made in preliminary closed storm sewer design.
4. SUMMARY OF CONCLUSIONS / RECOMMENDATIONS: summary of study objectives, alternatives being considered, opinions of probable costs and identification of preferred design alternatives.
5. PHOTOGRAPHS, FIGURES AND APPENDICES: all items necessary to support the analysis.
6. ELECTRONIC DATA: computer files of hydrologic and hydraulic modeling with appropriate labeling of location, project reference, and submittal date.
7. FINALIZED DOCUMENT: one (1) copy of final report with electronic submittal to include a PDF of the entire report.

Task BS5 Deliverables

1. Plan and Profile depictions of drainage structures on Schematic
2. Drainage Area Map Exhibits
3. Preliminary Drainage Design Technical Summary Report at 60% schematic.
4. Final Drainage Design Technical Summary Report at 100% schematic.
5. Opinion of Probable Construction Costs

**BS6. SOCIAL, ECONOMIC AND ENVIRONMENTAL STUDIES**

During the alternatives analysis phase, up to five different alignments will be analyzed. Based on the National Environmental Policy Act (NEPA) requirements, a Preferred Alternative will be selected and classified as an environmental assessment (EA) as identified by TxDOT and Federal Highway Administration (FHWA) under the NEPA.

Each deliverable shall be sufficiently detailed to provide satisfactory basis for thorough review by the State, FHWA, and (where applicable) agencies with regulatory oversight. Any deliverable not specifically stated in the scope is excluded from this scope of services. Any additional services required to comply with environmental policies, laws, regulations, or procedures will be performed under a separate scope of services.

**Task 1: Constraints Map**
This task will include a establishing a Study Area boundary for the route study based on previous studies, existing roadway corridors, and collected traffic evaluations and projections. The established Study Area will be used for the development of the constraints map.

A constraints map for the Study Area will include environmental concerns, known constraints, aerial photography, contour information, and utility information, developed based on research of public databases and sources, and detailed screening measures for eliminating non-viable corridors.

Task BS6.1 Deliverables

1. Preliminary Constraints Map (PDF and up to 2 hardcopies)
2. Final Constraints Map (PDF and up to 2 hardcopies)

**Task 2: Environmental Analysis for the Alternatives Analysis**
This task will include data collection and field reconnaissance for the Study Area and up to five alternative corridors. Assume no right of entry for the alternative corridors. All field reconnaissance for this task will be conducted from public ROW. Right of entry is reserved for the Preferred Alternative corridor. The results will be included in the NEPA document.

Resources evaluated in the analysis will be in accordance with current Federal and State statutes, regulations and guidelines and the State's latest codes, practices, criteria, specifications, policies, procedures, and Statement of Understanding including but not limited to National Environmental Policy Act (NEPA) (42 U.S.C. 4371, as amended) and TAC Title 43 Part 1, Chapters 2 and 16.

Obtain environmental data from publicly available sources and purchased through GeoSearch. The information will be collected in GIS format and incorporated in the Constraints Map for the Study Area.

Update periodically publicly available information including but not limited to: locations of public buildings (schools, churches, parks), aerial photography, National Wetland Inventory data, Soil Survey data, TCEQ & EPA hazardous materials database information, FEMA floodplain information, vegetation information, and habitat for Federal and State protected species known to occur in Collin County. Available information will be complied into an Alternatives Analysis Matrix.

Task BS6.2 Deliverables:

1. Preliminary Alternatives Analysis Environmental Constraints Technical Memorandum (PDF and up to 2 hardcopies)
2. Final Alternatives Analysis Environmental Constraints Technical Memorandum (PDF and up to

2 hardcopies)

**Task 3: NEPA Environmental Studies for Preferred Alternatives**

The Engineer will prepare environmental studies following the online TxDOT Environmental Toolkit to accompany the schematic for each corridor. These deliverables will be prepared to link the schematic to the future National Environmental Policy Act (NEPA) document(s). The Engineer will prepare the following assessments:

**Community Impact Assessment**

- Conduct community impact investigations in accordance with current Federal and State rules, regulations, and guidelines.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Complete the TxDOT Community Impact Assessment Form Technical Report.

**Archeological Resources Assessment**

- Prepare a Project Initiation Letter and Texas Antiquities Permit Application based on data collection and field reconnaissance for the Preferred Alternative.
- Conduct a pedestrian survey and report of sufficient intensity to determine the nature, extent, and potential significance of any cultural resources located within the Area of Potential Effect of the Preferred Alternative in accordance with report guidelines as outlined by the Texas Historical Commissions Rules of Practice and Procedures.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Complete the TxDOT Archeological Background Study Report and TxDOT Archeological Pedestrian Survey Report for the Preferred Alternative corridor.

**Historic Properties Assessment**

- Prepare a historic building survey report that will follow the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation and document historic buildings and structures within the Area of Potential Effect based on data collection and field surveys of the Preferred Alternative corridor.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Complete the TxDOT Project Coordination Request for Historical Studies Form, Historic Resources Research Design, and Reconnaissance Survey Report for the Preferred Alternative corridor.

**Water Resources Assessment**

- Prepare report documenting the project's effects on protected water resources based on data collection and field surveys for the Preferred Alternative corridor.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Prepare a wetland delineation report identifying: specific impacts to Waters of the United States, measures to minimize the impacts, and applicable Section 404 options in accordance with current permits and conditions based on data collection and field surveys for the Preferred Alternative corridor.
- Complete the TxDOT "Surface Water Analysis" for each of the Preferred Alternative corridors.

**Biological Resources Assessment**

- Prepare report documenting the project's effects on protected biological resources based on data collection and field surveys for the Preferred Alternative corridor.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Complete the TxDOT Species Analysis, Species Analysis Spreadsheet, and Tier I Site Assessment for the Preferred Alternative corridor.

**Air Quality Assessment**

- Air quality analysis will be in accordance with current Federal and State rules, regulations, and guidelines.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Complete the TxDOT Air Quality Technical Report for the Preferred Alternative corridor.

**Hazardous Materials Initial Site Assessment**

- Prepare a Hazardous Materials Initial Site Assessment (ISA) based on the data collection and field survey conducted and identify potential hazardous material sites in the Preferred Alternative corridor.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Complete the TxDOT Hazardous Materials ISA Form Technical Report for the Preferred Alternative corridor.

**Traffic Noise Assessment**

- Conduct a preliminary traffic noise analysis in accordance with current Federal and State rules, regulations and guidelines for the Preferred Alternative.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.
- Prepare a Traffic Noise Technical Report for the Preferred Alternative.

**Indirect and Cumulative Impact Assessment**

- Conduct an indirect and cumulative impact assessment per current TxDOT guidance and the *AASHTO Practitioner's Handbook 12: Assessing Indirect Effects and Cumulative Impacts Under the National Environmental Policy Act (NEPA)* for the Preferred Alternative corridor.
- Utilize TxDOT guidance provided in the TxDOT Environmental Toolkit for this task.

**Section 4(f) of the U.S. Department of Transportation Act De Minimis Evaluations**

Prepare up to one Checklist for Section 4(f) *De Minimis* for Public Parks, Recreation Lands, Wildlife & Waterfowl Refuges, and Historic Sites per the TxDOT Environmental Online Toolkit for the Preferred Alternative corridor.

**Section 6(f) of the Land and Water Conservation Fund Act**

The Engineer will research and review publicly available data to determine if Land and Water Conservation Funds were applied to any properties within the Preferred Alternative and prepare one initial coordination letter with TxDOT.

**Chapter 26 of Texas Parks and Wildlife Code**

Prepare up to one Checklist for Chapter 26 of the Texas Parks and Wildlife Code and all applicable investigations per TxDOT's online Environmental Toolkit for each of the Preferred Alternative corridors.

Task BS6.3 Deliverables

1. Draft & Final Community Impact Assessment Form Technical Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
2. Draft & Final Archeological Background Study Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
3. Draft & Final Archeological Pedestrian Survey Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
4. Draft & Final Project Coordination Request for Historical Studies (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
5. Draft & Final Historic Resources Research Design (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
6. Draft & Final Historic Resources Reconnaissance Survey Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
7. Draft & Final Wetland Delineation Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
8. Draft & Final Surface Water Analysis (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
9. Draft & Final Biological Evaluation Form Technical Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
10. Draft & Final Air Quality Technical Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
11. Draft & Final Hazardous Materials Initial Site Assessment Form Technical Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
12. Draft & Final Traffic Noise Technical Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
13. Draft & Final Traffic Indirect and Cumulative Technical Report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
14. Checklist for Section 4(f) De Minimis for Public Parks, Recreation Lands, Wildlife & Waterfowl Refuges, and Historic Sites (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
15. Section 6(f) of the Land and Water Conservation Fund Act report (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
16. Checklist for Chapter 26 Evaluation (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)

**Task 4: NEPA Environmental Assessment (EA) and Finding of No Significant Impacts (FONSI)**

The Engineer will prepare a separate environmental assessment (EA) to accompany the schematic.

Each EA shall be in accordance with current Federal and State rules, regulations, and guidelines and utilize TxDOT guidance provided in the TxDOT Environmental Toolkit.

The EA content shall be in sufficient detail to meet regulatory requirements for legal sufficiency and include all items listed in the Environmental Document Review Checklist and the Administrative

Completeness Review Checklist.

Prepare Finding of No Significant Impacts (FONSI) forms and notice of availability (NOA) forms based on the TxDOT guidance provided on the TxDOT Environmental Toolkit.

Task BS6.4 Deliverables

1. Draft Environmental Assessment (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
2. Final Environmental Assessment (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
3. FONSI Form (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)
4. NOA for FONSI Form (up to 2 hard copies of drafts and 1 hard copy of final and electronic PDF of each)

**Task 5: U.S. Army Corps of Engineers (USACE) Coordination**

For the portion of the Preferred Alternative that crosses the Lake Lavon, the Engineer will prepare a pre-application meeting request to the USACE Fort Worth District.

The Engineer will also attend up to seven (7) meetings with the Lake Manager and up to three (3) meetings with the USACE Fort Worth District. The Engineer will prepare exhibits, maps, or other needed materials required for the meetings and support needed coordination to get USACE project concurrence.

**Nationwide Permit 14 Pre-Construction Notification**
This task will include preparing and submitting a Pre-Construction Notification (PCN) under Nationwide Permit (NWP) 14 (Linear Transportation Projects). Requirements for the submittal of a PCN to USACE Fort Worth District include documentation and evaluation of impacts to waters of the U.S., threatened and endangered species (and/or their habitats), and cultural/historic resources. The PCN will also include a mitigation plan documenting the proposed mitigation to off set impacts from the proposed project.

**Tree Survey**
This task will include conducting a tree survey within the proposed ROW to be acquired from the USACE. The survey will include all trees with a diameter of three (3) inches or greater measured at a height of four and one-half feet above ground level within the proposed ROW to be acquired from the USACE.
The following will be recorded for each tree identified:

- Species
- Diameter
- Location (GPS Collected)
- Tree tag issuing unique identifier

**Lavon Lake Real Estate Packet**
This task will include preparing and submitting the real estate packet required to purchase ROW from the USACE owned property along Lavon Lake. The packet will include items required to receive approval to acquire ROW from the USACE based on the email from Steve Perrin, USACE Lead Ranger, on March 22, 2022.

Task BS6.5 Deliverables

1. USACE Pre-application Meeting Request and Meeting Notes (1 hard copy of final and

electronic PDF of each)
2. Meeting minutes/documentation for all other USACE meetings
3. Nationwide Permit 14 Pre-Construction Notification
4. Tree Survey Map and Table identifying trees by size, species, remove/keep status, location within the project area, and elevation bracket.
5. Lavon Lake Real Estate Packet

**BS7. PUBLIC/STAKEHOLDER INVOLVEMENT**

Due to the COVID-19 Pandemic and limiting of in-person gatherings, virtual meetings may be held. Alternatively, one-on-one coordination may be needed to review or address specific stakeholder/property owner requirements or improvements.

**A. Public Involvement Plan**

The project team will develop a comprehensive Public Involvement Plan (PIP) that will include communications with stakeholders and the general public. Key items will include:

The project team will revise the Stakeholder Identification (includes the creation of a database for elected/public officials and business/community leaders along the corridor) to include but not limited to, officials in Collin County, TxDOT, City of McKinney, Town of Fairview, USACE, NTMWB, and NCTCOG.

- Public and Stakeholder Definitions
- Outreach Timeline
- Goals
- Stakeholder Meetings Methodology
- Public Meetings Methodology
- Public Hearings Methodology
- Quality Assurance Protocols

**B. Public Involvement Management**

This task provides for the monthly management of tasks and activities, as well as internal project team meetings. In addition, the project team will utilize publicinput.com or similar for public and stakeholder involvement management. The system will track stakeholder progress from kick-off through the end and assist with identifying and managing stakeholder input throughout the corridor area.

The task includes the utilization of Facebook and Twitter ad space for up to 20,000 residents along the corridor. Each ad placement is approximately $300. For each public meeting and public hearing, as well as general information updates, we estimate the number of ad placements to be 12.

**C. Stakeholder Coordination/Involvement**

Prior to following the TxDOT protocols for an Environmental Assessment, the project team will work with identified stakeholders to ensure that the right participants are at the table and to conduct a series of policy briefings and technical briefings. Task 3 is divided into 2 stages:

1. **Stage A:** Policy briefings will be conducted with the elected/public officials, while technical briefings will be conducted with county, city and state staff. It is estimated that each stakeholder

meeting will not exceed 12 participants.

The following stakeholder meetings are identified:

**City of McKinney/Airport & Town of Fairview**
Up to two Policy and two Technical Stakeholder Meetings Prior to the First Public Meeting
Up to six Policy and six Technical Stakeholder Meetings Throughout Project

Representatives from the county, TxDOT, USACE, NCTCOG and NTMWD will be invited to each of the above meetings, if applicable.

The project team will coordinate these meetings, as well as RSVPs, identify appropriate venues, create sign-in sheets, take notes and develop summaries for each meeting.

2. **Stage B:** The project team will conduct two additional stakeholder meetings that bring the technical, policy and business stakeholders together for facilitated discussions to build consensus and identify appropriate project goals.

The project team will coordinate these meetings, as well as RSVPs, identify appropriate venues, create sign-in sheets, take notes and develop summaries for each meeting, as well as assist with facilitation.

**D. Additional Property Owner/Stakeholder Coordination:** It is anticipated that the following, additional meetings may be needed to coordinate and gain consensus for the recommended alternative in the early stage of the project. Each will include time to prepare for and document each meeting.

- For our current, worst-case alignment scenario, there are thirty-nine (39) possible properties to be impacted along the corridor. It is assumed that we would plan for and attend up to thirty-five (35) meetings with affected property owners along the corridor throughout the alignment analysis stage of the project.
- Prepare for and attend up to seventeen (17) monthly meetings with TxDOT to coordinate the SH 399 alignment surrounding the McKinney National Airport, estimated from August 2021 to December 2022.
- Prepare for and attend up to 40 bi-weekly meetings with TxDOT, as a partner, to coordinate the Project, estimated from May 2022 to December 2023.
- Prepare for and attend a separate meeting (1) with NCTCOG to discuss their Collin County Strategic Roadway Initiative, projected traffic volumes within the project limits, demographics, and development of traffic numbers for use in microsimulations for the corridor.
- Prepare for and attend up to two (2) meetings with bicycle groups that utilize the corridor. Identified are the following: Bike DFW, Plano Bicycle Association, Shawnee Trail Cycling Club.
- Prepare for and attend up to one (1) separate meeting/work session with Lowry Crossing early in the project to discuss concerns, options, impacts, etc. (EDC; City Secretary; Mayor; Mayor Pro Tem; Fire Chief)

**1) Public Meetings**

For Environmental Assessment purposes, the project will require two (2) in-person and virtual public meetings. All public meeting materials for the first public meeting shall discuss or clearly portray two separate sets of alignment alternatives corresponding to the Spur 399 Purple (West) or Orange (East)

alternatives by others. Materials shall be submitted to TxDOT and COUNTY for review and approval. Public Involvement coordination for each meeting includes the development of the following:

- TxDOT Public Meeting Checklist
- EO/PO Database
- APO Database
- Public Notice (English/Spanish)
- Location Map
- Venue Coordination
- Newspaper Ad Placement and Schedule Matrix
- Public Meeting Materials
- Comment Cards (English/Spanish)
- Sign-in Sheets
- Public Meeting Photography
- Public Meeting Registration
- Coordination of All Public Meeting Comments & Responses
- Public Meeting Summary
- Project Website
- Interactive Project Map
- Interactive Project Virtual Room

**2) Public Hearings**

For Environmental Assessment purposes, the project will require one (1) public hearing to adhere to NEPA requirements.

Public Involvement coordination for each public hearing includes the development of the following:

- TxDOT Public Meeting Checklist
- EO/PO Database
- APO Database
- Public Notice (English/Spanish)
- Location Map
- Venue Coordination
- Newspaper Ad Placement and Schedule Matrix
- Public Meeting Materials
- Comment Cards (English/Spanish)
- Sign-in Sheets
- Public Meeting Photography
- Public Meeting Registration
- Coordination of a Court Reporter and Report
- Coordination of All Public Meeting Comments & Responses
- Public Hearing Summary

<u>Task BS7 Deliverables</u>

1. Public Meeting sign-in sheets, comment sheets, project information handout, and meeting summary report.
2. Public Hearing sign-in sheets, comment sheets, project information handout, PowerPoint presentation, and meeting summary report.

**BS8. PROJECT MANAGEMENT**

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

A. Schedule, Progress Reports, and Invoices

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

The schedule will be adjusted to include traffic projections and accommodations for Spur 399 schedule, which impacts FM 546 Phase II schedule.

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 and will be time and material based (Specified Rate). Monthly progress reports will include verbal description of all activities ongoing or completed during the reporting period, problems encountered and action required to remedy them. The progress report will include a tabulation of percent complete by task.

B. Progress/Coordination Meetings

Attend an estimated twenty-four (24) 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 by the ENGINEER and distributed for all meetings.

The ENGINEER will coordinate and hold twenty-four (24) internal monthly team meetings to coordinate critical path schedule items, outstanding tasks, and risk factors for the project to keep the project on track and on budget.

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

Task BS8 Deliverables

1. Monthly Progress Reports and Invoices
2. Design Schedule
3. Meeting Sign-In Sheets and Minutes (24 Meetings)

**SPECIAL SERVICES**

**SS1. SURVEY AND RIGHT-OF-WAY**

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 Engineers and Land Surveyors (TBPELS), 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), with an applied combined scale factor utilized by TXDOT for Collin County, 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 Survey Manual, 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 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. The 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.

Survey Location

Survey will be performed along the approved corridor determined in **Task BS3**.

Specific Work to Be Performed (Survey)

1. The Surveyor shall use the Horizontal and Vertical Control Monuments established in Phase I.
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 84 parcels and/or rights-of-way that are within or adjacent to the technically preferred alignment.
8. All Surveying shall be performed under the direct supervision of a Professional Land Surveyor licensed and in good standing with the State of Texas.

Deliverables (Survey)

1. ROE Contact Log, copies of ROE permission letters
2. DGN file containing planimetrics, contours, break lines, and property lines and ownership information
3. Microstation GeoPak DTM file
4. ASCII file of points, field notes and field sketches

Specific Work to Be Performed (Right-of-Way)

1. The Surveyor will prepare overall Parcel Exhibit Map. The Surveyor shall use the previously established Aerial mapping image as a backdrop for the new parcel configuration that comprises the length of the new Right-of-Way corridor. The overall Parcel Exhibit Map will show the new right-of-way lines, parcel boundaries, current ownership, bearings and distances and set or found monumentation for the new right-of-way corridor. Each 22"x 34" sheet will cover approximately 5,600 feet of length of the new right-of-way corridor.
2. The Surveyor will prepare up to 39 Parcel Exhibits. These will show the individual configurations that comprise the new right-of-way corridor. These will show new right-of-way lines, parcel boundaries, current ownership, bearings and distances and set or found monumentation. They will be reviewed by COUNTY and ENGINEER representatives for correctness and parcel configuration. These will include area designations for any determined prescriptive easement areas within the boundaries of the Parcel Exhibits and shown for appraisal purposes. There are approximately 39 Parcels that need Right-of-Entry permission within the Right-of-Way corridor. If Right-of-Entry can't be obtained, the Surveyor will be unable to set the new Right-of-Way monuments on those Parcels. The Surveyor could prepare Parcel Exhibits omitting the new Right-of-Way monumentation to be set. New Right-of-Way monuments can be set after Collin County obtains title to these parcels.
3. The Surveyor will prepare up to 39 Metes and Bounds descriptions that describe the Parcel boundaries. These will be signed and sealed by a Texas Registered Professional Land Surveyor and will become part of each Parcel Exhibit and suitable for acquisition purposes. These will be prepared after Parcel Exhibits have been reviewed and approved by others.
4. The Surveyor shall research public records to obtain names, physical addresses, mailing addresses, and telephone numbers, if available, of all property owners that adjoin and are within the ROW Mapping project limits. The surveyor shall fill out an Excel Spreadsheet with the found information. The Surveyor shall obtain copies of all parent tract recorded deeds and current subdivision plats within the project limits.
5. ABSTRACT MAP (Working Sketch): The Surveyor shall create an Abstract Map (Working Sketch) of up to 39 properties (assumed from worst case scenario alignment) for the ROW Mapping Project. The final Micro-Station shall be a scale drawing prepared from record documents depicting the approximate locations of existing right-of-way lines, easement lines, and private property lines with relevant grantee names, recording data, and recording dates. The Abstract Map (working sketch) shall not depict right-of-way, easement, or private property lines resolved through found monumentation and evaluation by a Registered Professional Land Surveyor and will not be suitable as a land survey document for right-of-way or easement parcel document creation. Easement research shall span no earlier than 1945 (75 years).

1. All Surveying shall be performed under the direct supervision of a Texas Registered Professional Land Surveyor licensed and in good standing with the State of Texas.

Deliverables (Right-of-Way)

1. DGN files containing bearings, distances, monumentation of each parcel configuration (with easements) required to reproduce the overall Parcel Exhibit Maps.
2. Three (3) copies of signed and sealed Parcel Exhibits that include the associated Metes and Bounds for approximately thirty-nine (39) Parcels with PDF copies.
3. Two hard copies (22"x34" & 11"x17") and PDF copies of the overall Parcel Exhibit Map.
4. Excel Spreadsheet that includes information of all property owners within the described limits.
5. PDF copies of all pertinent property records.
6. An electronic file of the Abstract Map shall be provided in MicroStation V8i format.

**SS2. UTILITY INVESTIGATION (SUE)**

Subsurface Utility Engineering (SUE) includes utility investigations subsurface and above ground prepared in accordance with AASHTO standards [ASCE C-1 38-02 (http://www.fhwa.dot.gov/programadmin/asce.cfm)] and Utility Quality Levels.

A. Utility Quality Levels

Utility Quality Levels are defined in cumulative order (least to greatest) as follows:

1. Quality Level D - Existing Records: Utilities are plotted from review of available existing records.
2. Quality Level C - Surface Visible Feature Survey: Quality level "D" information from existing records is correlated with surveyed surface-visible features. Includes Quality Level D information.
3. Quality Level B - Designate: Two-dimensional horizontal mapping. This information is obtained through the application and interpretation of appropriate non-destructive surface geophysical methods. Utility indications are referenced to established survey control. Incorporates quality levels C and D information to produce Quality Level B.
4. Quality Level A - Locate (Test Hole): Three-dimensional mapping and other characterization data. This information is obtained through exposing utility facilities through test holes and measuring and recording (to appropriate survey control) utility/environment data. Incorporates quality levels B, C and D information to produce Quality Level A.

B. Designate (Quality Level B)

Designate means to indicate the horizontal location of underground utilities by the application and interpretation of appropriate non-destructive surface geophysical techniques and reference to established survey control. Designate (Quality Level B) Services are inclusive of Quality levels C and D.

The Engineer shall:

1. As requested by the Client compile "As Built" information from plans, plats and other location data as provided by the utility owners.

2. Coordinate with utility owner when utility owner's policy is to designate their own facilities at no cost for preliminary survey purposes. The Engineer shall examine utility owner's work to ensure accuracy and completeness.

3. For the alignment options being considered, correlate utility owner records with designating data and resolve discrepancies using professional judgment. A color-coded composite utility facility plan with utility owner names, quality levels, line sizes and subsurface utility locate (test hole) locations, shall be prepared and delivered to the Client. It is understood by both the Engineer and the Client that the line sizes of designated utility facilities detailed on the deliverable are from the best available records and that an actual line size is normally determined from a test hole vacuum excavation. All above ground appurtenance locations must be included in the deliverable to the Client. This information shall be provided in the latest version of Microstation or Geopak used by the Client.

4. After a final alignment has been selected, designate, record, and mark the horizontal location of the existing utility facilities and their service laterals to existing buildings using non-destructive surface geophysical techniques.

5. Revise the utility facility plan by incorporating the Level B utility information collected along the selected final alignment. Clearly identify all utilities that were discovered from quality level B or what cannot be depicted in quality level B standards (levels C and D). These utilities must have a unique line style and symbology in the designate (Quality Level B) deliverable.

C. Subsurface Utility Locate (Test Hole) Service (Quality Level A)

The ENGINEER shall complete a Quality Level B subsurface utility engineering (SUE) investigation (exclusive of Quality Levels C and D) for 200 LF at 13 locations within the full project limits, as requested by the Engineer, estimated at up to 2,600 LF of Quality Level B. The ENGINEER shall complete thirteen (13) Quality Level A test holes as needed at potential utility conflict locations as identified by others.

Locate means to obtain precise horizontal and vertical position, material type, condition, size and other data that may be obtainable about the utility facility and its surrounding environment through exposure by non-destructive excavation techniques that ensures the integrity of the utility facility. Subsurface Utility Locate (Test Hole) Services (Quality Level A) are exclusive of Quality Levels B, C, and D.

The Engineer shall:

1. Review requested test hole locations and advise the COUNTY in the development of an appropriate locate (test hole) work plan relative to the existing utility infrastructure and proposed highway design elements.

2. Coordinate with utility owner inspectors as may be required by law or utility owner policy.

3. Neatly cut and remove existing pavement material, such that the cut not to exceed 0.10 square meters (1.076 square feet) unless unusual circumstances exist.

4. Measure and record the following data on an appropriately formatted test hole data sheet that has been sealed and dated by the Engineer:

    a. Elevation of top and/or bottom of utility tied to the datum of the furnished plan.
    b. Identify a minimum of two benchmarks utilized. Elevations shall be within an accuracy of 15mm (.591 inches) of utilized benchmarks.
    c. Elevation of existing grade over utility at test hole location.
    d. Horizontal location referenced to project coordinate datum.
    e. Outside diameter of pipe or width of duct banks and configuration of non-encased multi-conduit systems.
    f. Utility facility material(s).
    g. Utility facility condition.
    h. Pavement thickness and type.
    i. Coating/Wrapping information and condition.
    j. Unusual circumstances or field conditions.

5. Excavate test holes in such a manner as to prevent any damage to wrappings, coatings, cathodic protection or other protective coverings and features.

6. Be responsible for any damage to the utility during the locating process. In the event of damage, the Engineer shall stop work, notify the appropriate utility facility owner, the Client and appropriate regulatory agencies. The regulatory agencies include, but are not limited to the Railroad Commission of Texas and the Texas Commission on Environmental Quality. The Engineer shall not resume work until the utility facility owner has determined the corrective action to be taken. The Engineer shall be liable for all costs involved in the repair or replacement of the utility facility.

7. Back fill all excavations with appropriate material, compact backfill by mechanical means, and restore pavement and surface material. The Engineer shall be responsible for the integrity of the backfill and surface restoration for a period of three years. Install a marker ribbon throughout the backfill.

8. Furnish and install a permanent above ground marker (as specified by the COUNTY, directly above center line of the utility facility.

9. Provide complete restoration of work site and landscape to equal or better condition than before excavation. If a work site and landscape is not appropriately restored, the Engineer shall return to correct the condition at no extra charge to the COUNTY.

10. Plot utility location position information to scale and provide a comprehensive utility plan sign and sealed by the responsible Engineer. This information shall be provided in the latest version of Microstation or Geopak format used by the COUNTY.

11. Return plans, profiles, and test hole data sheets to the County. If requested, conduct a review of the findings with the County.

DELIVERABLES

The Engineer shall provide the following:

- Utility Records/As-Builts obtained from utility owners

- Level C/D Microstation File depicting utility line work for four alignments under consideration
- Level B Microstation File depicting utility line work for final selected alignment
- PDF of SUE Level A Test Hole Data Sheets
- Utility Layout Sheets are not included in this scope

**SS3. Aerial Photography and LiDAR Acquisition**

**A. Feasibility Study**

N/A. The ENGINEER will utilize aerial photography and LiDAR acquisition obtained for the Project during Phase I.

**B. Design Schematic**

Upon approval of the recommended alternative, the ENGINEER will perform digital mapping of the Project. The corridor will have 1400-foot width (700 feet each side of centerline). Aerial mapping will use the previously acquired 5cm GSD imagery and helicopter LiDAR. Aerial photography and LiDAR will suitable for ASPRS Class I 1" = 50' scale mapping specifications and to generate 1-foot contours. Aerial mapping photogrammetry will hold to 0.167-foot vertical RMSE on hard surfaces in well-defined areas and 0.33-foot vertical RMSE on soft surfaces. Aerial LiDAR will hold a 0.15-foot vertical RMSE on hard surfaces and 0.33-foot on soft surfaces.

DELIVERABLES

- 1"-50' scale 2D planimetrics of the Project in PowerGeopak V8i format

**SS4. GEOTECHNICAL INVESTIGATION**

The geotechnical engineering services will consist of field and laboratory investigations, engineering analysis and development of a pavement geotechnical report prepared by a Licensed Professional Engineer.

**A. Field Investigation**

The field investigation will consist of eighteen (18) pavement borings, spaced evenly along the proposed roadway alignment and drilled to 15 feet below proposed grade elevations. In addition, four (4) bridge borings will be drilled to depths of approximately 90 feet at the northern tributary of Lake Lavon. Up to two (2) retaining wall borings will be drilled approximately south of McKinney National Airport. The ENGINEER will provide alternative recommendations for the proposed retaining wall(s) along the approaches to Lake Lavon. ENGINEER will provide soil design parameters for sheet pile design.

Spacing and depths will follow TxDOT's Geotechnical Manual and may be adjusted by the Geotechnical Engineer's recommendations. A boring and TCP plan will be developed and submitted to the COUNTY for review and approval.

The ENGINEER will assist the COUNTY in obtaining the right-of-entry of the properties and assumes that the boring locations will be accessible to a conventional truck mounted drilling equipment during normal working hours.

The ENGINEER shall include traffic control during field operations.

**B. Laboratory Investigation**

Laboratory tests will be conducted to classify the soil to evaluate the volume change potential and strength of the soil and rock present at the site per TxDOT standards, Atterberg limits, sieve analysis and moisture contents will be performed on every stratum within each of the pavement borings. The volume change potential of the soils will also be evaluated by swell tests. The strength of the soil will be estimated using hand penetrometer tests and unconfined compressive strength tests. Unconfined compressive strength testing will also be performed on the rock cores. Sulfate testing will be performed at 0 to 2 feet and 2 to 4 feet per TxDOT standards. Lime/PI series tests will also be performed on selected clay samples.

**C. Geotechnical Report**

Results and field and laboratory work will be presented in a geotechnical engineering report. The report will consist of recommendations to guide design and construction of the new roadway and shall include the following:

- Generalized soils stratigraphy and groundwater levels
- Results of classification and TCP testing with Wincore format boring logs
- Site Condition and Geology
- Visually classify the soil samples by an engineer in the laboratory
- Pavement PVR Calculations
- Recommended Depth of Pavement Coverage
- Recommendations for Flexible and Rigid Pavement Sections
- Recommendations for bridge foundation system
- Recommendations for L-Pile parameters
- Seismic site classifications
- Geotechnical design recommendations for earth retaining walls and/or sheet piles
- Comments on the presence and effect of expansive soils on pavement construction will be provided. Up to two (2) alternative methods of reducing any anticipated shrink/swell movements associated with expansive clays will be included for pavement construction, if required.

**Task SS4 Deliverables**

1. Draft Geotechnical Report
2. Final Geotechnical Report

**SS5. 3D VISUALIZATION SERVICES**

The ENGINEER will develop and deliver a 3-D project model that shows a three-dimensional representation of the proposed designs superimposed on the surrounding existing conditions within the approximate Area of Modeling defined above. Model development services will be based on the tasks described below.

## A. Modeling of Existing Conditions (Feasibility Study)

The 3-D project models will depict the existing conditions within the Area of Modeling by draping aerial photographs onto 3-D terrain surface models and simulating selected surface features. Modeling of existing conditions within the Areas of Modeling will include:

- Aerial photography draped onto the terrain surface models developed from the initial wide-area topographic data;
- Infill of areas underneath bridge structures that are obscured on aerial photography;
- Simplified three-dimensional representation of the existing FM-546 corridor and associated bridge structures, similar in quality and level of detail to the example shown in Figure 1;
- Simplified and approximate representation of existing buildings located within the Area of Modeling, consisting of building footprints extruded to form shapes with generic facades and roofs, similar in quality and appearance to the buildings shown in Figure 1;
- Approximation of existing trees and foliage within the Areas of Modeling based on visual inspection of aerial and street-level photography, similar in quality and appearance to the examples shown in figures below;
- Floating "billboard" labels identifying primary points of interest, similar to those shown in Figure 1;
- Overlay of street name labels on primary roads.

Except as listed above, the 3-D project model will not include any other existing topographic features such as existing signs, signals, utility poles and cables, curbs, islands, lights, barriers, railings, or mailboxes.


**Figure 1 - Example of Representation of Existing Rural Highway, Existing Buildings, and Trees**

## B. Initial Modeling of Alignment Alternatives (Feasibility Study)

The 3-D project model will depict simplified representations of the proposed designs of FM 546 on up to four different alignments including:

- Simplified three-dimensional representation of the corridor alternatives including pavement textures, basic striping and markings, medians, curbs, gutters, and sidewalks, similar in quality and level of detail to the examples shown in Figure 2;
- Simplified three-dimensional representation of bridge and causeway structures crossing the wetland area;
- Simplified traffic consisting of vehicles moving in both directions on each roadway at constant speeds and on non-conflicting paths, similar to the traffic that can be seen on the video found at https://www.mass.gov/north-washington-street-bridge-replacement

Except as listed above, the 3-D project model will not include driveway openings, roadside and way-finding signs, traffic signals, utility poles and cables, and other features not specifically described.


**Figure 2 - Example of Simplified Representation of Proposed Roadway**

**C. Modeling of Preferred Alternative (Design Schematic)**

After detailed designs for the preferred alignment alternative have been developed the 3-D project model will be updated to depict a more detailed representation of the selected corridor, including:

- Updating the existing conditions to include more detailed survey data collected for the selected corridor;
- Removal of the representations of the rejected alternatives;
- Detailed three-dimensional representation of the roadway for the selected alignment including pavement textures, detailed striping and marking, medians, curbs and gutters, driveway openings, traffic signals, and other relevant roadway details, similar in quality and level of detail to the examples shown in Figure 3 and Figure 4;
- Detailed three-dimensional representation of the causeway and bridge structures used to cross the wetland area, similar in quality and level of detail to the example shown in Figure 5;
- Simplified traffic consisting of vehicles moving in both directions on each roadway at constant speeds and on non-conflicting paths, similar to the traffic that can be seen on the video found at https://www.mass.gov/north-washington-street-bridge-replacement;


Figure 3 - Example of Detailed Representation of Proposed Rural Highway

Figure 4 - Example of Detailed Representation of Proposed Rural Highway

Figure 5 - Example of Detailed Representation of Wetland Crossing Bridge

**D. <u>Other / Miscellaneous (Feasibility Study and Design Schematic)</u>**

1. The 3-D project model will include the following features that can be used to facilitate review and presentation of the proposed improvements in both phases:

- Shortcuts to critical viewpoints;
- Up to ten camera animations along paths to be designated by the COUNTY, such as flyovers and drive-throughs.
- Predefined controls to easily show different view states such as Existing and Alternatives conditions.

2. The ENGINEER will also provide the following services related to usage of the 3-D project visualization model:

- Assistance in the development of a Virtual Tour hosted on the 123bim.com web collaboration systems using camera viewpoint locations selected by the COUNTY (for an example of a virtual tour see http://vtour.123bim.com/AAIY/);
- One hour of introductory training via web meeting to project team members on the use of the various 123BIM applications;
- One hour of assistance via web meeting for optimal use of the 3-D project model for specific public and stakeholder outreach events;
- Assistance in the development of "storyboard" videos with titles and captions developed from animated video clips exported from the 3-D project model, similar in quality to the example that may be seen at https://www.mass.gov/north-washington-street-bridge-replacement.

Note: One-year subscription period to 123BIM.com was purchased for Phase I. A second year will be included as part of this contract and will used

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**BGE, Inc.**
**Corridor Analysis/Public Involvement/Schematic Design/Environmental/Geotech/SUE_Utilities/ROW Mapping/Traffic Projections**

| **From: Airport Drive in McKinney, TX<br>To: County Road 393 in Lowry Crossing, TX** | |
|---|---|
| **Total BGE, Inc. Fee (Engineering/Public/Stakeholder Involvement)** | **$561,840.00** |
| **Total Lamb-Star Engineering, L.P. Fee (SUE)** | **$36,448.00** |
| **Total Gorrondona & Associates, Inc. Fee (Aerial LiDAR/Ortho-Photogrammetry)** | **$3,504.00** |
| **Total Terracon Consultants, Inc. Fee (Geotechnical Investigations)** | **$47,805.00** |
| **Total RDV Systems, Inc. Fee (3D Design/Visualization Services)** | **$1,650.00** |
| **Total Public Information Associates (PIA) Fee (Public/Stakeholder Involvement)** | **$8,000.00** |
| **Total Kimley-Horn and Associates, Inc. Fee (Traffic Projections)** | **$56,620.00** |
| **Total BGE, Inc. Team Fee** | **$715,867.00** |

| **SUMMARY BREAKDOWN BY SERVICE:** | | | |
|---|---|---|---|
| Schematic Design & H&H/Drainage | $ | 371,393.00 | 51.88% |
| Geotechnical Services: | $ | 47,805.00 | 6.68% |
| Project Management: | $ | 42,522.00 | 5.94% |
| Environmental Assessment (EA): | $ | - | 0.00% |
| Public/Stakeholder Involvement: | $ | 128,418.00 | 17.94% |
| USACE Coordination | $ | 27,507.00 | 3.84% |
| Supplemental Ground Survey & Aerial Topo Processing: | $ | 3,504.00 | 0.49% |
| Utility Investigation/Coordination & SUE Services: | $ | 36,448.00 | 5.09% |
| ROW Mapping: | $ | - | 0.00% |
| 3D Visualization/Animation Services: | $ | 1,650.00 | 0.23% |
| Traffic Projections: | $ | 56,620.00 | 7.91% |
| **TOTAL:** | **$** | **715,867.00** | |

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**BGE, Inc.**
**Corridor Analysis and Schematic Design**

| From: Airport Drive in McKinney, TX<br>To: County Road 393 in Lowry Crossing, TX | Sr. Project Manager | Subject Matter Expert | Senior Engineer | Project Engineer | Design Engineer | EIT / GIS Technician | Senior Civil Designer (20+ yrs) | Senior Env. Scientist | Clerical | TOTAL HRS PER TASK | TOTAL PER TASK |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RATE** | **$260.00** | **$245.00** | **$198.00** | **$135.00** | **$120.00** | **$110.00** | **$170.00** | **$170.00** | **$85.00** | | |
| **BASIC SERVICES** | | | | | | | | | | | |
| **TASK BS2 - CORRIDOR TYPICAL SECTION EVALUATION** | | | | | | | | | | | |
| A. CORRIDOR SECTION EVALUATION | | | | | | | | | | | |
| Development of Typical Sections (Interim and Ultimate) | 1 | | 2 | 4 | | 8 | | | | 15 | $ 2,076.00 |
| | | | | | | | | | | | $ - |
| **TASK BS2 TOTALS (HOURS)** | **1** | **0** | **2** | **4** | **0** | **8** | **0** | **0** | **0** | **15** | **$ 2,076.00** |
| **TASK BS2 TOTALS (COST)** | **$ 260.00** | **$ -** | **$ 396.00** | **$ 540.00** | **$ -** | **$ 880.00** | **$ -** | **$ -** | **$ -** | | |
| **TASK BS3 - CORRIDOR ALTERNATIVES ANALYSIS** | | | | | | | | | | | |
| A. AIRPORT/SP399 ALIGNMENT ANALYSIS | | | | | | | | | | | |
| Evaluation of Five Additional Alternatives | | | | | | | | | | | |
| Horizontal and Vertical Alignment Analysis | 2 | | 4 | 10 | | 32 | | | | 48 | $ 6,182.00 |
| Conceptual 3D modeling | 2 | | 8 | 22 | 22 | 42 | | | | 96 | $ 12,334.00 |
| Base and Sheet File Preparation | 8 | 4 | 16 | 16 | | 32 | | | | 76 | $ 11,908.00 |
| Development of Cost Estimates | | | 2 | 2 | | 8 | | | | 12 | $ 1,546.00 |
| Conceptual Geometric Design of Independent Utility | 4 | 2 | 12 | 24 | 24 | | | | | 66 | $ 10,026.00 |
| Implementation Plan | 4 | 2 | 14 | 54 | 54 | | | | | 128 | $ 18,072.00 |
| Analyze Compatability with Known Improvements | 2 | | 4 | 12 | 12 | | | | | 30 | $ 4,372.00 |
| Evaluation of Direct Connector at Spur 399 | | | | | | | | | | | |
| Design of Horizontal and Vertical Geometry | | | 2 | 8 | | 24 | 8 | | | 42 | $ 5,476.00 |
| Evaluate Impacts to Spur 399 Ramping Configuration | 4 | | 8 | 16 | | 16 | 24 | | | 68 | $ 10,624.00 |
| Conceptual 3D modeling | | | 4 | 8 | | 24 | 16 | | | 52 | $ 7,232.00 |
| Base and Sheet File Preparation | 4 | 2 | 6 | 6 | | 8 | | | | 26 | $ 4,408.00 |
| Development of Cost Estimates | 2 | | 4 | 4 | | 8 | | | | 18 | $ 2,732.00 |
| Evaluation Future Intersecting Arterials | | | | | | | | | | | |
| Analyze Operational Efficiencies and City Thoroughfare Plan | 4 | | 6 | 12 | | 12 | | | | 34 | $ 5,168.00 |
| B. CROSSING OF EAST FORK TO LAKE LAVON - ALTS ANALYSIS | | | | | | | | | | | |
| Up to three alternatives for Lake Lavon Flood Storage and Mitigation | | | | | | | | | | | |
| Horizontal and Vertical Alignment Analysis | | 2 | 4 | 8 | | 24 | | | | 38 | $ 5,002.00 |
| Conceptual 3D modeling | | | 12 | 40 | 40 | 80 | 20 | | | 192 | $ 24,776.00 |
| Analysis of Mitigation and Flood Storage | 8 | 16 | 36 | 60 | | 60 | | | | 180 | $ 27,828.00 |
| Development of Cost Estimates | 2 | 2 | 4 | 12 | | 20 | | | | 40 | $ 5,622.00 |
| C. DEVELOPMENT OF COMPARISON SCORING MATRIX | | | | | | | | | | | |
| Evaluation of Three Additional Alternatives | 4 | | 8 | 8 | | 24 | | | | 44 | $ 6,344.00 |
| Evaluation of Independent Utility | 4 | | 4 | 16 | | 16 | | | | 40 | $ 5,752.00 |
| D. PUBLIC MEETING & HEARING | | | | | | | | | | | |
| (See section BS7) | | | | | | | | | | | |
| Engineer's responses to public/stakeholder comments | 16 | | 16 | 8 | | 4 | | | | 44 | $ 8,848.00 |
| (all meetings) | | | | | | | | | | | |
| **TASK BS3 TOTALS (HOURS)** | **70** | **30** | **174** | **346** | **152** | **434** | **68** | **0** | **0** | **1,274** | **$ 184,252.00** |
| **TASK BS3 TOTALS (COST)** | **$ 18,200.00** | **$ 7,350.00** | **$ 34,452.00** | **$ 46,710.00** | **$ 18,240.00** | **$ 47,740.00** | **$ 11,560.00** | **$ -** | **$ -** | | |

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**BGE, Inc.**
**Corridor Analysis and Schematic Design**

| From: Airport Drive in McKinney, TX<br>To: County Road 393 in Lowry Crossing, TX | Sr. Project Manager | Subject Matter Expert | Senior Engineer | Project Engineer | Design Engineer | EIT / GIS Technician | Senior Civil Designer (20+ yrs) | Senior Env. Scientist | Clerical | TOTAL HRS PER TASK | TOTAL PER TASK |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RATE** | **$260.00** | **$245.00** | **$198.00** | **$135.00** | **$120.00** | **$110.00** | **$170.00** | **$170.00** | **$85.00** | | |
| **TASK BS4 - SCHEMATIC DEVELOPMENT** | | | | | | | | | | | |
| A. GENERAL | | | | | | | | | | | |
| Typical Sections | | | 1 | 4 | | 4 | | | | 9 | $ 1,178.00 |
| 3D Corridor Model Development (Bentley OpenRoads) | 4 | 4 | 16 | 20 | 20 | 40 | 20 | | | 124 | $ 18,088.00 |
| ROW Development | | | 2 | 4 | | 4 | | | | 10 | $ 1,376.00 |
| Independent Utility | | | | | | | | | | | $ - |
| Design Criteria | | | 4 | 8 | 8 | | | | | 20 | $ 2,832.00 |
| Base and Sheet File Updates | 2 | 4 | 12 | 20 | 20 | | | | | 58 | $ 8,976.00 |
| Develop 3D Model | 4 | 4 | 16 | 32 | 60 | | 32 | | | 148 | $ 22,148.00 |
| B. INTERSECTIONS, INTERCHANGES & GRADE SEPARATIONS | | | | | | | | | | | $ - |
| FM 546 at proposed SP 399 south of Airport | | | | | | | | | | | $ - |
| Two-Level Interchange (overpass) | 4 | | 14 | 20 | 40 | 80 | 8 | | | 166 | $ 21,472.00 |
| TxDOT Preliminary Bridge Design and Layouts | 2 | 24 | 8 | 40 | 120 | | 40 | | | 234 | $ 34,584.00 |
| Independent Utility | 4 | 16 | 20 | 40 | 40 | | | | | 120 | $ 19,120.00 |
| East Fork Trinity River Crossing | | | | | | | | | | | $ - |
| Wildlife Crossing (USACE Request) | 4 | | 12 | 20 | 40 | 60 | 8 | | | 144 | $ 18,876.00 |
| TxDOT Preliminary Bridge Design and Layouts | 4 | 24 | 12 | 40 | 120 | | 40 | | | 240 | $ 35,896.00 |
| **TASK BS4 TOTALS (HOURS)** | **28** | **76** | **117** | **248** | **468** | **188** | **148** | **0** | **0** | **1,273** | **$ 184,546.00** |
| **TASK BS4 TOTALS (COST)** | **$ 7,280.00** | **$ 18,620.00** | **$ 23,166.00** | **$ 33,480.00** | **$ 56,160.00** | **$ 20,680.00** | **$ 25,160.00** | **$ -** | **$ -** | | |

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**BGE, Inc.**
**Environmental Studies**

| From: Airport Drive in McKinney, TX<br>To: County Road 393 in Lowry Crossing, TX | Sr. Project Manager | QA/QC Manager | Senior Engineer | Environmental Task Leader | Sr. Env. Scientist | EIT / GIS Technician | Environmental Scientist II | Environmental Scientist I | Clerical | TOTAL HRS PER TASK | TOTAL PER TASK |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RATE** | **$260.00** | **$245.00** | **$198.00** | **$145.00** | **$115.00** | **$110.00** | **$105.00** | **$95.00** | **$85.00** | | |
| **BASIC SERVICES** | | | | | | | | | | | |
| **TASK BS6 - SOCIAL, ECONOMIC, AND ENVIRONMENTAL STUDIES** | | | | | | | | | | | |
| 5. USACE COORDINATION | | | | | | | | | | | |
| USACE Real Estate Packet | | | | | | | | | | | |
| Task 1: Nationwide Permit 14 Pre-Construction Notification | | 2 | 1 | 20 | 20 | 8 | 15 | | | 66 | $ 8,343.00 |
| Task 2: Tree Survey | | 2 | 1 | 4 | 30 | 8 | 30 | 30 | | 105 | $ 11,598.00 |
| Task 3: Lavon Lake Real Estate Packet | | 2 | 2 | 40 | | 8 | | | | 52 | $ 7,566.00 |
| **TASK BS6 TOTALS (HOURS)** | **0** | **6** | **4** | **64** | **50** | **24** | **45** | **30** | **0** | **223** | **$ 27,507.00** |
| **TASK BS6 TOTALS (COST)** | **$ -** | **$ 1,470.00** | **$ 792.00** | **$ 9,280.00** | **$ 5,750.00** | **$ 2,640.00** | **$ 4,725.00** | **$ 2,850.00** | **$ -** | | |

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**BGE, Inc.**
**Public Involvement**

| From: Airport Drive in McKinney, TX<br>To: County Road 393 in Lowry Crossing, TX | Sr. Project Manager | Subject Matter Expert | Senior Engineer | Project Engineer | Design Engineer | EIT / GIS Technician | Senior Civil Designer (20+ yrs) | Senior Env. Scientist | Clerical | TOTAL PER TASK |
|---|---|---|---|---|---|---|---|---|---|---|
| **RATE** | **$260.00** | **$245.00** | **$198.00** | **$135.00** | **$120.00** | **$110.00** | **$170.00** | **$170.00** | **$85.00** | |
| **BASIC SERVICES** | | | | | | | | | | |
| **TASK BS7 - PUBLIC/STAKEHOLDER INVOLVEMENT** | | | | | | | | | | |
| C Stakeholder Involvement | | | | | | | | | | $ - |
| D Additional Property Owner/Stakeholder Coordination | | | | | | | | | | $ - |
| Prepare for/Attend TxDOT Spur 399 Coord. Mtgs (Up to 17) | 13 | | 20 | 32 | | | | 13 | | $ 13,870.00 |
| Prepare for/Attend Bi-weekly TxDOT Meetings (Up to 40) | 40 | | 65 | 50 | | | | 40 | | $ 36,820.00 |
| 1) Public Meetings | | | | | | | | | | $ - |
| Interactive Virtual Public Meetings (Assume 2) | 8 | | 16 | 24 | 24 | 100 | | 8 | | $ 23,728.00 |
| Develop Public Friendly Exhibits for Independent Utility | 2 | 4 | 16 | 24 | 24 | | | 8 | | $ 12,148.00 |
| Submit Packages to TxDOT for Review (Assume 2) | 2 | | 12 | 16 | 8 | | | 12 | | $ 8,056.00 |
| Submit Packages to TxDOT for Approval (Assume 2) | 2 | | 12 | 16 | 8 | 16 | | 12 | | $ 9,816.00 |
| Exhibits for Additional Alternatives/Considering Adj. Projects | 2 | | 20 | 20 | | 80 | | | | $ 15,980.00 |
| **TASK BS7 TOTALS (HOURS)** | **69** | **4** | **161** | **182** | **64** | **196** | **0** | **93** | **0** | **769** |
| **TASK BS7 TOTALS (COST)** | **$ 17,940.00** | **$ 980.00** | **$ 31,878.00** | **$ 24,570.00** | **$ 7,680.00** | **$ 21,560.00** | **$ -** | **$ 15,810.00** | **$ -** | **$ 120,418.00** |
| **TASK BS8 - PROJECT MANAGEMENT** | | | | | | | | | | |
| A. SCHEDULE, PROGRESS REPORTS, AND INVOICES | | | | | | | | | | $ - |
| Schedule and Updates | 4 | | 8 | | | | | | | $ 2,624.00 |
| Progress Reports | | | 4 | | | | | | | $ 792.00 |
| Preparing Invoices | | | 4 | | | | | | | $ 792.00 |
| B. PROGRESS/COORDINATION MEETINGS | | | | | | | | | | $ - |
| Prepare for/Attend Client Coordination Meetings (Up to 24) | 24 | | 24 | 6 | | | | 4 | | $ 12,482.00 |
| Prepare for/Attend Internal Coordination Meetings (Up to 24) | 24 | 8 | 32 | 16 | 16 | | | 16 | | $ 21,336.00 |
| Prepare subcontracts, direct & monitor sub activities, review sub work and invoices | 4 | | 8 | | | | | | | $ 2,624.00 |
| **TASK BS8 TOTALS (HOURS)** | **56** | **8** | **84** | **30** | **16** | **0** | **0** | **20** | **0** | **214** |
| **TASK BS8 TOTALS (COST)** | **$ 14,560.00** | **$ 1,960.00** | **$ 16,632.00** | **$ 4,050.00** | **$ 1,920.00** | **$ -** | **$ -** | **$ 3,400.00** | **$ -** | **$ 42,522.00** |
| **TOTAL BGE HOURS (BASIC SERVICES)** | **224** | **124** | **542** | **874** | **750** | **850** | **261** | **143** | **0** | **3,768** |
| **TOTAL BGE LABOR COST (BASIC SERVICES)** | **$ 58,240.00** | **$ 30,380.00** | **$ 107,316.00** | **$ 118,630.00** | **$ 89,750.00** | **$ 93,500.00** | **$ 41,445.00** | **$ 22,060.00** | **$ -** | **$ 561,321.00** |

| **Reimbursable Direct Expenses** | | **Unit** | **Quantity** | **Rate** | **Total** |
|---|---|---|---|---|---|
| Utility Vehicle - UTV | | DAY | 3 | $ 125.00 | $ 375.00 |
| GPS Unit | | HOURS | 3 | $ 25.00 | $ 75.00 |
| Mileage | | EA | 120 | $ 0.575 | $ 69.00 |
| **Total Reimbursable Direct Expenses** | | | | | **$ 519.00** |

| | |
|---|---|
| ***BASIC SERVICES TOTALS (BGE)*** | **$ 561,840.00** |

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**LAMB-STAR ENGINEERING, LLC**
**SUE and ROW Mapping**

| From: Airport Drive in McKinney, TX<br>To: County Road 393 in Lowry Crossing, TX | Senior Design Engineer | Project Engineer | Design Engineer | Sr. CAD Operator | RPLS Project Manager | RPLS Task Lead | GIS Technician | Survey Tech | Abstractor | Utilities Coordinator | Utilities Field Inspector | TOTAL HRS PER TASK | TOTAL PER TASK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RATE** | **$200.00** | **$175.00** | **$150.00** | **$135.00** | **$181.00** | **$164.00** | **$120.00** | **$115.00** | **$90.00** | **$150.00** | **$120.00** | | |
| **SPECIAL SERVICES (SPECIFIED RATE)** | | | | | | | | | | | | | |
| **TASK SS1. SURVEY AND RIGHT-OF-WAY** | | | | | | | | | | | | | |
| Abstracting and Ownership List (Assuming 39 properties) | | | | | | | | | | | | 0 | $ - |
| **TASK SS1 TOTALS (HOURS)** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **$ -** |
| **TASK SS1 TOTALS (COST)** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | | |
| **TASK SS2 - UTILITY INVESTIGATION (SUE)** | | | | | | | | | | | | | |
| A. UTILITY QUALITY LEVELS | | | | | | | | | | | | | |
| Project Management, Coordination, & QA/QC | | | | | | | | | | | | 0 | $ - |
| Digtess Ticket Preparation & Coordination w/ Utility Site Rep's | | | | | | | | | | | | 0 | $ - |
| Records Research (13 Utilities) - included in direct cost below | | | | | | | | | | | | 0 | $ - |
| Level C/D Linework (Area incl. 4 options) - included in direct cost below for QL C/D | | | | | | | | | | | | 0 | $ - |
| C. SUBSURFACE UTILITY LOCATE (TEST HOLE) SERVICE (QUALITY LEVEL A) | | | | | | | | | | | | 0 | $ - |
| Develop SUE Level A Test Hole Data Sheets | | | | | | | | | | | | 0 | $ - |
| **TASK BS4 TOTALS (HOURS)** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **$ -** |
| **TASK BS4 TOTALS (COST)** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | | |

| **DIRECT COSTS** | | | | | |
|---|---|---|---|---|---|
| **Task Description** | **Unit Cost** | **Quantity** | **Unit** | | |
| Mileage | $ 0.575 | | EA | | $ - |
| Photocopies B/W (8.5"x11") | $ 0.10 | | EA | | $ - |
| Photocopies B/W (11"X17") | $ 0.20 | | EA | | $ - |
| SUE Mobilization/Demobilization | $ 5.50 | | MILE | Compensation for 2 mobilizations. Vacuum excavation truck (non-local) | $ - |
| SUE Quality Level C | $ 0.85 | 42880 | LF | Includes records research and linework. | $ 36,448.00 |
| SUE Quality Level B in combination with Level A Locates | $ 1.60 | | LF | (To be completed by BGE) | $ - |
| SUE (QL A - Utility Locate, Test Holes) | | | | Includes labor and equipment for vacuum excavation, engineering, surveying, CADD, and limited Traffic Control. | $ - |
| Level A: 0 to 4 ft | $ 1,100.00 | | EA | | $ - |
| Level A: 4 to 8 ft | $ 1,350.00 | | EA | | $ - |
| Level A: 8 to 12 ft | $ 1,650.00 | | EA | | $ - |
| Level A: 13 to 18 ft | $ 2,100.00 | | EA | | $ - |
| 2-Man Designating Crew | $ 185.00 | | HR | | $ - |
| Traffic Control | $ 5,000.00 | | EA | | $ - |
| **DIRECT COSTS TOTALS** | | | | | **$ 36,448.00** |

| | |
|---|---|
| **TOTAL SPECIAL SERVICES (LAMB-STAR ENGINEERING, LLC)** | **$ 36,448.00** |
| **TOTAL FEE (LAMB-STAR ENGINEERING, LLC)** | **$ 36,448.00** |

**EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)**
**GORRONDONA & ASSOCIATES, INC.**
**Aerial Mapping**

| *From: Airport Drive in McKinney, TX*<br>*To: County Road 393 in Lowry Crossing, TX* | PROJECT MANAGER | PROJECT COORD. AM | CERTIFIED PHOTO-GRAMMETRIST | ANALYTICAL TRIANGULATION SPECIALIST | AERIAL MAPPING TECHNICIAN | ORTHOPHOTO SPECIALIST | MAPPING EDITOR | PROJECT COORD. AP | ADMIN/ CLERICAL | TOTAL LABOR HRS. & COSTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| Additional Topographic Mapping for Direct Connectors | | 4 | 2 | | 24 | | 6 | | 2 | 38 |
| HOURS SUB-TOTALS | | 4 | 2 | | 24 | | 6 | | 2 | 38 |
| CONTRACT RATE PER HOUR | $ 160.00 | $ 139.00 | $ 116.00 | $ 92.00 | $ 86.00 | $ 86.00 | $ 86.00 | $ 128.00 | $ 68.00 | |
| TOTAL LABOR COSTS | $0.00 | $556.00 | $232.00 | $0.00 | $2,064.00 | $0.00 | $516.00 | $0.00 | $136.00 | $3,504.00 |
| | | | | | | | | | | |
| **SUBTOTAL (Aerial Mapping)** | $0.00 | $556.00 | $232.00 | $0.00 | $2,064.00 | $0.00 | $516.00 | $0.00 | $136.00 | **$3,504.00** |
| | | | | | | | | | | |
| **Project Totals** | | | | | | | | | | **$3,504.00** |

# EXHIBIT "C" - FEE SCHEDULE
## Terracon Consultants, Inc.
### Geotechnical Engineering Services

| *From: Airport Drive in McKinney, TX*<br>*To: County Road 393 in Lowry Crossing, TX* | PROJECT MANAGER | SENIOR ENGINEER | PROJECT ENGINEER | DESIGN ENGINEER | ENGINEER IN TRAINING | ADMIN / CLERICAL | TOTAL LABOR HRS. & COSTS |
|---|---|---|---|---|---|---|---|
| **SS4. Geotechnical Investigation** | | | | | | | |
| **A. Field Investigation** | | | | | | | |
| Collection of Existing Data and Training Requirements | | | | | | | 0 |
| Obtaining Permits | 2 | | 4 | | 6 | | 12 |
| Borehole Layout, Traffic Control Plan, Stake Borings and Utility Clearance | 2 | | 8 | | 12 | | 22 |
| Drilling Coordination and Logging | | | | | 48 | | 48 |
| Meetings/Communication with County, Airport, USACE and State | 6 | | 6 | | 8 | | 20 |
| **B. Laboratory Investigation** | | | | | | | |
| Review Samples, Field Logs & Assign Laboratory Testing | | | | | | | 0 |
| Boring Logs Preparation | | | | | 8 | | 8 |
| Review of Wincore Logs | 2 | | 4 | | | | 6 |
| Foundation Recommendations for Bridge | 2 | | 4 | | | | 6 |
| LPILE Parameters for Bridge | 2 | | 4 | | | | 6 |
| Settlements Analysis | 4 | | 8 | | | | 12 |
| Global Stability Analysis for Bridge Abutments | 4 | | 8 | | | | 12 |
| Scour Analysis | 3 | | 6 | | | | 9 |
| **C. Geotechnical Report** | | | | | | | |
| Preparation of Draft BRIDGE Geotechnical Report | 12 | | 32 | | | | 44 |
| Preparation of Final BRIDGE Geotechnical Report | 4 | | 6 | | | | 10 |
| | | | | | | | |
| HOURS SUB-TOTALS | 43 | 0 | 90 | 0 | 82 | 0 | 215 |
| CONTRACT RATE PER HOUR | $222.10 | | $150.73 | | | $68.23 | |
| TOTAL LABOR COSTS | $9,550.30 | $0.00 | $13,565.70 | $0.00 | $0.00 | $0.00 | $23,116.00 |
| | | | | | | | |
| **SUBTOTAL - LABOR** | | | | | | | **$23,116.00** |

# EXHIBIT "C" - FEE SCHEDULE
## Terracon Consultants, Inc.
### Geotechnical Engineering Services

| Direct Expenses | UNIT | RATE | SS4 | | | |
|---|---|---|---|---|---|---|
| Mileage | mile | $0.575 | 360 | | | $207.00 |
| Traffic Control Services, Arrow Boards and Attenuator trucks - Large Project (Includes labor, equipment and fuel) | day | $2,900.00 | 2 | | | $5,800.00 |
| Portable Message Board | day | $500.00 | 2 | | | $1,000.00 |
| Mobilization of Drilling Rig | per mile | $4.50 | 180 | | | $810.00 |
| | | | | | | $0.00 |
| Standard Penetration Test (SPT) | LF | $30.00 | 20 | | | $600.00 |
| Unconfined Compressive Strength (Soil) | each | $60.00 | 10 | | | $600.00 |
| Unconfined Compressive Strength (Rock) | each | $70.00 | 10 | | | $700.00 |
| Soil Boring/Rock Coring with TCP ( < 60 ft.) | LF | $36.00 | 220 | | | $7,920.00 |
| Soil Boring/Rock Coring with TCP ( > 60 ft.) | LF | $40.00 | 40 | | | $1,600.00 |
| Daily Rig Mobilization/Demob Charges | day | $150.00 | 2 | | | $300.00 |
| Consolidation Test | each | $500.00 | 3 | | | $1,500.00 |
| Determining Moisture Content in Soil Materials | Each | $11.50 | 12 | | | $138.00 |
| Determining Liquid Limits of Soils | Each | $36.00 | 12 | | | $432.00 |
| Determining Plastic Limit of Soils | Each | $36.00 | 12 | | | $432.00 |
| Calculating the Plasticity Index of Soils | Each | $15.00 | 12 | | | $180.00 |
| Particle Size Analysis - Retained +40 | Each | $65.00 | 2 | | | $130.00 |
| Consolidated Undrained (CU) Triaxial Compression Test for Undisturbed Soils- Single Stage | Each | $780.00 | 3 | | | $2,340.00 |
| Texas Cone Penetration | Each | $35.00 | | | | $0.00 |
| Determining Sulfate Content in Soils - Colorimetric Method | Each | $75.00 | | | | $0.00 |
| **SUBTOTAL Direct Expenses** | | | $ - | $ - | $ - | **$24,689.00** |

| | |
|---|---|
| SUBTOTAL - LABOR | $23,116.00 |
| SUBTOTAL Direct Expenses | $24,689.00 |
| ***Total Terracon Consultants, Inc. Fee*** | **$47,805.00** |

# EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)
## RDV Systems, Inc.
## 3D Visualization Services

| Software / Subscriptions / Direct Costs | Months | Rate | Cost |
|---|---|---|---|
| 123BIM.com Platinum Level - initial setup | 1 | $1,650.00 | $1,650.00 |
| 123BIM.com Platinum Level subscription (2nd Year) | 0 | $1,100.00 | $0.00 |
| **Total Software / Subscriptions** | | | $1,650.00 |

| | |
|---|---|
| TOTAL SOFTWARE / SUBSCRIPTIONS / DIRECT COSTS | $1,650.00 |
| TOTAL MODEL DEVELOPMENT | $0.00 |
| **TOTAL PROPOSAL COST** | **$1,650.00** |

## EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)
## Public Information Associates
## Public Involvement

| *From: Airport Drive in McKinney, TX*<br>*To: County Road 393 in Lowry Crossing, TX* | | PI Specialist (Partner) | PI Coordinator | PI Admin Support | Totals |
|---|---|---|---|---|---|
| **Rate** | | **$155.00** | **$109.00** | **$54.00** | |
| **BASIC SERVICES** | | | | | |
| ***TASK BS7 - PUBLIC/STAKEHOLDER INVOLVEMENT*** | | | | | |
| ***Reimbursable Direct Expenses*** | | **Unit** | **Quantity** | **Rate** | **Total** |
| Venue Rental | | EA | 2 | $4,000.00 | $8,000 |
| **Total Reimbursable Direct Expenses** | | | | | **$8,000.00** |
| | | | | | |
| ***Total Public Information Associates Fee*** | | | | | **$8,000.00** |

# EXHIBIT "C" - FEE SCHEDULE (AMENDMENT 3 - PHASE 2)
## Kimley-Horn and Associates, Inc.
## Traffic Projections

| TASK DESCRIPTION | Traffic Project Manager | Quality Manager | Project Engineer | Engineer-In-Training | Traffic Modeler (Senior) | Project Controller | TOTAL HRS. | TOTAL LABOR HRS. & COSTS | AMENDMENT # 3 TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | $285.00 | $295.00 | $195.00 | $150.00 | $285.00 | $125.00 | | | |
| **PROJECT MANAGEMENT AND ADMINISTRATION** | | | | | | | | | |
| Project management and coordination | 10 | | 2 | | | | 12 | $ 3,240.00 | $ 30.00 |
| Progress reports and invoices (assuming 12 invoices) | 12 | | | | | 12 | 24 | $ 4,920.00 | $ - |
| Meetings (assuming 12 meetings) | 16 | | 2 | 6 | | | 24 | $ 5,850.00 | $ 150.00 |
| **TRAFFIC PROJECTIONS** | | | | | | | | | |
| TPP Coordination regarding Consultant Information Packet | 2 | | 6 | 1 | | | 9 | $ 1,890.00 | $ (20.00) |
| Historical Traffic Data Growth Rate | 1 | 4 | 16 | 31 | | | 52 | $ 9,235.00 | $ (50.00) |
| NCTCOG Coordination regarding Travel Demand Model | 2 | | 6 | 1 | 6 | | 15 | $ 3,600.00 | $ (20.00) |
| Travel Demand Model Growth Rate | 1 | 4 | 8 | 10 | 15 | | 38 | $ 8,800.00 | $ 60.00 |
| US Census Growth Rate | 1 | 2 | 5 | 7 | | | 15 | $ 2,900.00 | $ 85.00 |
| Traffic Projections Methodology Memo | 4 | 12 | 28 | 56 | 16 | | 116 | $ 23,100.00 | $ (20.00) |
| Address TPP comments on Traffic Projections Methodology Memo | 1 | | 5 | 1 | | | 7 | $ 1,410.00 | $ 225.00 |
| Traffic Projections for ADT, AM, PM for opening year, design year, and pavement design year for no-build and up to 3 build | 4 | 24 | 78 | 140 | 30 | | 276 | $ 52,980.00 | $ 3,970.00 |
| Address TPP comments on Traffic Projections | 1 | | 26 | 46 | | | 73 | $ 12,255.00 | $ 1,310.00 |
| Traffic Analysis for Highway Design and Coordination with TPP | 2 | 5 | 8 | 15 | | | 30 | $ 5,855.00 | $ 420.00 |
| **TRAFFIC ANALYSIS** | | | | | | | | | |
| Synchro Traffic Analysis (opening year and 20-year design year, no-build and one build alternative, AM and PM peak hours) | 2 | 4 | 28 | 85 | | | 119 | $ 19,960.00 | $ 19,960.00 |
| VISSIM Traffic Analysis for one intersection (opening year and 20-year design year, no-build and one build alternative, AM and PM peak hours) | 1 | 2 | 18 | 74 | | | 95 | $ 15,485.00 | $ 15,485.00 |
| Traffic Memo and up to two (2) rounds of comments | 2 | 2 | 25 | 60 | | | 89 | $ 15,035.00 | $ 15,035.00 |
| | | | | | | | | | |
| HOURS SUB-TOTALS | 62 | 59 | 261 | 533 | 67 | 12 | | 994 | |
| TOTAL LABOR COSTS | $17,670.00 | $17,405.00 | $50,895.00 | $79,950.00 | $19,095.00 | $1,500.00 | | **$ 186,515.00** | **$ 56,620.00** |

# FM 546 Phase 2

| | Original | Amendment # 3 | | | | | | | Combined Total |
|---|---|---|---|---|---|---|---|---|---|
| | Total | BGE, Inc. | LSE | GAI | Terracon | RDV | PIA | Kimley-Horn | Total | |
| **BASIC SERVICES** | | | | | | | | | | |
| BS1 - Assembly and Review of Data | $ 48,690.00 | | | | | | | | $ - | $ 48,690.00 |
| BS2 - Corridor Typical Section Eval. | $ 3,832.00 | $ 2,076.00 | | | | | | | $ 2,076.00 | $ 5,908.00 |
| BS3 - Corridor Alternatives Analysis | $ 273,085.00 | $184,252.00 | | | | | | $ 56,620.00 | $ 240,872.00 | $ 513,957.00 |
| BS4 - Schematic Development | $ 321,858.00 | $184,546.00 | | | | | | | $ 184,546.00 | $ 506,404.00 |
| BS5 - H&H Investigation | $ 120,910.00 | | | | | | | | $ - | $ 120,910.00 |
| BS6 - Soc., Econ., and Env. Studies | $ 353,660.00 | $ 27,507.00 | | | | | | | $ 27,507.00 | $ 381,167.00 |
| BS7 - Public/Stakeholder Involvement | $ 213,867.00 | $120,418.00 | | | | | | | $ 120,418.00 | $ 334,285.00 |
| BS8 - Project Management | $ 140,779.00 | $ 42,522.00 | | | | | | | $ 42,522.00 | $ 183,301.00 |
| BS - Expenses | $ 56,003.77 | $ 519.00 | | | | | $8,000.00 | | $ 8,519.00 | $ 64,522.77 |
| **Subtotal** | **$1,532,684.77** | **$561,840.00** | **$ -** | **$ -** | **$ -** | **$ -** | **$ 8,000.00** | **$ 56,620.00** | **$ 626,460.00** | $ 2,159,144.77 |
| | | | | | | | | | | |
| **SPECIAL SERVICES** | | | | | | | | | | |
| SS1 - Surveying & ROW Mapping | $ 280,137.00 | | | | | | | | $ - | $ 280,137.00 |
| SS2 - SUE | $ 107,161.00 | | | | | | | | $ - | $ 107,161.00 |
| SS3 - Aerial and Lidar | $ 43,850.00 | | | $3,504.00 | | | | | $ 3,504.00 | $ 47,354.00 |
| SS4 - Geotechnical Investigation | $ 81,794.87 | | | | $47,805.00 | | | | $ 47,805.00 | $ 129,599.87 |
| SS5 - 3D Visualization | $ 30,508.30 | | | | | | | | $ - | $ 30,508.30 |
| SS - Expenses | $ 241,999.75 | | $36,448.00 | | | $1,650.00 | | | $ 38,098.00 | $ 280,097.75 |
| **Subtotal** | **$ 785,450.92** | **$ -** | **$36,448.00** | **$3,504.00** | **$47,805.00** | **$1,650.00** | **$ -** | **$ -** | **$ 89,407.00** | **$ 874,857.92** |
| **Total** | **$2,318,135.69** | **$561,840.00** | **$36,448.00** | **$3,504.00** | **$47,805.00** | **$1,650.00** | **$ 8,000.00** | **$ 56,620.00** | **$ 715,867.00** | **$ 3,034,002.69** |