

ENGINEERING SERVICES AGREEMENT

THIS AGREEMENT is made and entered into by and between the Fort Bend County Toll Road Authority, a Texas Local Government corporation organized and operating under the laws of the State of Texas, hereinafter called the “FBCTRA” and LJA Engineering, Inc. hereinafter called “Engineer.”

WITNESSETH

WHEREAS, the FBCTRA proposes to prepare preliminary engineering and alignment study for the extension of the Fort Bend Parkway Toll Road, Segment B-4 (Project 101-1029), from Sienna Levee to FM 2759, and for the extension of FM 2759 from Thompson’s Ferry Rd / Champlin Rd. to the Fort Bend Parkway Toll Road, in Fort Bend County, Texas, (the “Project”);

WHEREAS, the FBCTRA desires to enter into an agreement with Engineer for the performance of services during the Project, that are within the scope of services in Attachment A (“Scope of Services”);

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth below, the parties agree as follows:

AGREEMENT

1. General

The Engineer shall render professional services to FBCTRA related to the Project as defined in the Scope of Services in Attachment A.

The standard of care for all professional engineering or surveying and related services performed or furnished by Engineer under this Agreement will be the care and skill ordinarily used by members of Engineer’s profession practicing under similar conditions at the same time and in the same locality.

2. Compensation and Payment

- a. The Maximum Compensation under this Agreement is \$4,790,795.80. The amount paid under this Agreement may not exceed the Maximum Compensation without an approved supplemental agreement.

Compensation for the performance of services within the Scope of Services described in Attachment A will be paid as a lump sum amount not to exceed \$3,221,405.97, and hourly (time & expenses) not to exceed \$1,569,389.83 as shown in Attachment B. Progress payments for work detailed in Attachment A will be made when the Engineer has attained a level of completion equal to or greater than agreed upon milestones of completion in the reasonable opinion of the FBCTRA.

The Engineer shall furnish satisfactory documentation of such work (e.g. timesheets, billing rates, classifications, invoices, etc.) as may be required by FBCTRA.

- b. All performance of the Scope of Services and any services outside the Scope of Services (“Additional Services”), including changes in the contractual scope of work and revision of work satisfactorily performed, will be performed only when approved in advance and authorized by the FBCTRA, and Additional Services will be reimbursed based on the billing rates in effect at that time, to the extent that such labor costs and subcontracts are reasonable and necessary for the performance of such services. Out-of-pocket expense costs may be reimbursed only when approved in advance and authorized by the FBCTRA. Payment will be made (i) on the basis of project progress to be billed monthly and, for Additional Services, (ii) on the basis of time and expense records, and in accordance with those payment procedures set forth in subsection d. below. Billing rates will be inclusive of all direct labor, fringe benefits, general overhead, and profit.
- c. Where subcontractors are employed by the Engineer to perform pre-approved and pre-authorized Additional Services, the Engineer will be reimbursed for subcontractors’ actual salaries and hourly rates, including overtime rates. Reimbursement to the subcontractor for non-salary costs incurred by subcontractor will be on the same basis as if the cost was incurred by the Engineer. For subcontractors employed for the convenience of the FBCTRA, the Engineer will be paid a subcontract administrative fee equal to ten percent (10%) of all subcontractor invoiced amounts.
- d. It is understood and agreed that monthly payments will be made to the Engineer by the FBCTRA based on the following procedures: 14 days before the 3rd Wednesday of each month during the performance of services hereunder and on or about the fifteenth day of the month following completion of all services hereunder, the Engineer shall submit to the FBCTRA one copy of invoice showing the amounts due for services performed during the previous month, set forth separately for work under this Agreement and for any Additional Services (accompanied by supporting certified time and expense records of such charges in a form acceptable to the FBCTRA). It is specifically understood that any requests for travel reimbursements shall comply with those procedures for travel reimbursement to Fort Bend County (the “County”) employees established by the Fort Bend County Auditor (the “Auditor”). The FBCTRA shall review such invoices and approve them within 30 calendar days with such modifications as are consistent with this Agreement, and forward same to the Auditor. The County shall pay each such invoice as approved by the FBCTRA within thirty (30) calendar days after the FBCTRA’s approval of same.

3. Time of Performance

It is understood and agreed that the time for performance of the Engineer's services under this Agreement shall begin with receipt of the Notice to Proceed. The Engineer will maintain the delivery schedule to be provided by the FBCTRA.

This Agreement will terminate upon the Engineer's completion of the Scope of Services to the satisfaction of the FBCTRA.

4. The FBCTRA's Option to Terminate

- a. The FBCTRA has the right to terminate this Agreement at its sole option at any time, with or without cause, by providing 30 days written notice of such intentions to terminate and by stating in said notice the "Termination Date" which shall be less than 30 days later than the actual receipt of such written notice by the Engineer. Upon such termination, the FBCTRA shall compensate the Engineer in accordance with Section 2, above, for those services which were provided under this Agreement prior to its termination and which have not been previously invoiced to the FBCTRA. The Engineer's final invoice for said services will be presented to and paid by the FBCTRA in the same manner set forth in Section 2(d), above.
- b. Termination of this Agreement and payment as described in subsection (a) of this section shall extinguish all rights, duties, obligations, and liabilities of the FBCTRA and the Engineer under this Agreement, and this Agreement shall be of no further force and effect, provided, however, such termination shall not act to release the Engineer from liability for any previous default either under this Agreement or under any standard of conduct set by common law or statute. The obligations in Sections 5, 6, and 14 of this Agreement shall survive the termination of this Agreement.
- c. If the FBCTRA terminates this Agreement as provided in this section, no fees of any type, other than fees due and payable at the Termination Date, shall thereafter be paid to the Engineer.
- d. The FBCTRA's rights and options to terminate this Agreement, as provided in any provision of this Agreement shall be in addition to, and not in lieu of, any and all rights, actions, and privileges otherwise available under law or equity to the FBCTRA by virtue of this Agreement or otherwise. Failure of the FBCTRA to exercise any of its said rights, actions, options, or privileges to terminate this Agreement as provided in any provision of this Agreement shall not be deemed a waiver of any rights, actions, or privileges otherwise available under the law or equity with respect to any continuing or subsequent breaches of this Agreement or of any other standard of conduct set by common law or statute.
- e. Copies of all completed and partially completed documents prepared under this Agreement shall be delivered to the FBCTRA within 30 days of the Termination Date or upon Engineer's receipt of fees due and payable at the Termination Date, whichever is sooner, when and if this Agreement is terminated.

5. Inspection of the Engineer's Books and Records

Upon written notice (including email), the Engineer will permit the FBCTRA, or any duly authorized agent of the FBCTRA, to inspect and examine the books and records of the Engineer for the purpose of verifying the amount of work performed on the Project at reasonable times during normal business hours. FBCTRA's right to inspect survives the termination of this Agreement for a period of four years.

6. Ownership and Reuse of Documents

Upon payment in full for undisputed amounts of Engineer's services, all documents, including original drawings, estimates, specifications, field notes, and data created, produced, developed or prepared by Engineer or its approved outside advisory or support consultants (collectively, the "Documents") shall be the property of the FBCTRA, subject to all of the following terms and conditions; provided, however, FBCTRA shall not own and shall have no right to receive any documents not deemed "final" by the Engineer until completion or termination of this Agreement, as applicable. Engineer will deliver the Documents to FBCTRA within 30 days of the completion or termination of this Agreement and may retain a set of reproducible record copies of the Documents, provided that the Engineer has received full compensation due pursuant to the terms of this Agreement. It is mutually agreed that FBCTRA will use the Documents solely in connection with the Project and for no other purposes, except with the express written consent of the Engineer, which consent will not be unreasonably withheld. Any use of the Documents without the express written consent of the Engineer will be at FBCTRA's sole risk and without liability or legal exposure to Engineer.

FBCTRA shall also be the owner of all intellectual property rights of the services rendered hereunder, including all rights of copyright therein. It is the intention of Engineer and FBCTRA that the services provided are a "work for hire" as the term is used in the federal Copyright Act. Moreover, Engineer hereby agrees to assign, and by these presents, does assign to FBCTRA, all of Engineer's worldwide right, title, and interest in and to such work product and all rights of copyright therein.

Engineer agrees that all trademarks, trade names, service marks, logos, or copyrighted materials of FBCTRA that Engineer is permitted to use in connection with the services will not be used without FBCTRA's consent and shall remain the sole and exclusive properties of FBCTRA, and this Agreement does not confer upon Engineer any right or interest therein or in the use thereof.

7. Personnel, Equipment, and Material

- a. The Engineer represents that it presently has, or is able to obtain, adequate qualified personnel in its employment for the timely performance of the Scope of Services required under this Agreement and that the Engineer shall furnish and maintain, at its own expense, adequate and sufficient personnel and equipment, in the opinion of the FBCTRA, to perform the Scope of Services when and as required and without delays. It is understood that the FBCTRA will approve assignment and release of all key Engineer personnel and that the Engineer shall submit written notification

of all key Engineer personnel changes for the FBCTRA's approval prior to the implementation of such changes. For the purpose of this Agreement, key Engineer personnel are defined as: Project Manager. Services described in this Agreement shall be performed under the direction of an engineer and a surveyor licensed to practice professional engineering and surveying in the State of Texas.

- b. All employees of the Engineer shall have such knowledge and experience as will enable them to perform the duties assigned to them. Any employee of the Engineer who, in the opinion of the FBCTRA, is incompetent, or, by his conduct, becomes detrimental to the Project, shall, upon request of the FBCTRA, immediately be removed from association with the Project.
- c. Except as otherwise specified, the Engineer shall furnish all equipment, transportation, supplies, and materials required for its operation under this Agreement.

8. Items to be furnished to Engineer by the FBCTRA

As applicable, the following items will be supplied to the Engineer:

- a. Copies of preliminary studies by others.
- b. Assistance in coordination with all utility companies.
- c. Assistance in coordination with all public and governmental entities.

9. Subletting

The Engineer shall not sublet, assign, or transfer any part of its rights or obligations in this Agreement without the prior written approval of the FBCTRA. Responsibility to the FBCTRA for sublet work shall remain with the Engineer.

10. Conference

At the request of the FBCTRA, the Engineer shall provide appropriate personnel for conferences at its offices, or attend conferences at the various offices of the FBCTRA, or at the site of the Project, and shall permit inspections of its offices by the FBCTRA, or others when requested by the FBCTRA.

11. Appearance as Witness

If requested by the FBCTRA, or on its behalf, the Engineer shall prepare such engineering and/or surveying exhibits and plans as may be requested for all hearings and trials related to the Project and, further, it shall prepare for and appear at conferences at the office of the FBCTRA and shall furnish competent expert engineering and/or surveying witnesses to provide such oral testimony and to introduce such demonstrative evidence as may be needed throughout all trials and hearings with reference to any litigation relating to the Project. Trial preparation and appearance by the Engineer in courts regarding litigation

matters are Additional Services and compensation will be paid in accordance with Section 2(b).

12. Compliance with Laws

The Engineer shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any matter affecting the performance of this Agreement, including, without limitation, Worker's Compensation laws, minimum and maximum salary and wage statutes and regulations, licensing laws and regulations. When required, the Engineer shall furnish the FBCTRA with certification of compliance with said laws, statutes, ordinances, rules, regulations, orders, and decrees above specified.

13. Insurance

The Engineer shall obtain and maintain, throughout the term of the Agreement, insurance of the types and in the minimum amounts set forth in Attachment C.

14. Indemnification

With respect to claims brought by third parties against either Engineer or the FBCTRA relating to the property or facilities with respect to which this Agreement pertains, Engineer and the FBCTRA agree as follows:

- a. **ENGINEER WILL INDEMNIFY AND HOLD HARMLESS THE FBCTRA, ITS DIRECTORS, OFFICERS, AND EMPLOYEES AGAINST ANY CLAIMS, DEMANDS OR CAUSES OF ACTION; AND COSTS, LOSSES, LIABILITIES, EXPENSES AND JUDGMENTS INCURRED IN CONNECTION THEREWITH, INCLUDING REASONABLE ATTORNEY'S FEES AND COURT COSTS, BROUGHT BY ANY OF ENGINEER'S EMPLOYEES OR REPRESENTATIVES, OR BY ANY OTHER THIRD PARTY, BASED UPON, IN CONNECTION WITH, RESULTING FROM OR ARISING OUT OF THE NEGLIGENT ACTS, ERRORS OR OMISSIONS OF ENGINEER; HOWEVER, ENGINEER'S CONTRACTUAL OBLIGATION OF INDEMNIFICATION SHALL NOT EXTEND TO THE NEGLIGENCE OR OTHER FAULT OF THE FBCTRA OR STRICT LIABILITY IMPOSED UPON THE FBCTRA AS A MATTER OF LAW (INCLUDING STRICT LIABILITY IMPOSED UPON THE FBCTRA AS A RESULT OF THE CONDITION OF THE PROPERTY OR FACILITIES WITH RESPECT TO WHICH THIS AGREEMENT PERTAINS).**
- b. In the event that both the FBCTRA and Engineer are adjudicated negligent or otherwise at fault or strictly liable without fault with respect to damage or injuries sustained by the claimant, each shall be responsible for its own costs of litigation and pro rata share of damages as determined by the proceedings.

It is a condition precedent to the indemnitor's contractual obligation of indemnification under this Agreement that the party seeking indemnity shall provide written notice of a third party claim, demand, or cause of action within 30 days after such third party claim, demand, or cause of action is received by the party seeking indemnity. It is a further condition precedent to the indemnitor's contractual obligation of indemnification under this Agreement that the indemnitor shall thereafter have the right to participate in the investigation, defense, and resolution of such third party claim.

15. Dispute Resolution

Except as expressly provided in Section 4. Option to Terminate, if a dispute arises out of, or relates to, the breach thereof, and if the dispute cannot be settled through negotiation, then the FBCTRA and the Engineer agree to submit the dispute to mediation. In the event the FBCTRA or the Engineer desires to mediate any dispute, that party shall notify the other party in writing of the dispute desired to be mediated. If the parties are unable to resolve their differences within 10 days of the receipt of such notice, such dispute shall be submitted for mediation in accordance with the procedures and rules of the American Arbitration Association (or any successor organization) then in effect. The deadline for submitting the dispute to mediation can be changed if the parties mutually agree in writing to extend the time between receipt of notice and submission to mediation. The expenses of the mediator shall be shared 50 percent by the FBCTRA and 50 percent by the Engineer. This requirement to seek mediation shall be a condition required before filing an action at law or in equity.

16. Delivery of Notices, Etc.

- a. All written notices, demands, and other papers or documents to be delivered to the FBCTRA under this Agreement, shall be delivered to the Fort Bend County Toll Road Authority, 1950 Lockwood Bypass, Richmond, Texas 77469, Attention: Mike Stone, or at such other place or places as it may from time to time designate by written notice delivered to the Engineer. For purposes of notice under this Agreement, a copy of any notice or communication hereunder shall also be forwarded to the following address: Fort Bend County Clerk, 301 Jackson Street, Richmond, Texas 77469, Attention: County Judge.
- b. All written notices, demands, and other papers or documents to be delivered to the Engineer under this Agreement shall be delivered to LJA Engineering Inc. 3600 W Sam Houston Pkwy S, Suite 600, Houston, Texas 77042 Attention: Jeff T. Cannon, Senior Vice President or such other place or places as the Engineer may designate by written notice delivered to the FBCTRA.

17. Reports of Accidents, Etc.

Within 24 hours after the occurrence of any accident or other event which results in, or might result in, injury to the person or property of any third person (other than an employee of the Engineer), whether or not it results from or involves any action or failure to act by the Engineer or any employee or agent of the Engineer and which arises in any manner from the performance of this Agreement, the Engineer shall send a written report of such

accident or other event to the FBCTRA, setting forth a full and concise statement of the facts pertaining thereto. The Engineer shall also immediately send the FBCTRA a copy of any summons, subpoena, notice, other documents served upon the Engineer, its agents, employees, or representatives, or received by it or them, in connection with any matter before any court arising in any manner from the Engineer's performance of work under this Agreement.

18. The FBCTRA's Acts

Anything to be done under this Agreement by the FBCTRA may be done by such persons, corporations, or firms as the FBCTRA may designate.

19. Limitations

Notwithstanding anything herein to the contrary, all covenants and obligations of the FBCTRA under this Agreement shall be deemed to be valid covenants and obligations only to extent authorized by the Act creating the FBCTRA and permitted by the laws and the Constitution of the State of Texas. This Agreement shall be governed by the laws of the State of Texas, and no officer, director, or employee of the FBCTRA shall have any personal obligation hereunder.

20. Captions Not a Part Hereof

The captions of subtitle of the several sections and divisions of this Agreement constitute no part of the content hereof, but are only labels to assist in locating and reading the provisions hereof.

21. Controlling Law, Venue

This Agreement shall be governed and construed in accordance with the laws of the State of Texas. The parties hereto acknowledge that venue is proper in Fort Bend County, Texas, for all disputes arising hereunder and waive the right to sue or be sued elsewhere.

22. Successors and Assigns

The FBCTRA and the Engineer bind themselves and their successors, executors, administrators, and assigns to the other party of this Agreement and to the successors, executors, administrators, and assigns of the other party, in respect to all covenants of this Agreement.

23. Statutory Terms Applicable To State Political Subdivisions

- a. Contractor certifies and agrees that it (i) does not, nor will not, so long as the Agreement remains in effect, boycott Israel, as such term is defined in Chapter 808, Texas Government Code, (ii) does not engage in business with Iran, Sudan, or any foreign terrorist organization pursuant to Subchapter F of Chapter 2252 of the Texas Government Code; (iii) is not identified on a list prepared and maintained under Sections 806.051, 807.051, or 2252.153, Texas Government Code; (iv) does not, nor will not, so long as the Agreement remains in effect, boycott energy companies, as such term is defined in Chapter 809, Texas Government Code; (v) does not, nor will not, so long as the Agreement remains in effect, have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, as such term is defined in 2274.001(3), Texas Government Code; and (vi) is not (a) owned or controlled by (1) individuals who are citizens of China, Iran, North Korea, Russia or any designated country (as such term is defined in 113.003, Texas Business & Commerce Code); or (2) a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China, Iran, North Korea, Russia, of any designated country; or (b) headquartered in China, Iran, North Korea, Russia or a designated country.
- b. Prior to execution of this Agreement by FBGPTRA, the Engineer will be required to submit a Texas Ethics Commission Form 1295. Please see this website for details related to this disclosure:
https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm
- c. In accordance with Section 176.0065, Texas Local Government Code, a list of local government officers of FBGPTRA may be obtained by contacting the FBGPTRA's records administrator at (281) 500-6050.

24. Appendices

The Appendices attached to this Agreement, which consists of:

Attachment A	Scope of Services
Attachment B	Compensation for Scope of Services
Attachment C	Insurance Requirements

[Signatures Follow]

IN WITNESS WHEREOF, the parties hereto have signed or have caused their respective names to be signed to multiple counterparts to be effective on the 19th day of December 2022.

FORT BEND COUNTY TOLL ROAD
AUTHORITY, a Texas local government
corporation

By: Bobbie Tallas
Name: Bobbie Tallas
Title: Vice Chairman

LJA Engineering, Inc.

By: _____
Name: Jeff T. Cannon
Title: Senior Vice President

EFFECTIVE DATE

THIS AGREEMENT IS EFFECTIVE ON THE DATE IT IS APPROVED BY THE FORT BEND COUNTY COMMISSIONERS COURT, AND IF NOT SO APPROVED SHALL BE NULL AND VOID.

DATE OF COMMISSIONERS COURT APPROVAL:

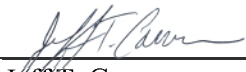
AGENDA ITEM NO.: _____

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FORT BEND COUNTY TOLL ROAD
AUTHORITY, a Texas local government
corporation

By: _____
Name: _____
Title: _____

LJA Engineering, Inc.

By:  _____
Name: Jeff T. Cannon
Title: Senior Vice President

EFFECTIVE DATE

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DATE OF COMMISSIONERS COURT APPROVAL:

AGENDA ITEM NO.: _____

ATTACHMENT A**ENGINEER'S SCOPE OF SERVICES**

Provide preliminary engineering services the extension of the Fort Bend Parkway Segment B-4 from Sienna Levee to FM 2759 (~8,100 LF), and for the extension of FM 2759 from Thompson's Ferry Rd / Champlin Rd. to the Fort Bend Parkway (~2,500 LF). Preliminary engineering services will include:

- A. Project Management
- B. Route Studies and Schematic Design
- C. Environmental
- D. Utility Coordination and Engineering and Subsurface Utility Engineering (SUE)
- E. Design and ROW Surveys and Documents
- F. Geotechnical Investigations and Recommendations
- G. Brazos River Geomorphic Analysis
- H. Bridge Studies and Recommendations
- I. Brazos River Hydrologic and Hydraulic Analysis
- J. Drainage Analysis and Recommendations
- K. Preliminary Engineering Report

Coordinate with preliminary engineering being performed by others for the extension of the Fort Bend Parkway

Segment B-3: East of Sienna Ranch Road to Sienna Levee

Segment C: FM 2759 to SH 36

A. PROJECT MANAGEMENT

The Project Manager, in coordination with the Fort Bend County Toll Road Authority (FBCTRA) Project Manager, shall be responsible for directing and coordinating all activities associated with the project. The Project Manager shall coordinate all subconsultant activity to include quality of and consistency of plans and administration of the invoices and monthly progress reports. The Project Manager shall coordinate (if necessary) with the Texas Department of Transportation (TxDOT) and local entities through the FBCTRA Project Manager. The Project Manager shall:

1. **Contract Administration** – Maintain and administer contract documents and invoicing.
2. **Design Team Progress Meetings and Reports** – Coordinate with Design Team and prepare progress reports.
3. **FBCTRA Progress Meetings** – Meet with the FBCTRA to review project progress.
4. **Schedule Management** – Develop and maintain a detailed project schedule to track project conformance.
5. **Segments B-3 and C Coordination** – Coordinate with the Segments B-3 and C design teams.

B. ROUTE STUDIES AND SCHEMATIC DESIGN

1. DATA COLLECTION AND FIELD RECONNAISSANCE

Collect, review, and evaluate data including “as-built plans”, existing schematics, right-of-way maps, Subsurface Utility Engineering (SUE) mapping, existing cross sections, existing planimetric mapping, environmental documents, existing channel and drainage easement data, existing traffic counts, accident data, Bridge Inspection records, identified endangered species, identified hazardous material sites, current unit bid price information, current special provisions, special specifications, standard drawings, existing utility plans, and flood plain information and studies. Perform site visits to observe existing constraints, issues, and utilities.

2. TRAFFIC PROJECTIONS

Coordinate with others (Segment C Engineer is preparing traffic projections of Segments B-4 and C) as they prepare traffic projections for the opening-year, design-year (opening year +20) and pavement design year (opening year + 30) for the mainlanes, ramps, cross streets, interchanges, intersections, and frontage roads. Utilize the traffic data to prepare the geometric schematic design.

3. DESIGN CRITERIA

Prepare design criteria (including design speed, lane and shoulder widths, pavement structure and slopes, horizontal curvatures, horizontal and vertical clearances, range of vertical profile grades, and side slopes) in accordance with the latest version of:

1. *Roadway Design Manual*, published by TxDOT;
2. *TxDOT Project Development Process Manual*, published by TxDOT;
3. *Policy on Geometric Design of Highways and Streets*, published by the American Association of State Highway and Transportation Officials’ (AASHTO).
4. *Standard Specifications for Construction of Highways, Streets, and Bridges* published by TxDOT.
5. *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*, published by TxDOT.
6. *Highway Capacity Manual (HCM)*, published by the Transportation Research Board (TRB);
7. *Highway Safety Manual (HSM)*, published by AASHTO.
8. *Hydraulic Design Manual*, published by TxDOT.
9. *Access Management Manual*, published by TxDOT; and
10. *Roadside Design Guide*, published by AASHTO

4. TYPICAL SECTIONS

Develop (4) proposed typical sections 1. ML on grade 2. ML on structures 3. Ramp Areas 4. FM 2759 extension that depict the number and type of lanes, shoulders, median width, curb offsets, cross slope, border width, clear zone widths, and ROW limits.

5. CONCEPTUAL ALTERNATIVES (3 maximum)

Identify and analyze up to three (3) conceptual schematic alternatives to minimize potential adverse operational impacts, crash impacts, ROW impacts, environmental impacts, major utility conflicts, structural impediments, or exceptions to design criteria. The conceptual schematics must contain the following design elements:

1. Mainlane roadway alignment
2. Pavement edges, face of curbs, and shoulder lines of mainlanes, intersections, interchanges, and connecting

highways or streets

3. Bike and Pedestrian accommodations
4. Typical sections proposed roadways
5. Anticipated structure locations
6. Anticipated retaining wall locations
7. Anticipated conveyance of major drainage elements
8. Preliminary ROW and easement requirements and control-of-access locations
9. Direction of traffic flow and the number of lanes on all roadways
10. Waters of the United States (WOTUS)

6. ALTERNATIVE ANALYSIS

Utilize a decision matrix to evaluate the conceptual schematic alternatives and to select a recommended alternative considering various engineering, environmental, socioeconomic, cost, and safety factors. The selection of a recommended alternative will be coordinated with the FBCTRA and various alignment alternatives for Segment C to the south of FM 2759.

7. GEOMETRIC DESIGN SCHEMATIC (OF RECOMMENDED ALTERNATIVE)

Prepare the geometric design schematic horizontal layout to a design scale of 1 inch = 100 foot (or 1 inch = 200 foot, when directed by the FBCTRA.) Develop the schematic layout, exhibits, and attachments in English units. All Microsoft Office, MicroStation, Keyhole Markup Language (KML), Keyhole Markup Language Zipped (KMZ), and Bentley OpenRoads Designer computer graphic files furnished to the FBCTRA must be submitted on CD, DVD, or USB flash drive to the FBCTRA in their native format.

Coordinate geometric schematic design with the Segment B-3 design team at the Sienna Levee and with the Segment C design team at FM 2759. Develop geometric design schematics based on the conceptual schematics after the basic layout, lane arrangement, and anticipated ROW and easement impacts depicted on the conceptual schematics are approved. Utilize Bentley OpenRoads Designer tools in performing this task. The geometric design schematics must include both a plan view and profile view.

The geometric schematic plan view must contain the following design elements:

1. Bentley OpenRoads Designer calculated roadway alignments for mainlanes, general purpose lanes, ramps, direct connectors, bridges, HOV lanes, managed lanes, express lanes, collector distributor roads, frontage roads and cross streets at major intersections and grade separations
2. Horizontal curve data shown in tabular format
3. Pavement edges, curb lines, sidewalks for all roadway improvements
4. Typical sections of existing and proposed roadways
5. Proposed bridge structures, including bridge deck, abutment, bent, and rail locations
6. Proposed retaining walls and sound walls
7. Proposed cross-drainage structures with outfall flow arrows and significant drainage features or waterways identified
8. Existing utilities and proposed utilities
9. Existing property lines and respective property ownership information
10. Existing ROW and easements
11. Proposed ROW and easements adequate for preparation of ROW maps
12. Waters of the US (WOTUS)
13. Control-of-access limits
14. Projected traffic volumes
15. Location and text of the proposed guide signs and the preliminary locations for changeable message signs
16. Lane lines, shoulder lines, and direction of traffic flow arrows indicating the number of lanes on all

roadways

The geometric schematic profile view must contain the following design elements:

1. Calculated profile grade and vertical curve data including “K” values for all curves and sight distance values for crest vertical curves on the mainlanes
2. Existing ground line profiles along the mainlanes
3. Grade separations and overpasses including preliminary abutment and bent locations, girder type, and span lengths
4. Calculated vertical clearances at grade separations and overpasses
5. Anticipated cross-drainage structures with approximate inlet and outfall flowline elevations
6. 100-yr water surface elevations at all crossing waterways
7. Bridge low chord elevation for each waterway crossing
8. Proposed ditch grading (special grading), if it does not follow the typical section.
9. Approximate locations of existing and proposed major utility crossings
10. The calculated profile grade for frontage roads, connectors, ramps and cross streets.

8. CROSS-SECTIONS OF RECOMMENDED ALTERNATIVE

Utilize a Bentley 3D OpenRoads Designer model to generate cross-sections at 100-foot intervals (unless otherwise directed by FBCTRA) and at culvert locations in conjunction with the geometric schematic. Determine earthwork volumes for use in the cost estimate.

9. COST ESTIMATES

Prepare and maintain preliminary cost estimates of conceptual alternatives and of the recommended alternative including the costs of construction, required ROW and associated improvements, and utility adjustments.

10. AGENCY COORDINATION AND LANDOWNER COORDINATION

Assist the FBCTRA in conducting meetings with property owners, stakeholders, and various agencies to discuss and review the schematic design.

C. ENVIRONMENTAL

1. WATERS OF THE U.S. DELINEATION

Conduct a waters of the U.S. delineation and ordinary high water mark identification within the subject property in order to map onsite aquatic features potentially regulated by the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA). Field efforts will be designed to identify and delineate the boundaries of potentially jurisdictional waters of the U.S. at the project site.

Note: The majority of the subject property was previously delineated by Bio-West in 2017; however waters of the U.S. delineation data has a five year expiration timeline as set forth by the USACE.

Collect new data throughout the subject property to determine the presence or absence of potential aquatic features. Utilize the methodologies as specified in the 1987 USACE Wetlands Delineation Manual, the 2010 Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region – Version 2.0, Regulatory Guidance Letter 05-05 – Ordinary High Water Mark (OHWM) Identification, and other applicable industry guidance and standards. All aquatic features will be classified in the field by either, the simplified United States Fish and Wildlife Department’s (USFWS) Cowardin System of Wetland Classification for wetlands, or observable/recorded flow regime per current United States Geologic Survey (USGS) and USACE definitions.

2. THREATENED AND ENDANGERED SPECIES INVESTIGATION

Assess the subject property for the presence or absence of federally listed and state-listed threatened and endangered species. Utilizing the Information for Planning and Consultation (IPaC) database, determine what, if any, species or their critical habitat may potentially be present within the subject property. Based on the data research, general determinations will be made to ascertain if the subject property meets the requirements for species or their critical habitats during the field efforts for waters of the U.S. delineation. Review and investigate the subject property for the potential state-listed species that may occur.

If impacts to water occur due to the proposed crossing of Steep Bank Creek and the Brazos River, perform biological in-field mussel surveys according to the most up-to-date state regulations. The latest freshwater mussel guidelines were issued in 2021 by the USFWS and TPWD and they are very rigorous compared to the previous versions, laying out some exact standards based on stream type, previous records/databases, and agency guidance. According to these protocols, the Brazos River is a Group 2 stream, requiring a 10(a)(1)(a) permitted biologist to lead surveys while Steep Bank is a Group 5 stream. Perform the following survey and coordination effort for two segments to help TPWD and USFWS understand each segment and expedite approvals.

1. **Brazos River** – Conduct both Phase I and II surveys using qualitative and quantitative timed transect searches of the ROW as well as upstream and downstream buffer areas.
2. **Steep Bank Creek** – Perform a field reconnaissance visit to potentially rule out the presence of mussels. If mussels are found, perform a Phase I qualitative survey.

Note: Bio-West has extensive survey history on this segment and has reliable data that supports a conclusion that these two mussel species have not been encountered.

Consider requirements for time of year, visibility, flow regime, and handling restrictions.

Note: Several mussel species may be listed by the USFWS by 2023-2024 which will require Section 7/10 ESA consultation in addition to of surveys and relocations.

Due to the location and known findings within the general geographic area of the subject property the USFWS will most likely require FBCTRA to assume Texas fawnsfoot (*Truncilla macrodon*) and Brazos heelsplitter (*Potamilus streckersoni*) presence. Additionally, USFWS may limit in-field surveys to the summer season due to the higher likelihood of encountering the species and will most likely require strict adherence to survey protocols.

3. CULTURAL RESOURCES INVESTIGATION

The Affected Potential Environment (APE) for the project was surveyed by HRA Gray via Texas Historical Commission (THC) pedestrian shovel test criteria in 2017. A draft report of these findings was not submitted to the THC for review and approval. The proposed scope of work herein would include the preparation and submittal of an Antiquities permit for approval by the THC and the preparation of the draft report detailing the findings from 2017 for approval by the THC. It is anticipated the THC will not require additional study. If the THC requires additional shovel testing or trenching, this level of effort and scope is included as a potential additional service.

4. PHASE I ENVIRONMENTAL SITE ASSESSMENT

Conduct Phase I Environmental Site Assessment(s) for individual parcel tracts which will be purchased for the project. Individual parcels with different owners may be combined together into a single investigative and reporting effort if so desired. Phase I Environmental Site Assessments are only valid for 180 days, therefore if separate parcels will be purchased at separate times with a gap of 180 days or more, individual Phase I Environmental Site Assessments will occur. The scope of work will include: (1) a review of readily available historical topographic maps, fire insurance maps, soil maps, and aerial photographs, (2) interviews with the property owner or occupant, purchaser, and agency officials from the local health and fire departments, (3) searches of state and federal records databases, (4) a site inspection, and (5) completion of a report.

Utilize the following existing reports (if available): (a) site assessment reports; (b) environmental audit reports; (c) environmental permits for disposal, discharge, etc.; (d) tank registration; (e) material safety data sheets (MSDS); (f) community right to know plans; (g) health and safety plans, spill prevention plans, etc.; (h) hydrogeologic reports; (i) government violations or notices; (j) hazardous waste generator notices or reports; (k) any geotechnical studies, (j) site or plat maps; (k) appraisal information (not including property value), and (l) title reports showing the chain of ownership.

The work will be conducted according to the protocols for conducting Phase I assessments described in the American Society for Testing and Materials (ASTM) E 1527-21 document. This specific investigatory work will not include: soil or groundwater sampling, asbestos, building materials, waste sampling, threatened and endangered species, wetlands, or archaeology.

5. ECOLOGICAL ASSESSMENT MODELING

Conduct the appropriate ecological assessment modeling within identified waters of the U.S. In order for impacts to waters of the U.S. to be calculated and mitigated correctly, the USACE Galveston district requires specific ecological assessment modeling occur within the areas of potential impact.

Perform the appropriate Riverine interim Hydrogeomorphic Model (iHGM) assessment (either the Riverine Forested iHGM or the Riverine Herbaceous/Shrub iHGM) in order to ascertain a numerical ecological functional value. This functional value will be used to determine what, if any, mitigation crediting purchase requirement will be due to project impacts. If impacts to waters of the U.S. occur, mitigation credits may be required to be purchased from an approved mitigation bank for a Section 404 Clean Water Act Permit to be valid.

**Note: If Steep Bank Creek and/or the Brazos River will be impacted by the proposed project additional ecological assessment models will be required to be assessed. Level 1 or Level 2 Stream Assessment methodologies will be required for those areas that are within the subject property or are directly adjacent to the subject property and are required to be included within the investigation. A change order request will be issued to conduct these surveys if*

needed.

6. CLEAN WATER ACT PERMITTING (404 PERMIT)

Submit the appropriate Clean Water Act (CWA) Section 404 Permit, either in the form of a Nationwide Permit Pre-Construction Notification (PCN) or a Standard Individual Permit to the Galveston District USACE.

Utilize an USACE ENG Form for the permit application and attach the following:

1. Applicant and Applicant's Agent Name and Contact Information
2. Project Description
3. Project Location Information
4. Description of Proposed Impacts
5. TCEQ Tier I Checklist or TCEQ Tier II Questionnaire
6. Alternatives Analysis – compliant with Section 401 and 404 (b)1
7. Threatened and Endangered Species Determination
8. Cultural Resource Assessment

Utilize the wetland delineation information and project plans to address and calculate project impacts. The ecological assessments will be prepared and included to identify the functional values of the existing features. Once the permit application is completed, forward an electronic copy of the application for review and comment. Following incorporation of comments, submit the completed application to the USACE Galveston District for review. Upon determination that impacts to jurisdictional areas are unavoidable and will require mitigation, begin seeking out appropriate mitigation options.

Note: This scope of services does not include the purchase of compensatory mitigation credits for wetland and/or stream impacts.

7. SECTION 9 COAST GUARD PERMIT DETERMINATION AND INITIAL COORDINATION

Coordinate with the U.S. Coast Guard (USCG) for a bridge permit (or exemption where approved) to construct a new bridge across the navigable waters of the United States. Coordination and permitting is required for any individual, partnership, corporation, or local, state, or federal legislative body, agency, or authority planning to construct a bridge across a navigable waterway of the United States. This includes all temporary bridges used for construction access or traffic detour.

1. Contact the USACE for a navigable water determination of the Brazos River bridge location. The U.S. Army Corps of Engineers (USACE), Galveston District, makes navigable water determinations on a case-by-case basis.
2. Submit a Bridge Project Initiation Request to USCG District 8 to arrange a pre-app meeting with the USCG. Request meeting at the project site so all district and division staff that will be involved in the design, permitting, and construction can be informed as to what is required from the USCG. Exemptions from this process are available for Federally aided bridges under 23 U.S.C 144(h).

Note: It is the understanding the at sponsor does not wish to include TxDOT or FHWA, hence the approval of this exemption is unlikely.

3. If the Coast Guard determines that the proposed project will require Coast Guard approval under Section 9, prepare the Section 9 permit submittal and associated NEPA document as described in subsequent scope item. A concurrence letter from the Texas GLO will be requested to indicate whether the project will or will not be located on state owned land (submerged lands within the Brazos Riverbank)

8. CONSTRAINTS MAPPING

Prepare a constraints map that depicts all findings of technical reports to assist in assessing potential environmental hazards or concerns for alternative alignments. The task will include the review with the development team for the selection alternatives and the least damaging practical preferred alignment. Constraint's mapping will include, but not be limited to, research of listed hazardous material sites, pipelines, potential wetlands, cemeteries, churches, schools, known archeology sites, waters of the U.S., and rookeries. A due diligence level site reconnaissance will be conducted as well to confirm research. All findings will be mapped on aerial photographs and geo-referenced.

9. SEGMENT C COORDINATIO

Coordinate environmental issues with Segment C. Ensure that data, analysis, and recommendations are consistent throughout and at the interface of Segment B-4 and Segment C. Identify opportunities to streamline environmental issues, permits, or commitments through collaboration between Segment B-4 and Segment C.

10. SEGMENT B-4 COORDINATION AND QA/QC

Perform QA/QC reviews of all environmental tasks and deliverables utilizing published standards normally such as ASTM Standards, the 1987 Corps of Engineers Manual for Wetland Delineation Manual and Regional Supplements, EPA Standards and Guidelines, Corps of Engineers Standards and Guidelines, SHPO Guidelines, TPWD standards, etc.

C.1. ENVIRONMENTAL (ADDITIONAL SERVICES IF REQUIRED)

1. SECTION 9 COAST GUARD SECTION 9 PERMIT (IF REQUIRED)

Complete the USCG Bridge Permit application by adhering to the USCG BPAG and completing the required navigational study, NEPA document, agency coordination, technical reports, and complete set of bridge plans.

PERMIT APPLICATION PACKAGE will include the following information Per 33 CFR § 115.50(j):

Proposed Bridge(s):

- 1) Name of the waterway that the bridge(s) would cross;
- 2) Number of miles above the mouth of the waterway where the bridge(s) would be located and provide latitude and longitude coordinates (degree/minute/second) at centerline of navigation channel (contact the local Coast Guard Bridge Office for guidance);
- 3) City or town, county/parish, and state where the bridge(s) would be located at, near, or between;
- 4) Brief description of project to include type of bridge(s) proposed [fixed or movable (drawbridge, bascule, vertical lift, swing span, pontoon), highway, railway, pedestrian, pipeline] and existing bridge(s) at project site
- 5) Date of plans and number of plan sheets;
- 6) Estimated cost of bridge(s) and approaches; a) Provide the estimated cost of the bridge(s) as proposed, with vertical and horizontal navigational clearances. b) Provide the estimated cost of a low-level bridge(s) on the same alignment with only sufficient clearance to pass high water while meeting the intended purpose and need.
- 7) Type and source of project funding (federal, state, private, etc.);
- 8) Proposed project timeline;
- 9) Other Federal actions (e.g., permits, approvals, funding, etc.) associated with the proposal;
- 10) Legal authority for proposed action: a) If the applicant does not own the existing bridge(s) that is being replaced or modified, include a signed statement from the bridge owner authorizing the removal or modification work. b) State whether the applicant has the right to build in accordance with 33 CFR § 115.05.

Application will also include

- 1) Vertical clearance as indicated on plan sheets: This is the minimum vertical distance between the lowest part (e.g., member, chord, or steel) of the superstructure spanning the navigation channel and the recognized datum (e.g., MHW, 2% flow line, etc.) at the bridge site. Cite clearances above the appropriate high water elevation and low water elevation. In the case of movable bridges, cite clearances in the open and closed positions. In some situations, vertical clearances should be cited at the margins of the navigation channel, and for a bascule bridge clearances at the tip of the leaves, if not fully open.
- 2) Horizontal clearance as indicated on plan sheets: This is the horizontal distance, measured normal to the axis (centerline) of the channel, through which the stated vertical clearance is available. Clearance may be between piers (full width of the span), between the bridge protective system, within the margins of the navigational channel, or bank-to-bank in the case of a bridge having no piers or bridge pier protective fender system within the waterway.
- 3) Length of bridge(s) project: This is the length of the bridge(s) project from abutment-to-abutment or approach-to-approach.
- 4) Width of bridge(s) project: This is the width of the bridge(s) at its widest point (out-to-out)
- 5) Depth of the waterway: At project site at MHW if tidal or OHW if non-tidal, using the appropriate elevation and datum (e.g., NGVD 1929, NAVD 1988, etc.).
- 6) Width of waterway: At project site at MHW if tidal or OHW if non-tidal.
- 7) Significant effect on flood heights and associated drift, if any, that could cause a navigation hazard.
- 8) As Coast Guard bridge permits are federal actions that require the preparation of an environmental evaluation

document describing the potential environmental effects under NEPA, coordination. Hence the permit package will include a NEPA document.

2. 408 PERMITTING (if required)

The subject property crosses a flood protection levee inspected annually by the USACE Real Estate Division. Coordinate the 408 permitting of the levee.

Note: Fees incurred for the 408 review process as dictated by the USACE are not included in this scope of work.

3. TxDOT CATEGORICAL EXCLUSION (CE) (if required for FM 2759 connection)

1. Waters of the U. S. Impact Assessment & Jurisdictional Determination

Evaluate the proposed project to identify methods to minimize jurisdictional waters and wetland impacts, if any. If jurisdictional waters and/or wetlands will be impacted by the project, an explanation of cost and technical factors, as applicable (such as discussion if there is no practicable alternative to the construction). A summary of the methodology used, existing conditions, delineation findings, a detailed table of identified aquatic features and their volumes within the project area, and a jurisdictional delineation (JD) form (either approved or preliminary, TBD) will be included as part of the Waters of the U.S. delineation report.

Conduct site reconnaissance as part of this assessment in accordance with the 1987 Corps of Engineers Wetland Delineation Manual and applicable Regional Supplement(s) to identify and delineate on-site aquatic features, including wetlands. The proposed project will be reviewed for any impacts to waters of the U.S., including wetlands. The following will be performed:

Collect samples of vegetation, soils, and hydrology indicators at each change in topography or vegetation. Vegetation samples will be evaluated and recorded at each sample area. Upland vegetation will be verified, for it is as significant as wetland vegetation in the determination process. As many as 25 sample sites, evaluating vegetation, soil, and hydrology criteria, may be necessary.

Inspect the property for evidence or lack of wetland hydrology at each sample area. Conduct delineation of the ordinary high-water mark at proposed crossings of the waters of the U.S.

Examine and evaluate soil samples at each test site for their hydric and non-hydric characteristics. Nonhydric soils verify upland status and are as significant as hydric soils in the determination process.

Present the findings of the delineation and JD form in a Waters of the U.S. Delineation Technical Report.

2. Surface Water Analysis Form

Update previous research efforts of all hydrological elements within the proposed project area, including Clean Water Act and Rivers and Harbors Act compliance and compliance with Executive Orders 11990 (Protection of Wetlands) and 11988 (Floodplain Management). The goal is to identify whether proposed action surface water impacts would require regulatory permitting.

3. Biological Studies

Evaluate the Threatened and Endangered Species listings currently maintained by the U.S. Fish & Wildlife Service (USFWS) and the Texas Parks & Wildlife Department (TPWD) to determine if any of the listed species may be shown to potentially inhabit the project area. The biological aspects of the project area habitat will be physically reviewed and documented to determine if the habitat is desirable or reproductively useful to the specific species. Identified listed species habitat, if present, will be indicated on a map. The project right of way (ROW) will be

assessed for biological indicators of presence. If marginal or suspicious habitats are encountered, a specialist on the specific study species will be consulted and included in the site impact assessment.

Map the presence of state or national parks, forest, wildlife refuges, wildlife management areas, wild or scenic rivers, natural areas, or similar preserves in the planning area.

Characterize vegetation types within the project ROW accordance with the September 2021 TPWD-TxDOT Memorandum of Understanding (MOU) and impacts to the vegetation types will be calculated. Following the completion of research efforts and site reconnaissance, TxDOT's Species Analysis Form and Table (and all necessary attachments), if applicable, will be prepared in accordance with the TPWD-TxDOT MOU and TxDOT's online Environmental Compliance Toolkit.

4. Community Impacts Assessment (CIA)

Assess the potential of the proposed action to disrupt existing communities due to lane reduction, street closures, bisection of existing neighborhoods, or reduced access to community services, using the current census data from the U.S. Census Bureau and American Community Survey for population, racial and ethnic proportions, median household income, and family poverty statistics at the census block level, if possible. Data will be compiled in a tabular format ("Appendix A") for analysis of socioeconomics. For Environmental Justice (EJ) evaluation, also determine if affected communities are disproportionately comprised of minority or low-income populations, compared to the region and the state. Available information will also be evaluated to determine the presence of limited English proficiency (LEP) populations. Results/findings will be included in TxDOT's CIA Form, including attachments.

5. Hazardous Materials Initial Site Assessment (ISA)

Conduct a hazardous materials Initial Site Assessment (ISA) to identify, to the extent feasible under the processes prescribed in the American Society of Testing and Materials (ASTM) E 1527-21, the potential for recognized environmental conditions; that is, the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into the ground, groundwater, or surface water of the subject property. The ISA will include the following components, the results of which will be presented in the various sections of the ISA Form:

- (1) **Records Review:** Obtain and review updated records that will help identify recognized environmental conditions in connection with the property. Some records will pertain to properties within an additional approximate search distance in order to help assess the likelihood of potential issues from migrating substances. Included in the records review is a review of historical aerial color and black/white photographic enlargements for selected years.
- (2) **Site Reconnaissance:** Visually and physically inspect the property and adjoining properties, to the extent not obstructed by bodies of water, adjacent buildings, or other obstacles, for evidence of hazardous substances or petroleum products.
- (3) **Evaluation and ISA Form Preparation:** The information gathered from the previous tasks will be evaluated, and the findings will be presented in TxDOT's Hazardous Materials ISA report format that describes, at minimum, site and vicinity descriptions, current and past uses of the property and adjoining properties, information from records reviews, information from site reconnaissance and interviews, conclusions and opinions of impacts, if any, of recognized environmental conditions. Appropriate attachments will be included.

Should analytical testing be required, it can be performed as an additional service.

Assumptions:

Scope of Work assumes one (1) Chain of Title will be required for one (1) parcel of land with one (1) current owner. If the cost of the Chain of Title exceeds the typical standard cost, additional costs may be incurred and billed.

If there is a need to obtain and review regulatory file records for the subject site or adjoining property for items identified in the database search or based on findings of the site reconnaissance additional costs may be incurred. Notify FBCTRA of this situation and secure an approved change to address these services and augment the proposed budget accordingly.

This scope of work does not include any additional study, such as, lead, asbestos or mold testing or inspections surveys.

6. Air Quality Analysis

Utilize traffic data for the project's estimated time of completion (ETC) year and the ETC+20 years or farthest year used for other assessments for the air quality analysis. If the ETC and ETC+20-year traffic volumes do not exceed 140,000 vehicles per day (vpd), a Traffic Air Quality Analysis (TAQA) will not be required. Standard recommended template language per TxDOT's Air Quality guidance and standards will be used in the *Air Quality Technical Report (AQTR)*.

Assuming the existing and projected design year traffic volumes do not exceed 140,000 vpd, this project is not likely to meaningfully increase Mobile Source Air Toxics (MSAT) emissions. Therefore, a quantitative MSAT analysis is not required; however, a qualitative MSAT analysis will be conducted and the results documented in the AQTR in accordance with TxDOT's *Environmental Handbook for Air Quality* (May 2017); *Guidance for Preparing Air Quality Statements* (August 2020); and Transportation Conformity Report Form.

7. Traffic Noise Analysis

Utilize published TxDOT guidance, to predict the potential noise exposure to receivers along name of street within the project limits, or along name of street. *Noise modeling will only be conducted for the preferred build alternative.*

1. Determine baseline ambient noise levels by monitoring at receivers along the proposed project route, if required.
2. Perform noise level modeling of the proposed project using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM, Version 2.5) and 2019 Noise Guidelines (or other current guidelines).
3. Determine the noise impacts and, if necessary, evaluate potential abatement measures such as noise barriers.
4. Analyze noise data and prepare a *Traffic Noise Technical Report (TNTR)* for submittal to the FBCTRA and TxDOT. Standard recommended template language per TxDOT's Traffic Noise guidance and standards will be used in the *Air Quality Technical Report (AQTR)*.
5. Consider comments provided by reviewing agencies and, if necessary, revise the technical report.

Utilize high resolution aerial maps (if available) with alignments; identification of property owners and occupants; MicroStation files of both horizontal and vertical alignments (including topography and structures within about 500 feet of the proposed roadway); and all predicted design year traffic counts, year breakdowns (percent cars, heavy trucks, medium trucks, buses and motorcycles), and k-factors for the alignments and main arterial roads.

8. Historical, Cultural, and Archeological Assessments

The proposed undertaking would be sponsored by the FRCTRA, a political subdivision of the state of Texas. As such, the project would fall under the jurisdiction of the Antiquities Code of Texas. In addition, the project would fall under the jurisdiction of Section 106 of the National Historic Preservation Act (NHPA) via the indirect involvement of TxDOT's parent agency, the Federal Highway Administration (FHWA). As the proposed project represents a publicly sponsored undertaking, the project sponsor is required to provide the applicable regulatory agencies and the Texas Historical Commission (THC), which serves as the State Historic Preservation Office (SHPO) for the state of Texas, with an opportunity to review and comment on the project's potential to adversely affect historic properties listed on or considered eligible for listing on the National Register of Historic Places (NRHP) and/or for designation as State Antiquities Landmarks (SAL). At this time, no other federal or state jurisdiction has been identified for the project. In the event that any additional regulatory triggers are identified as the project moves forward, evaluate whether or not any additional, out-of-scope cultural studies or agency coordination may be required.

Archeological Background Study (ABS)

Prior to initiating fieldwork, the Engineer shall:

Perform basic archival research of readily available State agency historical and archeological records, such as the Texas Historical Commission's (THC) *Texas Archeological Sites Atlas* and *Texas Historic Sites Atlas* online databases, Texas Archeological Research Laboratory (TARL) records, TxDOT *NRHP-Listed and Eligible Bridges of Texas* and *Historic Districts and Properties of Texas* online databases, General Land Office (GLO) records, as well as Federal agency records, such as the National Park Service's National Register of Historic Places (NRHP) database. Additionally, research relevant archives for information on previous cultural resources investigations conducted in the vicinity of the project area. The archival research will examine a 1.0-mile radius surrounding the project area.

Review the abovementioned archives; historical, geological, and soil maps; and aerial surveys and photographs to evaluate the potential for encountering significant cultural resources within the project area.

Define the Area of Potential Effect (APE) of the proposed project based on applicable Federal and State agency guidelines.

Identify and map any previously recorded cultural resources within the project area for further inspection.

Prepare an Archeological Background Study (ABS) according to TxDOT's Standards of Uniformity for Technical Reports—Review Standards for Archeological Background Studies. Coordinate review of the ABS with TxDOT unless the FBCTRA would prefer to handle the coordination.

Historic Resources Project Coordination Request (PCR)

Complete and submit a Project Coordination Request (PCR) for Historic Studies, per TxDOT Environmental Affairs Division (ENV) Historic Studies Department Standards dated 08/2019, to determine the scope of any further historic resource studies required for the project. This task would include a review of recorded National Historic Landmarks (NHL), NRHP, SAL, and Recorded Texas Historic Landmarks (RTHL) site data as published on the Texas Historic Sites Atlas and on TxDOT's Historic Bridges of Texas and Historic Districts & Properties of Texas online databases. The potential for encountering additional, unrecorded historic-age sites would be assessed by analyzing historical maps and aerial photo imagery of the project area. This task would include completion of the PCR would require certain information be coordinated between and provided by the project sponsor and TxDOT (i.e., TxDOT CSJ #, targeted TxDOT ENV clearance date, anticipated letting date, as well as uploads of the PCR report design documents) via TxDOT's Environmental Compliance Oversight System (ECOS).

Assumption:

Scope of Work assumes that no additional ROW would be needed and that historic resources investigations are limited to the PCR only. If TxDOT requires a Reconnaissance Survey, it can be performed as an additional service.

4. PUBLIC INVOLVEMENT (if required)**TxDOT Virtual Public Meeting with In-Person Option**

If required by FBCTRA, in lieu of the Notice and Opportunity to Comment (NOC), one (1) virtual public meeting (VPM) with an in-person option (i.e., hybrid) will be held to support the project. If a Spanish or other language speaking interpreter will be needed; the Engineer* or FTCTRA will provide such personnel. Provide the following public coordination activities:

If an In-Person Option is afforded, identify potential public meeting locations and, upon FBCTRA approval, secure a facility for the public meeting.

Develop database of names and addresses of adjacent landowners, public officials, and any other stakeholders that will receive notification letters.

Draft public meeting letters for review and approval by FBCTRA.

Draft a newspaper notice for public meeting and, upon approval by FBCTRA, schedule for publication in one major newspaper, one local newspaper, and in one Spanish language newspaper (if applicable), in accordance with TxDOT's Environmental Handbook for Public Involvement.

Draft and prepare comment forms for obtaining public input regarding the proposed project.

If an In-Person Option is afforded, prepare signs for use at the public meeting to direct traffic to parking areas and the meeting room, and for the stations at the meeting, such as Welcome/Registration, Proposed Design, Environmental (Exhibit Boards and Constraints Map, if applicable), and Comments.

If an In-Person Option is afforded, provide staff for the Welcome/Registration, Environmental, and Comments stations, and to mingle among the public to answer questions or direct, as needed, to the appropriate FBCTRA official.

Draft responses to all public comments and compile all meeting information into a separate Public Meeting Documentation Report for submittal to FBCTRA for approval.

Note: Assumes public notice publication cost for a small local paper will not exceed \$500.00. public notice publication cost for a regional paper will not exceed \$3,000.00. Public notice publication is a one-time event for the number of days noted. Also Assumes a translator may be provided by the Engineer for one language (e.g., Spanish). If LEP data indicates a second language interpreter is warranted, a supplemental may be required to cover that cost.

Notice and Opportunity to Comment (NOC)

If FBCTRA agree that the project has no controversy, they may elect – in lieu of a VPM with an In-Person Option -- to send a Notice and Opportunity to Comment (NOC) to each affected property owner and all adjacent landowners, as well as project area stakeholders, to solicit comments on the proposed project. The results of the NOC would dictate whether further public involvement is required. Provide NOC activities, as identified in the following:

Create a database of names and addresses of affected landowners that will receive notification letters.

Draft NOC notification letters for review and approval by TxDOT, and then prepare final letters for mailout (mail affected landowner letters, if FBCTRA desires). A minimum 15-day comment period will be afforded the public.

Prepare any NOC documentation, including copies of all mailouts, mailing lists, and a summary of the responses received from any affected landowner.

5. DEEP TESTING/TRENCHING PER THC COORDINATION (if required)

It is understood that the project APE was previously studied via pedestrian shovel test protocol and the goal is to have the THC approve this previous work with no need for additional study. THC often requires deep testing/trenching OR monitoring during construction. The scope and work plan for deep testing/trenching or monitoring will be finalized with the THC as part of the antiquities permit modification if such work is required. The proposal herein has provided a potential level of effort based on past work experience in the area.

If required deep trenching testing will consist of using a backhoe or excavator to dig test trenches in areas of potential impact to search for buried cultural and historic resources per an approved scope of work and protocols approved by the THC.

Due to the nature of the project proposed, THC may allow On-Site Construction Monitoring instead of deep trenching or in addition to deep trenching. On-Site construction monitoring will provide an archeological monitor during construction activities near any identified sensitive areas, or other areas deemed appropriate by the project team.

6. STREAM ASSESSMENT LEVEL 1 (if required)

If a Level 1 Stream Assessment is required, perform

- 1) In-stream Channel Alteration Assessment;
- 2) Riparian Buffer Assessment;
- 3) Visual Channel Assessments;
- 4) Macro-invertebrate Index of Biological Activity;
- 5) Fish Index of Biological Integrity.

7. STREAM ASSESSMENT LEVEL 2 (if required)

Upon review of the project, the USACE may consider the need for a Level II Stream Assessment to fully document the baseline aquatic function and value of the stream. If required per USACE, perform the following: benthic sampling and identification via seining and collection, sampling seining and collection of fish via electro-shock and identification, physical measurement and collection of stream geometric ratios, and statistical model analysis.

8. AGENCY COORDINATION AND RESPONSE TO COMMENTS

Act as the Agent of Record for FBCTRA and provide agency coordination throughout the permitting effort. Additionally, under this task, respond to all comments generated from the posting of the CWA Permit to Public Notice. The response to comments will be prepared within 20 days of receipt of the comments from the USACE. The final response to comments must be received at the USACE Galveston District within 30 days after the permit applicant receives them.

D. Utility Coordination and SUE

1. Utility Conflict Determination and Coordination

- A. The Utility Coordinator shall coordinate all activities with the County, or their designee, to facilitate the orderly progress and timely completion of the County design phase. The Utility Coordinator shall be responsible for the following:
- i. Work Plan. Coordinate a work plan including a list of the proposed meetings and coordination activities, and related tasks to be performed, a schedule and an estimate.
 - ii. Initial Project Meeting. Attend an initial meeting and an on-site inspection (when appropriate) to ensure familiarity with existing conditions, project requirements and prepare a written report of the meeting.
 - iii. External Communications. The Utility Coordinator shall coordinate all activities with the County and its consultants or other contractors or representatives, as authorized by the County. Also, the Utility Coordinator shall provide the County copies of diaries, correspondence and other documentation of work-related communications between the Utility Coordinator, utility owners and other outside entities when requested by the County.
 - iv. Permits and rights of entry. Obtain all necessary permits from city, county, municipality, railroad or other jurisdiction to allow the Engineer to work within existing streets, roads or private property for additional designating and/or subsurface utility locating.
 - v. Progress Meetings. The Utility Coordinator shall implement a schedule of periodic meetings with each utility company and owner or owner's representatives for coordination purposes. Such meetings shall commence as early as possible in the design process and shall continue until completion of the project. The Utility Coordinator shall notify the County at least two (2) business days in advance of each meeting to allow the County the opportunity to participate in the meeting. The Utility Coordinator shall provide and produce meeting minutes of all meetings with said utility companies, owners or owners' representatives within seven (7) business days. The frequency of such meetings shall be appropriate to the matters under discussion with each utility owner (Assume 5 Meetings).
- B. As required the Utility Coordinator shall coordinate with the local utilities committees to present a footprint of the County's projects with represented utility companies and owners. The Utility Coordinator shall also coordinate with any other utility committees which may include county, city, or other officials, if needed.
- C. The Utility Coordinator shall provide initial project notification letters to all affected utility companies, owners, and other concerned parties, if needed.
- D. The Utility Coordinator shall provide the County and all affected utility companies and owners a Utility Contact List for each project with all information such as: (a) Owner's Name; (b) Contact Person; (c) Telephone Numbers; (d) Emergency Contact Number; (e) E-mail addresses; (f) as Well as all pertinent information concerning their respective affected utilities and facilities, including but not limited to: size, number of poles, material, and other information which readily identifies the utilities companies' facilities.
- E. The Utility Coordinator shall advise utility companies and owners of the general characteristics of the Project and provide an illustration of the project footprint for mark-up of the utility facility locations that occupy the project area.

2. Subsurface Utility Engineering

Subsurface Utility Engineering includes utility investigations subsurface and above ground prepared in accordance with AASHTO standards ASCE/CI 38-22 [(http://www.fhwa.dot.gov/programadmin/asce.cfm)] and Utility Quality Levels.

A. 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.

It is assumed that 18,500 LF of QL B designates will be required:

7,000 LF – FM 2759
9,500 LF – Along neighborhood
2,000 LF – Along Sienna Ranch Rd

The Utility Engineer must:

Designate, record, and mark the horizontal location of the existing utility facilities using non-destructive surface geophysical techniques.

Using both active and passive scans to attempt to locate any additional utilities, including unrecorded and abandoned storm and sanitary sewer facilities, at the direction of the County, may be investigated using additional methods such as rodding that would then classify them as Quality Level B.

Correlate utility owner records with designating data and resolve discrepancies using professional judgment. The Utility Engineer must prepare and deliver to the County a color-coded composite utility facility plan with utility owner names, quality levels, line sizes and subsurface utility locate (test hole) locations. The Utility Engineer and County acknowledge that the line sizes of designated utility facilities detailed on the deliverable will be 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 utility feature locations must be included in the deliverable to the County.

Clearly identify all utilities that were discovered from Quality Levels C and D investigation but cannot be depicted in Quality Level B standards. These utilities must have a unique line style and symbology in the designate (Quality Level B) deliverable.

B. Locate via Test Holes (Quality Level A)

Locate is the process used 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 inclusive of Quality Levels B, C, and D.

It is assumed that 15 QL A Test Holes will be required:

3 MUDS – assume 2 TH/MUD = 6 total
DOW Pipeline – assume 2 THs
Thompson Webster Pipeline – 1 TH
Conoco Pipeline (abandoned) – 1 TH – abandoned pipelines can still be a conflict we might want to identify

Assume an additional 5 TBD

The Utility Engineer must:

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

Place Texas 811 ticket 48 hours prior to excavation.

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

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

1. Elevation of top of utility tied to the datum of the furnished plan.
2. Minimum of two benchmarks utilized. Elevations must be within an accuracy of 15mm (.591 inches) of utilized benchmarks.
3. Elevation of existing grade over utility at test hole location.
4. Horizontal location referenced to project coordinate datum.
5. Outside diameter of pipe or width of duct banks and configuration of non-encased multi-conduit systems.
6. Utility facility material(s).
7. Utility facility condition.
8. Pavement thickness and type.
9. Coating/wrapping information and condition.
10. Unusual circumstances or field conditions.

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

Back fill all excavations with appropriate material, compact backfill by appropriate mechanical means, and restore pavement and surface material.

Furnish and install a permanent above-ground marker directly above center line of the utility facility. Provide complete restoration of work site and landscape to equal or better condition than before excavation.

Plot utility location position information to scale and provide test hole reports signed and sealed by the responsible Engineer.

Deliverables:

1. A MicroStation file with all Quality Level (QL B and A) data shown
2. Test Hole Reports sealed, signed, and dated

E. DESIGN AND ROW SURVEYS

1. **Right of Entry** – Identity and tabulate existing property owners. Request written permission for right of entry (ROE) to enter private property for the purposes of:
 - a. Field and ROW Surveys
 - b. Bathometric Surveys
 - c. Geotechnical Investigations
 - d. Environmental Investigations
 - e. Subsurface Utility Engineering

ROW MAPPING

ROW Surveys includes the performance of records research, field surveys, and analysis to establish land boundaries, prepare parcel descriptions and parcel plats, prepare Existing and Proposed right-of-way (ROW) Maps, and prepare ArcGIS files for proposed ROW parcels.

2. ROW Mapping

- a. **Existing ROW Map** – Submit the Existing ROW Map as a continuous CAD graphics file. Obtain copies of recorded deeds for the parent tracts and existing rights-of-way, subdivision plats, and easements within, along or intersecting the proposed ROW. Perform field work to locate existing ROW monuments and property corners and determine the locations of the existing ROW and boundary lines as needed for the project. Include on the Existing ROW Map file the monuments and corners located in the field, existing right-of-way lines, boundary lines and easements, improvements, and deed, ROW, easement, and plat recording and dedication information within the area of the planned roadway extension.
 - b. **Initial Proposed ROW Map** – Include on the Initial ROW Map the proposed ROW lines and proposed acquisition Parcel details. The ROW Map will be prepared to TxDOT standards for proposed ROW mapping.
 - c. **Final Proposed ROW Map** – Prepare the final ROW Map will to TxDOT standards for proposed ROW mapping.
 - d. **Monuments** – Set appropriate monuments on the proposed ROW lines at intersecting property lines, and at all Points of Curvature (PC), Points of Tangency (PT), angle points, intersecting ROW lines of side streets, and at 1,500-foot stations.
3. **Exhibits (Property Descriptions)** – Prepare an Exhibit (Property Description) for each parcel or tract consisting of two parts: (1) a metes and bounds description of the property and (2) a parcel plat. Each part of a Property Description shall be signed and sealed by an RPLS.
 - a. **Initial Exhibits** – Prepare a metes and bounds description for each parcel of land to be acquired. The descriptions shall be prepared according to TxDOT standards. Prepare a parcel plat for each parcel of land to be acquired. The parcel plats shall be prepared according to TxDOT standards.
 - b. **Signed and Sealed Final Exhibits** – Set appropriate monuments at property lines intersecting the new ROW lines. Prepare ArcGIS files if requested by Fort Bend County.

Deliverables for ROW Surveys

Right of Entry – tracking spreadsheet and landowner ROE responses.

ROW Mapping

- **Existing ROW** – The Existing ROW Map file will include the monuments and corners located in the field, existing right-of-way lines, boundary lines and easements, improvements, and deed, ROW, easement, and plat recording and dedication information within the area of the planned roadway extension.
- **Initial ROW Map** – Includes MicroStation graphics and pdf map sheets.
- **Final ROW Map** – Includes MicroStation graphics and pdf map sheets.

ROW Exhibits

- **Initial Parcel Exhibit Documents** – Marked “*Preliminary – Not to be used for recording purposes*”, in PDF format. MicroStation graphics files.
- **Final Parcel Documents** - Hard copy paper sets of metes and bounds descriptions and parcel plats, signed and sealed by the Surveyor, and the associated electronic files in PDF and Word formats. MicroStation graphics files. If required, ArcGIS files of the existing and proposed ROW lines and proposed acquisition parcel boundaries.

DESIGN SURVEYS

Design surveys consist of research, field work, analysis, computation, and documentation necessary to provide detailed topographic (3-dimensional) mapping of a project site. A design survey may include, but not be limited to locating existing ROW, surveying cross-sections or developing data to create cross-sections and Digital Terrain Models (DTM), horizontal and vertical location of utilities and improvements, collecting details of bridges and other structures, review of ROW maps, establishing control points, etc.

4. **Cross-Sections and Digital Terrain Models** – Utilize existing data and topographic surveys to prepare cross-sections and the Digital Terrain Model.
5. **Existing Utilities** – Locate existing utilities.
6. **Topographic Features and Existing Improvements**
 - a. **Fort Bend Parkway** – Perform ~8,000 linear feet of design/topographic surveys of proposed alignment. Surveys will extend 50 feet outside the proposed ROW. Includes 100 cross sections at 400 feet wide with transition to 500 feet wide. Conventional leveling between topography control points.
 - b. **Steep Bank Creek** – Survey ~14,000 linear feet of Steep Bank Creek. ~3,000 feet of the creek is wooded. Collect cross sections every 100 feet through the tangent sections. Where the channel bends, collect cross sections every 50 feet or less as needed to accurately model the channel alignment and geometry. Extend cross sections 50 feet beyond the creek bank. Locate weir or low-flow structures within the channel, and obtain cross sections immediately upstream and downstream of the structure.
 - c. **FM 2759** – Survey the full width of the FM 2759 ROW and the adjacent BNSF/UPRR ROW from Thompson Oilfield Rd to 6,360 LF east of Thompson Oilfield Rd. Include a corridor 150 feet wide adjacent to the north side of the FM 2759/RR rights-of-way. Survey Top of rail elevations every 100 feet of all three RR tracks from 6,360 feet east of Thompson Oilfield Road to the west abutment of the RR bridges over the Brazos River. Surveys within the RR ROW will require the services of a RR Flagger.

7. **Existing Railroad Bridges** – Provide details of existing railroad bridge structures for Brazos River hydraulic modeling, including bridge limits, bents, columns, retaining walls, and natural ground elevations.
8. **Existing Drainage Structures** – Provide details of existing drainage features (e.g., culverts, manholes, etc.).
9. **Wetlands** – Locate existing wetlands.
10. **Boreholes** – Locate borings.
11. **Locate and Set Control** – Verify existing and establish additional control points. Verify or set control points at a maximum spacing of 1,500 feet apart along the proposed ROW extension. Make ties to Horizontal and Vertical control in the vicinity, established by other sources such as the National Geodetic Survey (NGS), and the Federal Emergency Management Agency (FEMA), TxDOT, and any other local entities as directed.
12. **Prepare Control Sheets**
 - a. **Survey Control Index Sheets** – Prepare, sign, seal, and date a *Survey Control Index Sheet and Horizontal and Vertical Control Sheet(s)* to be inserted into the plan set. The Survey Control Index Sheet provides an overview of the primary project control and shall include:
 - (1) An unscaled vicinity map showing the general location of the project in relation to nearby towns or other significant cultural features.
 - (2) A scaled project map showing the extents of the project and the location of the primary control points. The map shall show street networks, selected street names, control point identification, and significant cultural features necessary to provide a general location of the primary control.
 - (3) A table containing the primary control point values including the point number, northing, easting, elevation, stationing, and stationing offset values.
 - (4) Map annotation including a graphic scale bar, north arrow, and project title block. The title block shall contain a section for a Texas Registered Engineer to sign, seal and date the sheet to include the following statement, *“The survey control information has been accepted and incorporated into this PS&E”*.
 - (5) In the title block under the heading “Notes”, identification of the horizontal and vertical datum on which the primary control is based with the date of the current adjustment, the surface adjustment factor used, and unit of measure. Include a note stating that the coordinates are State Plane and a notation specifying either grid or surface adjusted coordinates.
 - b. **Horizontal and Vertical Control Sheet(s)** – Prepare these control sheets providing detailed information about the construction, location, and monumentation of the primary control and shall include:
 - (1) An unscaled location map for each primary control point showing the location of the monument in relation to physical features located in the vicinity. The location map will include a north arrow, the monument designation, the monument northing, easting, and elevation.
 - (2) Directly below the location map a text description of the monument including size, material and construction followed by a description of the location of the monument starting with the county and State followed by a description suitable to locate the monument on the ground.

- (3) Map annotation including a graphic scale bar, north arrow, and project title block. The title block must contain a section for a Texas Registered Engineer to sign, seal and date the sheet to include the following statement, *"The survey control information has been accepted and incorporated into this PS&E"*.
- (4) In the title block under the heading "Notes", identification of the horizontal and vertical datum on which the primary control is based with the date of the current adjustment, the surface adjustment factor used, and unit of measure. Include a note stating that the coordinates are either grid or surface adjusted coordinates.

13. **Quality Assurance and Quality Control (QA/QC)** – Conduct a QA/QC review for Design Survey Deliverables.

Deliverables for Design Surveys

Prepare and submit the deliverables as specified in individual work authorizations for design surveys and construction surveys. The deliverables will be any combination of the following:

Digital Terrain Models (DTM) and the Triangular Irregular Network (TIN) files.

Maps, plans, or sketches prepared by the Surveyor showing the results of field surveys.

Computer printouts or other tabulations summarizing the results of field surveys.

Digital files or media containing field survey data (ASCII Data files).

Maps, plats, plans, sketches, or other documents acquired from utility companies, private corporations,
○ or other public agencies, the contents of which are relevant to the survey.

Field survey notes, as electronic and hard copies.

TxDOT Form 2462 for each primary and secondary control point. This form must be submitted in printed
○ format on 8 ½-inch by 11-inch paper and submitted electronically in PDF format.

Survey Control Index sheet(s) and Horizontal and Vertical Control sheet(s), signed and sealed by an RPLS.

A digital and hard copy of all computer printouts of horizontal and vertical conventional traverses, GPS analysis and results, and survey control data sheets.

All GEOPAK files and OpenRoads files.

BATHYMETRIC AND UAV SURVEYS

1. **Mobilization** – Mobilize to the project site Perform a site visit and finalize data collection methodology based on observed water levels.
2. **Brazos River Cross Sections** – Collect cross sections using a small boat every 2,500 feet utilizing GPS/RTK at the time the field work is conducted. Cross sections will be collected every 50 feet throughout the 1000' reach of the river through which alternative alignments could cross.
3. **Control Targets** – Deploy aerial targets along the project area. Locate targets via RTK/GPS technology and referenced to the NAD83 (2011) horizontal datum and the NAVD88 (Geoid12b) vertical datum. Tie into known

control points set by the design team.

4. **Aerial LiDAR / UAV Survey** – Collect LiDAR utilizing a UAV mounted LiDAR System at a height of 175 feet. Data will be post processed utilizing proprietary LiDAR processing software by Fenstermaker. See Exhibit 1 for assumed flight limits.
5. **Bathymetry** – Collect Bathymetry data within the river utilizing multibeam acoustic survey equipment attached to a survey vessel. Data collection will consist of a varying number of track lines (respective to the river) run within the project area. This insures adequate coverage of data within the river. Survey the river after a rain event or when the water level is high for more coverage acquired from the multibeam survey. See Exhibit 1 for assumed flight limits. For portions of the Brazos River are less than 4.0' deep (therefore prohibiting multibeam data Collection), obtain traditional cross-sections from the boat. The number of cross-sections and therefore spacing, will be determined once river depths are evaluated at the commencement of the field effort. The number of cross-sections will be presented to FBCTRA for approval. Within the proposed roadway alignment(s), collect traditional sections at the edge of ROW, center of ROW/Alignment, and every 50' in-between.

Deliverables for Bathymetric and UAV Surveys

1. Raw files (Both LiDAR and Multibeam Sonar)
2. ≤ 6-inch bare earth Gridded XYZ (combined LiDAR and Multibeam datasets)
3. DEM/ DTM

F. GEOTECHNICAL INVESTIGATIONS & RECOMMENDATIONS

Geotechnical Borings and Investigations: Determine the location of proposed soil borings for bridge design in accordance with the latest edition of TxDOT's Geotechnical Manual. The FBCTRA will review and provide comments for a boring layout submitted by the Engineer showing the general location and depths of the proposed borings. Once the Engineer receives the FBCTRA's review comments they shall perform soil borings (field work), soil testing and prepare the boring logs in accordance with the latest edition of the TxDOT Geotechnical Manual. The quantity and depth of borings is summarized in the following table. Any proposed retaining walls are assumed to lie within the vicinity of our proposed bridge borings. See Exhibits 2 and 3 for locations and depths of proposed borings.

1. Perform all geotechnical work in accordance with the latest version of the TxDOT's Geotechnical Manual. All testing

Planned Soil Boring Locations				
Structure Type	Location	Number of Borings		Boring Depth (ft)
		Terracon	GeoTest	
Bridge	Fort Bend Parkway	5	5	120
		6	4	100
Bridge	Fort Bend Parkway (Snake Slough Creek)	2	0	175
Bridge	Fort Bend Parkway (Brazos River)	3	3	250
Bridge Ramp	Fort Bend Parkway	0	2	120
		0	2	100
Bridge	FM 2759 (West of Fort Bend Parkway)	0	5	100
		0	4	120
Bridge	FM 2759 (East of Fort Bend Parkway)	0	1	120
Total Borings:		16	26	5,590

shall be performed in accordance with the latest version of the TxDOT Manual of Test Procedures. American Society for Testing Materials (ASTM) test procedures can be used only in the absence of TxDOT procedures. All soil classification shall be done in accordance with the Unified Soil Classification System.

2. As applicable, perform soil borings, testing and analysis to include global and external stability analysis of retaining walls, settlement analysis of retaining walls, and foundation design recommendations along proposed bridge alignments. The scope of work will be performed as detailed in the table below.

3. Provide signed, sealed, and dated geotechnical reports which contain, but are not limited to, soil boring locations, boring logs, laboratory test results, generalized subsurface conditions, ground water conditions, analyses and recommendations for retaining wall stability and settlement analysis, skin friction tables, and design capacity curves including skin friction and point bearing for drilled shaft foundations, as applicable.

4. Perform sieve analysis tests to include Grain Size distribution curves with D50 value for both Steep Bank Creek and the Brazos River.

5. Sign, seal, and date soil boring sheets.

6. Foundation Studies: coordinate to determine the location of soil borings to be drilled along the bridges. The soil borings shall be drilled to the depths previously described, up to a maximum depth for 250 feet below existing grade. Spacing of soil borings shall be in general accordance with the TxDOT Geotechnical Manual. Provide a boring layout for review and comment.

Note: This scope of services excludes any borings to be drilled within the Brazos River. If borings within the Brazos River are needed, we plan to add scope and fee for equipment to complete this work later.

7. It is anticipated that tree clearing will be required to access proposed borings. Unless otherwise required, fallen trees are planned to be left onsite.

Entity	Field Work	Laboratory Testing	Geotechnical Consulting and Reporting
Terracon	Field exploration for the Fort Bend Parkway Mainlanes from boring B-1 through B-16	Laboratory testing for the Fort Bend Parkway Mainlanes from boring B-1 through B-28	Geotechnical report with recommendations for the Fort Bend Parkway Mainlanes from boring B-1 through B-28 Geotest geotechnical report peer review
Geotest	<ul style="list-style-type: none"> ▪ Field exploration for the Fort Bend Parkway Mainlanes from boring B-17 through B-28 ▪ Field exploration for the Fort Bend Parkway Bridge Ramp from borings B-29 through B-32 ▪ Field exploration for the FM 2759 Bridge from borings B-33 through B-42 	<p>Borings B-17 through B-28 will be obtained by Geotest and provided to Terracon for Laboratory Testing.</p> <p>Laboratory testing for the Fort Bend Parkway Bridge Ramp and the FM 2759 Bridge from boring B-29 through B-42</p>	Geotechnical report with recommendations for the Fort Bend Parkway Bridge Ramp and FM 2759 Bridge from boring B-29 through B-42, including retaining wall of approach embankment and pavement design

G. BRAZOS RIVER GEOMORPHIC ANALYSIS

1. FIELD VISIT AND DATA COLLECTION

Data Collection – Gather background data regarding geomorphology of the river system and floodplain channels, including past studies of the river, regional geomorphology, subsidence impact on this portion of the river, known issues that could affect long-term trends in channel stability and other pertinent geomorphic information. Gather existing GIS and other digital data including relevant H&H models and data required to understand the stability and flows of the region.

Field Visit – Prepare field maps prior to any field investigation. Perform an initial site visit and geomorphic assessment (GA) to collect relevant geomorphic measurements and make observations related to the vertical and lateral stability of the channel.

- a. Locate specific reaches that have experienced substantial meander migration as near to the proposed site as possible. Collect bankfull data, bar samples, bar and channel deposits mapping. The GA will be limited to no more than 5 miles either side of the proposed roadway alignment. Developing the understanding of the processes of the river is essential for prediction and mitigation of future erosion issues for the proposed roadway.
- b. Map calibration Bank Erosion Hazard Index (BEHI) reaches of approximately 500' in length at a minimum of 2 locations upstream and downstream of the proposed roadway alignment.
- c. Map detailed BEHI for 1000' upstream and downstream of the proposed roadway alignment.
- d. Identify a relatively stable cross section of the river to be used as the "reference stable section" in the sediment transport analysis.
- e. Complete detailed mapping of geomorphic features for a minimum of 1000' upstream and downstream of the proposed alignment including features located within the floodplain to the extent of first relic river terrace.
- f. Perform a geomorphic assessment of the tributary's interaction within the floodplain. Document channel conditions, map geomorphic features and map BEHI distribution on at least 1 calibration reach to extrapolate for the entire channel. As with the main river, collect root samples and evaluate overall stability of the tributary to anticipate any migration or erosion issues.
- g. Map occurrence of variations in geologic strata as observed on cut-banks of the river.
- h. Install bed and bank pins at a minimum of 8 selected locations to represent variations in bank type in within the bridge's meander wavelength.
- i. Collect exposed root samples at a minimum of 5 locations for each of the major BEHI categories. This will provide the data required to develop a site/river specific lateral erosion rate curve for the prediction and analysis of erosion at other locations where measurements are not taken.

2. DESKTOP ANALYSIS AND REVIEW OF FIELD DATA

Desktop Analysis of Channel Stability – Conduct a desktop analysis of stream stability, including a review of historic aerial photographs and analysis of the field data to determine potential trends in stream stability, lateral erosion, sedimentation, vegetation, land use, sediment supply, and sediment transport. Utilize a modified version of the EPA Watershed Assessment of River Stability and Sediment Supply (WARSSS) method to predict trends in channel stability and evolution.

Analyze Field Data – Analyze bathymetry, survey, and other field information to better understand river stability. Evaluate cross sections as compared to varying BEHI ratings mapped for the calibration reaches of the immediate reach upstream and downstream of the proposed alignment.

Flow Modeling – Utilize Flow 3-D modeling of the proposed bridge location to better understand the geometry of flow and energy distribution expected within the near bridge reach of the river.

3. SEDIMENT TRANSPORT ANALYSIS

Sediment Transport Analysis – Evaluate (using Flowed/Powersed) the sediment transport competence and capacity of the river for relevant sections for upstream and downstream to the adjacent meander bend. Determine trends in aggradation, degradation or stability that will serve as a line of evidence of future channel evolution and potential migration. Identify locations of sediment transport impairment that may need evaluation by CFD (Flow 3-D) in final design phases

4. FOLLOW UP FIELD INSPECTION

Field Inspection – Conduct a follow up investigation of areas of concern, the bridge crossings (main channel and tributary), and locations where riverbank stabilization or flow redirection needs are expected.

Identify Data for Final Design – Collaborate with geotechnical engineers to determine likely locations and frequency of additional borings that may be required in final design of the riverbank stabilization and flow redirection devices.

5. BRIDGE DESIGN COORDINATION

Coordination – Provide detailed evaluation of proposed locations and bridge geometry for both the main channel bridge and any tributary or floodplain relief bridges. Evaluate alternative bridge and bent locations.

6. PRELIMINARY RIVERBANK STABILIZATION DESIGN

Preliminary Stabilization Design – Provide a preliminary design (30%) for locations identified by previously completed tasks that may require stabilization, flow redirection or other river modifications (point bars, bench, etc). This will include the proposed elements/measures proposed, plan sheets indicating location, typical sections and anticipated limits of impact/level of impact for permitting considerations. Identify the “time to act” and level of risk for proposed river stabilization locations.

Note: It is anticipated that some efforts may be required during bridge and road construction and that other design concepts and locations may be implemented on longer timeframes. This will depend on the results of the current and future conditions of the river that result from the previous tasks.

7. DOCUMENTATION

Technical Memorandum – Prepare a Draft Technical Memorandum documenting geomorphic analysis and submit to County electronically as PDF for review. Provide cost estimates for anticipated river stabilization measures upstream and downstream and a separate cost estimate for the near-bridge stabilization measures.

H. BRIDGE STUDIES AND PRELIMINARY LAYOUTS

1. SOIL BORING LAYOUT

Coordinate with the Geotechnical team to locate required soil borings for bridge foundations.

2. WATER CROSSING ALIGNMENT ANALYSIS AND PRELIMINARY BRIDGE DESIGN

Perform an engineering and cost analysis for alternative alignments and bridge designs (both substructure and superstructure) considering potential Brazos River migration to determine the optimum alignment and bridge design for the Fort Bend Parkway mainlanes over Steep Bank Creek and the Brazos River.

3. RAILROAD COORDINATION AND BRIDGE GEOMETRY

Coordinate with both the UPRR and the BNSF to determine the optimum bridge span configuration and beam type to cross the Fort Bend Parkway Mainlanes over the two (2) side-by-side 100' wide railroad right's-of-way (200' total).

4. BRIDGE AND RETAINING WALL AESTHETICS

Develop Aesthetic Alternatives for retaining walls and bridge superstructure / substructure. Hold a preliminary workshop to discuss possible alternatives and a final workshop to select the preferred aesthetic treatments.

5. BRIDGE LAYOUTS

Prepare a bridge layout plan sheet for each bridge and bridge class culvert. Comply with all relevant sections of the latest edition of the:

TxDOT LRFD Bridge Design Manual
TxDOT Bridge Project Development Manual
TxDOT Bridge Detailing Guide
AASHTO LRFD Bridge Design Specifications and respective checklists.

Prepare bridge layouts that include bridge typical sections, structural dimensions, abutment and bent locations, superstructure, and substructure types. Prepare Bridge Layouts for:

Fort Bend Parkway Mainlanes (including from the levee to RR Crossing) (~8,200 LF)
Fort Bend Parkway Southbound Exit Ramp (~1,000 LF)
Fort Bend Parkway Northbound Entrance Ramp (~1,000 LF)
FM 2759 (~2,500 LF)

I. BRAZOS RIVER HYDROLOGIC AND HYDRAULIC ANALYSIS

1. BRAZOS RIVER DATA COLLECTION

Review Survey Data – Coordinate with surveyor to review the channel bathymetry, LiDAR survey data, and survey cross sections that will be required for the hydraulic analysis.

Combined Surface Review – Coordinate with surveyor on combined terrain surface development. Review surface to ensure it will meet to standards required to be used in the hydraulic and geomorphic analysis.

2. BRAZOS RIVER EXISTING CONDITIONS MODELING

Hydrology – Perform minor updates to the existing Fort Bend County Master Drainage Plan HEC-HMS model to provide sufficient level of detail including subdividing existing drainage areas to obtain more detailed flows at the project location on Steep Bank Creek and the Brazos River. Utilize Atlas 14 rainfall and hydrology developed during the Brazos River master drainage plan to provide flows at the upstream end of the study area.

Hydraulics – Use the existing 1D/2D Brazos River master drainage plan HEC-RAS model as a starting point to develop a hydraulic model to establish baseline existing conditions within the study area (Figure 1). Update the model to the latest version of HEC-RAS (v6.3.1) and truncate with appropriate boundary conditions to study the area of interest. Update terrain data in the model with the survey/LiDAR/bathymetry data collected during survey and additionally with Fort Bend County 2019 LiDAR for all other areas to account for recent changes to river morphology. Convert the truncated 1D/2D model to a fully 2D model to obtain additional detail about scour potential, velocity profiles, and complex flow patterns in the area of interest. Confirm the calibration parameters of the truncated model and update if needed. Develop existing conditions runs for the 2-, 5-, 10-, 25-, 50-, 100, and 500-year events as a baseline.

3. BRAZOS RIVER PROPOSED CONDITION MODELING

Alternative Route Analysis Hydraulic Modeling – Coordinate with the roadway design teams on proposed alignments and bent locations. Attend one (1) working workshop with designers for both segments (B-4 and C) to provide initial feedback on alignments. Attend up to three (3) meetings with Segment B-4 design team to evaluate alignment alternatives. Attend up to three (3) coordination meetings with Segment C regarding drainage of Segment C. Attend up to three (3) coordination meetings with Segment C regarding alignment alternatives. Incorporate up to three (3) roadway alignments from each segment (B-4 and C) of the proposed extension into the hydraulic model.

Schematic Design Hydraulic Modeling – Incorporate the selected roadway route alignment into the hydraulic model for each segment (2) into the hydraulic model. Model the low chord, high chord, bents, abutments and tie into existing ground or roadways. Assessed alternatives for potential impacts and coordinate with the roadway design teams. Tie ins to existing at grade roads through ramps or frontage road or proposed fill will be included in the model to check for impacts and potential mitigation need. Attend up to three (3) meetings with Segment B-4 designers and up to three (3) meetings with Segment C designers regarding bridge design for hydraulic modeling results. Develop a combined hydraulic model of the selected roadway alignments for each segment (B-4 and C). Use the model to review impacts for all events up to the 500-year. Based on the modeling results, coordinate with each roadway team to potentially modify bridge components. Review Schematic Design to ensure the model adequately captures the proposed roadway alignment, bridge components, including the low chord, piers, abutments, and any proposed additional roadway or ramps or fill placed within the Brazos River floodplain.

4. BRAZOS RIVER MITIGATION AND BRIDGE PROTECTION

Mitigation and Channel/Bridge Protection – Based on the selected alternative and proposed modeling, explore

mitigation options as needed to provide a no impact analysis that includes no increase in water surface elevations upstream or downstream. The types of mitigation that could be explored include channel modifications, selective clearing, detention, bypass, etc. Coordinate with geomorphologists on areas where model results indicate that channel stabilization or armoring may be needed. The shear stresses at the bridge will be investigated to develop bridge protection concepts to protect from erosive forces at the bridge. Incorporate channel protection measures into the hydraulic model and impacts for events up to the 500-year will be reassessed and additional changes proposed as needed.

5. BRAZOS RIVER REGULATORY MODELING CHECK

Analyze for No Impact – Using the current effective FEMA regulatory model, analyze the selected bridge alignment for no adverse impact. Create a corrected effective, revised existing, and proposed condition model based on the current effective model. Coordinate modeling with roadway and bridge designers.

6. BRAZOS RIVER DOCUMENTATION (in the PER)

Documentation – Develop a drainage report for inclusion in the PER that will document data sources, modeling methodology, analysis of alignment alternatives, mapping, and statement of no adverse impact if supported by modeling. Document mitigation options for further study and design. Respond to comments and make necessary updates to the report.

J. DRAINAGE ANALYSIS AND RECOMMENDATIONS

Perform preliminary drainage analysis in order to develop recommendations bridge deck drainage and to determine sizes of cross culverts, storm sewers (if required), and roadside ditches, all of which will be (1) utilized to define the ROW footprint, (2) depicted on the schematic, and (3) utilized to develop of the construction cost estimate.

1. DATA COLLECTION

1. Conduct field inspections to observe current conditions and the outfall channels, the cross-drainage structures, drainage easements, the tributary channel, and land development projects that contribute flow to the tributary. Document field inspections with digital photos.
2. Collect available applicable data including GIS data and maps, site survey data, construction plans, previous reports and studies, and readily available rainfall history for the area. Sources of data collected must include, but are not limited to, the State, County, and Federal Emergency Management Agency (FEMA).
3. Collect available Flood Insurance Rate Maps (FIRMs), Flood Insurance Study (FIS) study data, and models.
4. Review survey data and coordinate any additional surveying needs with FBCTRA.
5. Present existing drainage structures in a 3D corridor MicroStation model.
6. Meet with local government officials to obtain historical flood records. Interview residents or local government employees to obtain additional high-water information if available. Obtain frequency of road closure and any additional high-water information from the District Maintenance office.
7. Submit a letter report to the FBCTRA Project Manager detailing completion of data collection.

2. PRELIMINARY HYDROLOGY

1. Incorporate in the hydrologic study a thorough evaluation of the methodology available, comparison of the results of two or more methods, and calibration of results against measured data, if available.
2. Calculate discharges using appropriate hydrologic methods and as approved by FBCTRA.
3. Consider the pre-construction and post-construction conditions in the hydrologic study, as required in the individual Work Authorization.
4. Obtain the drainage area boundaries and hydrologic parameters such as impervious covered areas, and overland flow paths and slopes from appropriate sources including, but are not limited to, topographic maps, GIS modeling, construction plans, and existing hydrologic studies. Confirm validity of existing hydrologic studies. If necessary, obtain additional information such as local rainfall from official sites such as airports.
5. Include, at a minimum, the “design” frequency to be specified in the Work Authorization and the 1% Annual Exceedance Probability (AEP) storm frequency. The report must include the full range of frequencies (50%, 20%, 10%, 4%, 2%, 1%, and 0.2% AEP).
6. Compare calculated discharges to the effective FEMA flows. If calculated discharges are to be used in the model instead of the effective FEMA flows, full justification must be documented.

3. PRELIMINARY HYDRAULICS

1. Gather information regarding existing drainage facilities and features from existing plans and other available studies or sources.
2. Perform hydraulic design and analysis using appropriate hydraulic methods, which may include computer models such as HEC-RAS, unsteady HEC-RAS or 2D models such as SWMM. 2D models shall not be developed without the express permission of FBCTRA. Data entry for appropriate hydraulic computer programs shall consist of a combination of both on-the-ground survey and other appropriate sources including but not limited to topographic maps, GIS modeling, and construction plans and existing hydrologic studies.

3. Use the current effective FEMA models, where appropriate, as a base model for the analysis. If a “best available data” model is provided by the local floodplain administrator, it must be utilized accordingly for this analysis. Review the provided base model for correctness and updated as needed. If the provided effective model is not in a HEC-RAS format, convert it to HEC-RAS for this analysis.
4. If the appropriate hydrologic model requires storage discharge relationships, develop HEC-RAS models or other approved models that will compute these storage discharge relationships along the channel.
5. Consider pre-construction, present and post-construction conditions, as well as future widening, as determined in the Work Authorization.
6. Quantify impacts, beneficial or adverse, in terms of increases in peak flow rates and water surface elevations for the above listed hydraulic conditions and hydrologic events. Impacts will be determined both upstream and downstream of the bridge crossings.
7. Compute right of way corridor 1% AEP flood plain volumes for existing and proposed roadway elevations. Provide mitigation to offset a decrease in 1% AEP flood plain volumes.
8. Use hydrograph calculations and peak flows to determine the storage required.
9. If necessary, present mitigation measures along with the advantages and disadvantages of each. Each method must consider the effects on the entire area. Include approximate construction costs in the report.
10. Provide calculations which quantify the cut and fill within the 1% AEP flood plain, if any.

4. PRELIMINARY CROSS-DRAINAGE STRUCTURES

1. Determine drainage areas and flows for cross culvert drainage systems.
2. Determine the sizing of the drainage crossings. Develop designs that minimize the interference with the passage of traffic or cause damage to the highway and local property in accordance with the TxDOT’s Hydraulic Design Manual, District criteria and any specific guidance provided by FBCTRA. Cross drainage design shall be performed using HY-8 or HEC RAS.

K. PRELIMINARY ENGINEERING REPORT (PER)

1. DRAFT PER

Prepare a Draft PER to summarize all data, evaluations, analyses, and recommendations for submittal to FBCTRA. The Draft PER shall include descriptions, exhibits, sketches, calculations, layouts, typical sections cost estimates for all alternatives considered. The Draft PER will address all issues included within the Engineer's Scope of Work.

2. FINAL PER

Address comments to the Draft PER and prepare a Final PER to summarize all data, evaluations, analyses, and recommendations for submittal to FBCTRA.









Exhibit 1
Assumed UAV Flight Path and Bathymetric Survey Limits along Brazos River

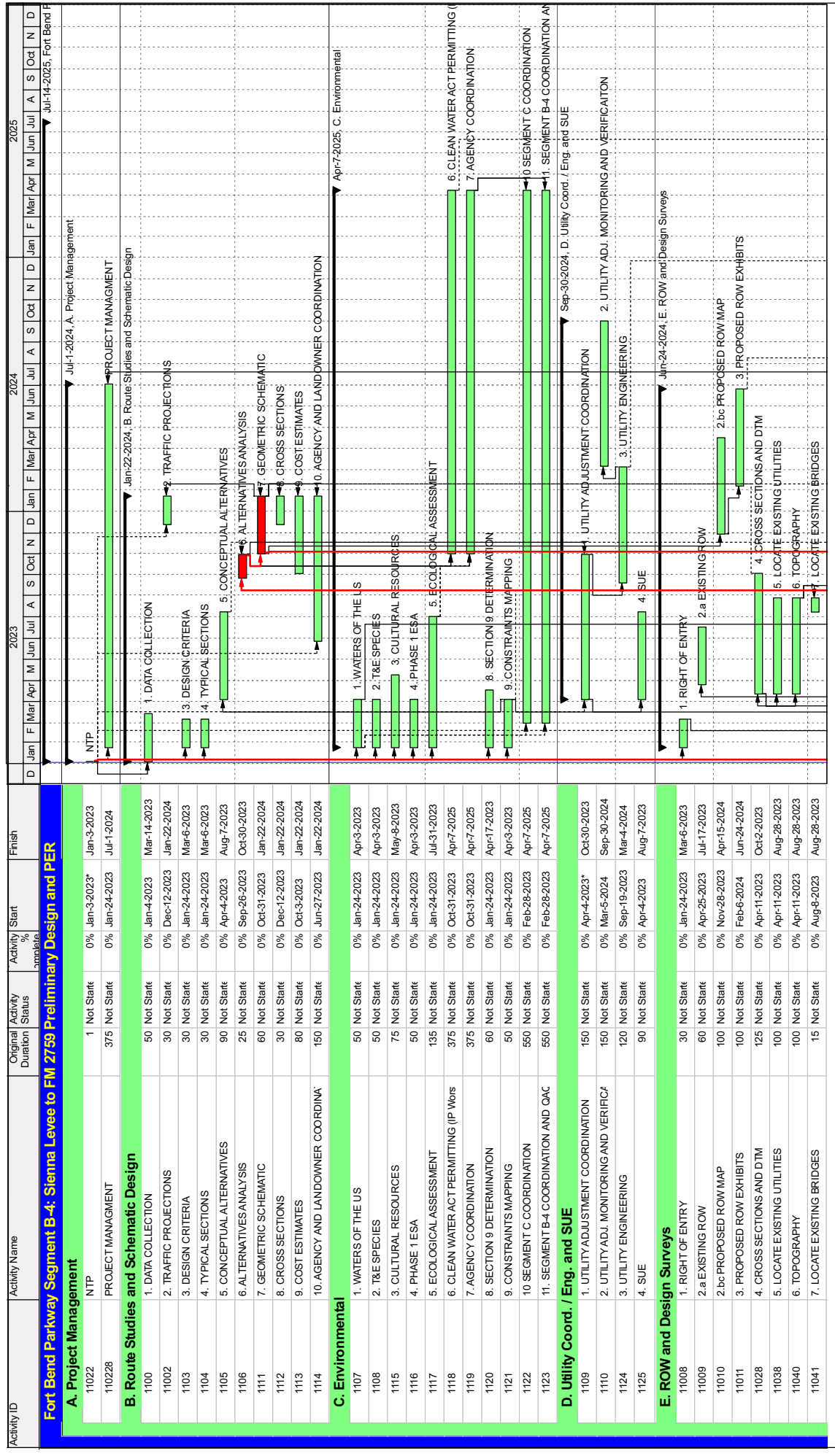


Exhibit 2 Preliminary Soil Boring Layout



Exhibit 3
Soil Boring Summary

Boring Number	Depth (Feet)	Latitude	Longitude	Company
B-1	100	29.51816	-95.56110	Terracon
B-2	120	29.51771	-95.56188	Terracon
B-3	100	29.51697	-95.56228	Terracon
B-4	120	29.51645	-95.56303	Terracon
B-5	100	29.51569	-95.56336	Terracon
B-6	120	29.51514	-95.56405	Terracon
B-7	100	29.51435	-95.56433	Terracon
B-8	120	29.51374	-95.56498	Terracon
B-9	100	29.51293	-95.56518	Terracon
B-10	175 	29.51228	-95.56578	Terracon
B-11	175 	29.51125	-95.56601	Terracon
B-12	100	29.51062	-95.56653	Terracon
B-13	250 	29.50990	-95.56653	Terracon
B-14	120	29.50918	-95.56700	Terracon
B-15	250 	29.50852	-95.56694	Terracon
B-16	250 	29.50792	-95.56733	Terracon
B-17	250 	29.50679	-95.56729	GeoTest
B-18	250 	29.50600	-95.56765	GeoTest
B-19	120	29.50517	-95.56749	GeoTest
B-20	250 	29.50436	-95.56777	GeoTest
B-21	100	29.50351	-95.56751	GeoTest
B-22	120	29.50271	-95.56775	GeoTest
B-23	100	29.50192	-95.56743	GeoTest
B-24	120	29.50112	-95.56772	GeoTest
B-25	100	29.50048	-95.56747	GeoTest
B-26	120	29.49965	-95.56780	GeoTest
B-27	100	29.49892	-95.56775	GeoTest
B-28	120	29.49833	-95.56824	GeoTest
B-29	100	29.50031	-95.56800	GeoTest
B-30	120	29.49922	-95.56823	GeoTest
B-31	100	29.49933	-95.56730	GeoTest
B-32	120	29.49846	-95.56758	GeoTest
B-33	100	29.49834	-95.56920	GeoTest
B-34	120	29.49826	-95.57013	GeoTest
B-35	100	29.49828	-95.57108	GeoTest
B-36	120	29.49819	-95.57202	GeoTest
B-37	100	29.49821	-95.57296	GeoTest
B-38	120	29.49812	-95.57389	GeoTest
B-39	100	29.49815	-95.57483	GeoTest
B-40	120	29.49806	-95.57551	GeoTest
B-41	100	29.49811	-95.57628	GeoTest
B-42	120	29.49833	-95.56662	GeoTest
SUM:	5590			



Fort Bend Parkway Segment B-4: Sienna Levee to FM 2759 Preliminary Design and PER

A. Project Management

B. Route Studies and Schematic Design

C. Environmental

D. Utility Coord. / Eng. and SUE

E. ROW and Design Surveys



Fort Bend Parkway Segment B-4: Sienna Levee to FM 2759 Preliminary Design and PER

Start Date: Jan-3-2023
 Finish Date: Jul-14-2025
 Data Date: Jan-3-2023
 Run Date/Time: Dec-9-2022 / 12:29

█ Remaining Level of Effort
█ Actual Work
█ Remaining Work
█ Critical Remaining Work
█ Milestone
█ Summary

Summary

Attachment B
Compensation for Scope of Services

Fort Bend Parkway Extension
Segment B-4: Sienna Levy to FM 2759
Preliminary Engineering

Task - Lump Sum Payment	LJA Engineering, Inc.	Freese and Nichols, Inc.	Landtech, Inc.	MBCO LLC	Terracon Consultants, Inc.	Geotest Engineering, Inc.	C. H. Fenstermaker & Associates, Inc.	Bio-West	Cobb, Fendley & Associates, Inc.	Total
A. Project Management	\$158,943.56	\$83,640.00	\$35,159.36	\$29,080.00			\$6,120.00	\$20,100.00		\$333,042.92
B. Route Studies and Schematic Design	\$360,142.60									\$360,142.60
C. Environmental	\$89,388.40							\$105,610.00		\$194,998.40
D. Utility Coordination and SUE	\$51,376.88									\$51,376.88
E. ROW and Design Surveys	\$36,654.00	\$4,432.00	\$214,793.77	\$102,475.00			\$12,470.00			\$370,824.77
F. Geotechnical Investigations and Recommendations	\$38,702.80	\$246,769.00								\$38,702.80
G. Brazos River Geomorphic Analysis	\$549,133.00									\$549,133.00
H. Bridge Studies and Recommendations	\$59,122.20	\$239,976.00								\$299,098.20
I. Brazos River H&H Analysis	\$69,811.90									\$69,811.90
J. Drainage Analysis and Recommendations	\$99,613.50	\$42,136.00								\$141,749.50
K. Preliminary Engineering Report	\$0.00	\$0.00	\$150,795.00	\$187,050.00			\$33,335.00	\$825.00		\$372,005.00
Unit Costs	\$2,375.00	\$13,724.00	\$41,762.00	\$25,062.50			\$3,825.00	\$80,522.50		\$167,269.00
Other Direct Expenses					\$0.00					
Totals	\$1,541,745.84	\$630,677.00	\$442,510.13	\$343,667.50	\$0.00	\$0.00	\$55,748.00	\$207,057.50	\$0.00	\$3,221,405.97

Task - Time and Materials (T&M) Payment	LJA Engineering, Inc.	Freese and Nichols, Inc.	Landtech, Inc.	MBCO LLC	Terracon Consultants, Inc.	Geotest Engineering, Inc.	C. H. Fenstermaker & Associates, Inc.	Bio-West	Cobb, Fendley & Associates, Inc.	Total
A. Project Management					\$36,343.04	\$33,880.00			\$4,182.00	\$74,405.04
B. Route Studies and Schematic Design					\$243,137.79	\$154,035.00		\$60,250.00		\$397,172.79
C. Environmental	\$134,768.00									\$195,018.00
D. Utility Coordination and SUE									\$6,460.00	\$6,460.00
E. ROW and Design Surveys										\$0.00
F. Geotechnical Investigations and Recommendations										\$0.00
G. Brazos River Geomorphic Analysis										\$0.00
H. Bridge Studies and Recommendations										\$0.00
I. Brazos River H&H Analysis										\$0.00
J. Drainage Analysis and Recommendations										\$0.00
K. Preliminary Engineering Report	\$19,500.00				\$246,162.00	\$329,780.00			\$60,395.00	\$655,837.00
Unit Costs					\$117,150.00	\$119,522.00			\$3,825.00	\$240,497.00
Other Direct Expenses					\$642,792.83	\$637,217.00	\$0.00	\$60,250.00	\$74,862.00	\$1,569,389.83
Totals	\$154,268.00	\$0.00	\$0.00	\$0.00	\$642,792.83	\$637,217.00	\$0.00	\$60,250.00	\$74,862.00	\$1,569,389.83
	9.8%	0.0%	0.0%	0.0%	41.0%	40.6%	0.0%	3.8%	4.8%	100.0%

Task	LJA Engineering, Inc.	Freese and Nichols, Inc.	Landtech, Inc.	MBCO LLC	Terracon Consultants, Inc.	Geotest Engineering, Inc.	C. H. Fenstermaker & Associates, Inc.	Bio-West	Cobb, Fendley & Associates, Inc.	Total
Totals	\$1,696,013.84	\$630,677.00	\$442,510.13	\$343,667.50	\$642,792.83	\$637,217.00	\$55,748.00	\$267,307.50	\$74,862.00	\$4,790,795.80

**ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES**

Prime Provider: LJA Engineering, Inc.

Labor Classification	Hourly Rate
Project Manager	\$333.60
Senior Structural Engineer	\$294.40
Senior Engineer	\$269.90
Project Engineer	\$207.90
Design Engineer	\$158.80
Senior Utility Coordinator	\$182.02
Engineer in Training	\$130.20
Senior Engineering Technician	\$157.20
Engineering Technician	\$117.90
Admin / Clerical	\$102.30
Environmental Support Manager	\$240.00
Project Coordinator III	\$170.00
Project Coordinator II	\$160.00
Project Coordinator I	\$150.00
GIS Analyst II	\$165.00
Field Leader	\$125.00
Project Office Officer II	\$135.00
Field Technician II	\$105.00

Subprovider: Bio-West

Labor Classification	Hourly Rate
Principle	\$160.00
Senior Project Manager	\$155.00
Project Manager	\$145.00
GIS Specialist	\$105.00
Wildlife Biologist	\$120.00
Environmental Scientist 2	\$110.00
Environmental Scientist 1	\$95.00
Field Technician 2	\$85.00
Field Technician 1	\$75.00
Admin / Clerical	\$75.00

**ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES**

Subprovider: Freese and Nichols, Inc.

Labor Classification	Hourly Rate
Project Manager	\$295.00
Senior H&H Engineer	\$295.00
Project H&H Engineer	\$193.00
H&H Engineer In Training	\$169.00
Senior Geomorphic Engineer	\$295.00
Senior Environmental Scientist	\$258.00
Project Geomorphic Engineer II	\$221.00
Project Geomorphic Engineer I	\$193.00
Project Environmental Scientist	\$193.00
Environmental Scientist in Training	\$141.00
GIS Support	\$141.00

Subprovider: C. H. Fenstermaker Associates, LLC

Labor Classification	Hourly Rate
Land Surveyor	\$295.00
Survey Project Manager	\$295.00
Senior Survey Technician	\$193.00

**ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES**

Subprovider: Landtech Consultants, Inc.

Labor Classification	Hourly Rate
Support Manager	\$206.02
Surveyor LSLs	\$208.45
Surveyor RPLS Senior	\$178.86
CADD Operator Senior	\$134.15
Survey Technician SIT - Senior	\$105.01
Field Coordinator	\$124.66
Abstractor	\$ 92.14
Admin Clerical	\$ 80.62

Subprovider: MBCO LLC

Labor Classification	Hourly Rate
Support Manager	\$200.00
Surveyor RPLS Senior	\$185.00
CADD Operator Senior	\$125.00
Survey Technician SIT - Senior	\$125.00
Field Coordinator	\$125.00
Admin Clerical	\$ 80.62

Subprovider: Cobb Fendley & Associates, Inc.

Labor Classification	Hourly Rate
Project Manager	\$238.00
Project Engineer	\$135.00
Senior Technician	\$135.00
Admin	\$86.00

**ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES**

Subprovider: Terracon Consultants, Inc.

Labor Classification	Hourly Rate
Project Manager	\$223.68
Senior Engineer	\$209.50
Project Engineer	\$160.67
Design Engineer	\$138.62
Engineer in Training	\$110.26
Senior Engineering Technician	\$122.86
Engineering Technician	\$96.09
Admin / Clerical	\$105.54

Subprovider: Geotest Engineering, Inc.

Labor Classification	Hourly Rate
Project Manager	\$205.00
Senior Engineer	\$250.00
Project Engineer	\$165.00
Engineer in Training	\$115.00
Engineering Technician	\$90.00
Admin / Clerical	\$70.00

ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES

Unit Costs – Field Surveys	Unit	Cost / Unit
1-Person Survey Crew	Hour	\$ 130.00
2-Person Survey Crew	Hour	\$ 180.00
3-Person Survey Crew	Hour	\$ 215.00
2-Person UAV Crew	Hour	\$ 235.00
18 - 22' Survey Vessel (fuel & lube not included)	Day	\$ 500.00
GPS - RTK (Real Time Kinematic) 2-GPS Receivers	Day	\$ 425.00
LiDAR - Velodyne Puck LITE	Day	\$ 450.00
Norbit Multibeam Sonar	Day	\$ 1,300.00
Multi Rotor RTK	Day	\$ 350.00
LiDAR - Riegl MiniVux	Day	\$ 1,750.00

Unit Costs – Public Involvement	Unit	Cost / Unit
Public Involvement Advertisement (English and Spanish)	Each	\$ 6000.00
Public Involvement meeting location rental	Each	\$ 3000.00
Public Involvement security	Each	\$ 500.00
Public Involvement equipment	Each	\$ 5000.00
Virtual Public Meeting Web service	Each	\$ 5000.00

Unit Costs - SUE	Unit	Cost / Unit
SUE (Quality Level D)	LF	\$ 250.00
SUE (Quality Level C)	LF	\$ 325.00
SUE (Quality Level B - Utility Designation)	LF	\$ 30,895.00
SUE (Quality Level A - Utility Locate, Test Holes)		
Level A: 0 to 5 ft (Total)	each	\$ 6,250.00
Level A: > 5 to 8 ft (Total)	each	\$ 8,700.00
Level A: > 8 to 13 ft (Total)	each	\$ 5,550.00
Level A: > 13 to 20 ft (Total)	each	\$ 2,650.00
Level A: > 20 ft (Total)	LF	\$ 1,125.00
One (1) Designating Person with equipment	hour	\$ 1,900.00
Two (2) Designating Person with equipment	hour	\$ 1,950.00
Two (2) Person Vacuum Excavation with equipment	hour	\$ 2,100.00
Coring and repairing the pavement includes labor, equipment, and materials	each	\$ 600.00

ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES

Unit Costs - Geotechnical	Test Code	Unit	Cost / Unit
Soil Boring/Rock Coring with TCP (< 60 ft.)	Tex-132-E	LF	\$ 45.00
Soil Boring/Rock Coring with TCP (60 - 120 ft.)	Tex-132-E	LF	\$ 54.00
Soil Boring/Rock Coring with TCP (120 - 180 ft.)	Tex-132-E	LF	\$ 63.00
Soil Boring/Rock Coring with TCP (>180 ft.)	Tex-132-E	LF	\$ 72.00
Stand By of Crew		hour	\$ 300.00
Standard Penetration Test (SPT)	ASTM D1586	each	\$ 30.00
Unconfined Compressive Strength (Soil)	ASTM D2166	each	\$ 70.00
Triaxial Compression Test for Undisturbed Soils	Tex-118-E	each	\$ 150.00
Determining Moisture Content in Soil Materials	Tex-103-E	each	\$ 15.00
Determining Liquid Limits of Soils	Tex-104-E	each	\$ 45.00
Determining Plastic Limits of Soils	Tex-105-E	each	\$ 45.00
Calculating Plasticity Index of Soils	Tex-106-E	each	\$ 45.00
Borehole Grouting - Bentonite Chips		LF	\$ 12.00
Determining the Amount of Material in Soils Finer than the 75 micrometer (No. 200) Sieve	Tex-111-E	each	\$ 60.00
Particle Size Analysis of Soils, Part I Sieve Analysis of Material Retained on the 425µm (No. 40) Sieve	Tex-110-E	each	\$ 100.00
Particle Size Analysis of Soils, Part II Hydrometer Analysis of Soils Passing 425µm (No. 40) Sieve	Tex-110-E	each	\$ 145.00
One Dimensional Consolidation Properties of Soil	ASTM D2435	each	\$ 914.00
California Bearing Ratio	ASTM D1883	each	\$ 243.00
Consolidated Undrained (CU) Triaxial Compression Test for Undisturbed Soils	Tex-131-E	each	\$ 1900.00
Specific Gravity	Tex-108-E	each	\$ 67.00

ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES

Other Direct Expenses	Unit	Cost / Unit
Various		
Mileage	Mile	\$ 0.625
Lodging/Hotel-Taxes and fees	day/person	\$ 122.00
Lodging/Hotel (Taxes/fees not included)	day/person	\$ 10.00
Meals (Excluding alcohol & tips) (Overnight stay required)	day/person	\$ 69.00
Rental Car Fuel	Gallon	\$ 3.80
Rental Car (Includes taxes and fees; insurance costs will not be reimbursed)	Day	\$ 150.00
Air Travel - In State - 2+ Wks Notice (Coach)	Rd. Trip/person	\$ 600.00
Boat Rental	Day	\$ 500.00
Standard Postage	Letter	\$ 10.00
Overnight Mail - Letter Size	each	\$ 30.00
Overnight Mail - Oversized Box	Each	\$ 100.00
Geotechnical		
Vehicle Charge	Hour	\$ 12.00
Bulldozer Rental for Clearing	Day	\$ 3,000.00
Mobilization of ATV Buggy / Track Drilling Equipment less 100 mile	Each	\$ 950.00
ATV Surcharge (for rig installed on ATV)	LF	\$ 10.00
Side by Side Rental To Move between Boring Locations	Each	\$ 200.00
Environmental		
Cultural Resources Invest. (Minor add.field work, state permit, reporting)	Single Fee	\$ 11.00
Phase I Database Search (fee per Phase I report)	Each	\$ 1,072.50
Arch. Deep Trenching *estimated total*	Single Fee	\$ 55,000.00
Arch. Construction Monitoring	Per Day	\$ 1,100.00

**ATTACHMENT B
COMPENSATION FOR ENGINEER'S SCOPE OF SERVICES
TIME AND MATERIAL MAXIMUM LOADED RATES**

Other Direct Expenses	Unit	Cost / Unit
Field Surveys		
SUV or ATV Rental (Includes taxes and fees)	day	\$ 225.00
Standard Postage	letter	\$ 0.60
Certified Letter Return Receipt	each	\$ 7.20
TxDOT Type II ROW/Control Monument	each	\$ 300.00
Boat with Motor	day	\$ 400.00
Railroad - Insurance in addition to STD Minimum Required	each	\$ 2,500.00
Railroad – Permit	each	\$ 4,500.00
Railroad - Safety Training	per person	\$ 525.00
Railroad - Valuation Maps	per sheet	\$ 75.00
Railroad Flagger (Service provided by RR)	per day	\$ 1,600.00
T-Posts (Materials only) at control points	each	\$ 50.00

ATTACHMENT C

The Engineer shall furnish certificates of insurance to the FBCTRA evidencing compliance with the insurance requirements hereof. Certificates shall indicate name of the Engineer, name of insurance company, policy number, term of coverage and limits of coverage. The Engineer shall cause its insurance companies to provide the FBCTRA with at least 30 days prior written notice of any cancellation or non-renewal of the insurance coverage required under this Agreement. The Engineer shall obtain such insurance from such companies having a Bests rating of B+/VII or better, licensed or approved to transact business in the State of Texas, and shall obtain such insurance of the following types and minimum limits:

- a. Workers' Compensation insurance in accordance with the laws of the State of Texas, or state of hire/location of Services, and Employers' Liability coverage with a limit of not less than \$1,000,000 each employee for Occupational Disease, \$1,000,000 policy limit for Occupational Disease; and Employer's Liability of \$1,000,000 each accident.
- b. Commercial General Liability insurance including coverage for Products/Completed Operations, Blanket Contractual, Broad Form Property Damage, Personal Injury/Advertising Liability, and Bodily Injury and Property Damage with limits of not less than:
 - \$2,000,000 general aggregate limit
 - \$1,000,000 each occurrence, combined single limit
 - \$2,000,000 aggregate Products, combined single limit
 - \$1,000,000 aggregate Personal Injury/Advertising Liability
 - \$50,000 Fire Legal Liability
 - \$5,000 Premises Medical
- c. Business Automobile Liability coverage applying to owned, non-owned and hired automobiles with limits not less than \$1,000,000 each occurrence combined single limit for Bodily Injury and Property Damage combined.
- d. Umbrella Excess Liability insurance written as excess of Employer's Liability, with limits not less than \$2,000,000 each occurrence combined single limit.
- e. Professional Liability insurance with limits not less than \$2,000,000 each claim/annual aggregate.

The FBCTRA and the FBCTRA's Directors shall be named as additional insureds, or be satisfied through a blanket additional insured endorsement, to all coverages required above, except for those requirements in paragraphs "a" and "e." All policies written on behalf of the Engineer shall contain a waiver of subrogation in favor of the FBCTRA and the FBCTRA's Directors, with the exception of insurance required under paragraph "e."