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 (the "Authority) organized and operating under the laws of the State of Texas, hereinafter called the "FBCTRA" and Woolpert, Inc., hereinafter called "Engineer."

W I T N E S S E T H

WHEREAS, the FBCTRA proposes to prepare the plans, specifications, and estimate (PS&E) along the tollway main lanes along the Fort Bend West Park, Project Number 101-1069 over Charger Way, 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 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 $1,125,567.00. 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 $1,025,567.00, and unit rate costs not to exceed $100,000.00 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: On or about the fifteenth day 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 two (2) copies of invoices 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

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. FBCTRA's right to inspect survives the termination of this Agreement for a period of four years.

6. Ownership and Reuse of Documents

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 licensed to practice professional engineering 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 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 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, c/o Greenberg Taurig, LLP, 1000 Louisiana Street, Suite 6700, Houston, Texas, 77002, Attention: James Hernandez, 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 Woolpert, Inc., 11750 Katy Freeway, Suite 1260, Houston, TX, 77079. Attention: Michelle Milliard, PE, 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. 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

24. Statutory Terms Applicable To State Political Subdivisions

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 117.003, 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.

a. Prior to execution of this Agreement by FBCTRA, 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

b. Engineer certifies and agrees that it is not identified on a list prepared and maintained under Sections 806.051, 807.051 or 2252.153, Texas Government Code.

In accordance with Section 176.0065, Texas Local Government Code, a list of local government officers of FBCTRA may be obtained by contacting the FBCTRA's records administrator at (281) 500-6050.

[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 18th day of November, 2024.

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

By: _____

Name: James D. Rice

Title: Chairman

Woolpert, Inc.
ENGINEER

By: _____

Name: Sam Talje, PE

Title: Market Director, South Region

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.: _____

ATTACHMENT A

SCOPE OF SERVICES

SERVICES TO BE PROVIDED BY ENGINEER

The Engineer shall provide engineering services required for the preparation of plans, specifications, and estimates (PS&E) and related documents, for the Fort Bend County Toll Road Authority (FBCTRA) Fort Bend Westpark Tollway Extension (Project 101-1069) over Charger Way from FM 359 to West of Texas Heritage Parkway (Approx Sta 146+50 to Sta 187+96.13) in Fort Bend County. These services may include, but not limited to project management and coordination with all team member consultants to provide a complete PS&E. Specific design effort will include roadway and bridge design, retaining walls design, hydrologic and hydraulic design, construction sequence and traffic control plan, storm water pollution prevention plan, signing and pavement marking design, traffic signal design (if required), survey and geotechnical data collection.

GENERAL REQUIREMENTS

1.1 Design Criteria. The Engineer shall prepare all work in accordance with the latest version of applicable Texas Department of Transportation (TxDOT) procedures, specifications, manuals, guidelines, standard drawings, and standard specifications or previously approved special provisions and special specifications, which include:

A. *PS&E Preparation Manual*, published by TxDOT;

B. *Roadway Design Manual*, published by TxDOT;

C. *Hydraulic Design Manual,* published by TxDOT;

D. *Texas Manual on Uniform Traffic Control Devices* (TMUTCD), published by TxDOT;

E. *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* (latest Edition), published by TxDOT;

When design criteria are not identified in TxDOT manuals, the Engineer shall notify the FBCTRA and refer to the American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, (latest Edition).

The Engineer shall follow TxDOT's Houston District guidelines in preparing the PS&E package, in a form suitable for letting through the FBCTRA's construction contract bidding and awarding process.

The Engineer shall identify, prepare exhibits and complete all necessary forms for each Design Exceptions and Waiver required within the project limits prior to the 50% project completion submittal. The Engineer shall submit each exception and waiver to the FBCTRA for coordination and processing of approvals. If subsequent changes require additional exceptions, the Engineer shall notify the FBCTRA in writing as soon as possible after identification of each condition that may warrant a design exception or waiver.

1.2 Right-of-Entry and Coordination. The Engineer shall secure permission to enter private property to perform any surveying, engineering or geotechnical activities needed off TxDOT right-of-way. The Engineer shall not commit acts which would result in damages to private property, and the Engineer shall make every effort to comply with the wishes and address the concerns of affected private property owners. The Engineer shall contact each property owner prior to any entry onto the owner's property.

1.3 Progress Reporting and Invoicing. The Engineer shall invoice according to Function Code breakdowns shown in Attachment B – Compensation for Scope of Services. The Engineer shall submit each invoice in a format acceptable to the FBCTRA.

The Engineer shall submit a monthly written progress report to FBCTRA's Project Manager regardless of whether the Engineer is invoicing for that month. The Engineer's written progress report must describe activities during the reporting period; activities planned for the following period, problems encountered, and actions taken to remedy them; list of meetings attended; and overall status, including a per cent complete by task.

The Engineer shall prepare a design time schedule and construction contract time schedule using the latest version of Primavera software or any FBCTRA-approved programs. The schedules shall indicate tasks, subtasks, critical dates, milestones, deliverables, and review requirements in a format that depicts the interdependence of the various items. The Engineer shall provide assistance to FBCTRA personnel in interpreting the schedule. The Engineer shall schedule milestone submittals at 50%, 90% and final project completion phases. The Engineer shall advise the FBCTRA in writing if the Engineer is not able to meet the scheduled milestone review date.

Once the project goes to letting, the Engineer shall deliver all electronic files within 30 days of written request.

Final payment is contingent upon the FBCTRA's receipt and confirmation by the FBCTRA's Project Manager that the electronic files run and are formatted in accordance with FBCTRA requirements and all review comments are addressed.

The Engineer shall prepare a letter of transmittal to accompany each document submittal to the FBCTRA. At a minimum, the letter of transmittal must include the FBCTRA project number, the highway number, and project limits.

1.4 Coordination. The Engineer shall coordinate issues and communications through FBCTRA's Project Manager. FBCTRA will communicate the resolution of issues and provide the Engineer direction through FBCTRA's Project Manager.

1.5 Level of Effort. The Engineer shall base the level of effort at each phase on the prior work developed in earlier phases without unnecessary repetition or re-study. As directed by the FBCTRA, the Engineer shall provide written justification regarding whether or not additional or repeated level of effort of earlier completed work is warranted, or if additional detail will be better addressed at a later stage in the project development.

1.6 Quality Assurance (QA) and Quality Control (QC). The Engineer shall provide peer review at all levels. For each deliverable, the Engineer shall have some evidence of their internal review and mark-up of that deliverable as preparation for submittal. A milestone submittal is not considered complete unless the required milestone documents and associated internal red line mark-ups are submitted. The FBCTRA's Project Manager may require the Engineer to submit the Engineer's internal mark-up (red lines) or comments developed as part the Engineer's quality control step. When internal mark-ups are requested by the FBCTRA in advance, the FBCTRA, at its sole discretion, may reject the actual deliverable should the Engineer fail to provide the evidence of quality control. The Engineer shall clearly label each document submitted for quality assurance as an internal mark-up document.

The Engineer shall perform QA and QC on all survey procedures, field surveys, data, and products prior to delivery to the FBCTRA. If, at any time, during the course of reviewing a survey submittal it becomes apparent to the FBCTRA that the submittal contains errors, omissions, or inconsistencies, the FBCTRA may cease its review and immediately return the submittal to the Engineer for appropriate action by the

Engineer. A submittal returned to the Engineer for this reason is not a submittal for purposes of the submission schedule.

1.7 Use of the TxDOT's Standards. The Engineer shall identify and insert as frequently as is feasible the applicable, current TxDOT's Standard Details, TXDOT Houston District Standard Details, or miscellaneous details (TxDOT or FBCTRA) that have been approved for use in the plans. The Engineer shall sign, seal, and date each Standard and miscellaneous detail if the Standard selected has not been adopted for use in the Houston District. The Engineer shall obtain approval for use of these details during the early stages of design from the FBCTRA Project Manager. In addition, these details shall be accompanied by the appropriate general notes, special specifications, special provisions, and method of payment. The Engineer shall retain the responsibility for the appropriate selection of each Standard identified for use within its design.

1.8 Organization of Plan Sheets. The PS&E shall be complete and organized in accordance with the latest edition of the TxDOT *PS&E Preparation Manual*. The PS&E package shall be suitable for the bidding and awarding of a construction contract, and in accordance with the latest FBCTRA's policies and procedures, and TXDOT PS&E Checklist.

1.9 Organization of Design Project Folder and Files (Electronic Project Files). The Engineer shall organize the electronic project files in accordance with the TxDOT's File Management System (FMS) format.

1.10 Underground excavation. If necessary, the Engineer shall contact the Texas Excavation Safety System, Inc. (DIGTESS) or call telephone number 811 to have underground utilities marked prior to digging holes for right of way monuments, utility engineering investigation, geotechnical investigation, or other purposes. The Engineer shall separately contact utilities that are not a part of the DIGTESS organization. The Engineer shall maintain documentation of all notification calls. The Engineer shall comply with Texas' excavation laws.

TASK DESCRIPTIONS AND FUNCTION CODES

The Engineer shall categorize each task performed to correspond with the Function Codes (FC) and Task Descriptions.

FUNCTION CODE 102 (110) – FEASIBILITY STUDIES

REVIEW ROUTE AND DESIGN STUDIES

110.1 Review Data Collection and Field Reconnaissance.
The Engineer shall review the data collected in the schematic phase. The Engineer shall notify the FBCTRA in writing whenever the Engineer finds disagreement with the information or documents**.**

110.2 Design Criteria. The Engineer shall develop the roadway design criteria based on the 4R criteria, design speed, functional classification, roadway class, and any other set criteria as set forth in the TxDOT PS&E Preparation Manual, TxDOT Roadway Design Manual, TxDOT Bridge Design Manual, TxDOT Hydraulic Design Manual, and other deemed necessary State approved manuals. The Engineer shall obtain written concurrence from the FBCTRA prior to proceeding with a design if any questions arise during the design process regarding the applicability of TxDOT's design criteria.

110.3 Geotechnical.

Borings and Investigations:

Based on available project information, geotechnical engineer understands that the proposed Westpark Tollway Extension project entails the following scope. Proposed Westpark Tollway Mainlanes extension starts from STA 130+00 to STA 187+96 approximately 5,796 linear feet and includes a bridge over the Charger Way intersection (with dedicated entry and exit ramp lanes at west locations) and longitudinal and abutment retaining walls (6).

The Charger Way Bridge will be constructed along the Westpark Tollway Extension Mainlanes at the approximate location STA 163 + 20 to STA 166+20.

Based on the preliminary project information, geotechnical engineer proposes drilling thirteen (10) soil borings to depths ranging from 50 to 120 feet below the existing grade to investigate the subsurface soils and groundwater conditions along the project alignment. The borings are generally spaced at a nominal 500-foot spacing, while borings are spaced between 200 to 300 feet or less at locations of critical structures (bridges, embankments, retaining walls, ditch crossings, etc.). Three (3) piezometers two (2) at 25 ft, and one (1) at 50 ft will be installed after drilling and sampling at selected borings. The approximate boring and piezometer locations and proposed depths are shown in the enclosed Proposed Boring and Piezometer Location Plans in the Table below.

Depth to groundwater will be important for the design and construction of the proposed construction. For this reason, borings will be drilled dry to the depth at which groundwater is encountered (provided borehole cave-in does not occur), and the water level will be recorded.

It is proposed to drill a total of thirteen (10) borings. The locations and depth of each Boring are tabulated below:

Borings	**Borings**	Count	Boring Depths, ft	Total, ft.
FBCTRA Tollway Main lanes:	**B-1 to B-4, B-7 to B-10**	8	45	360
Charger Way Bridge	**B-5 & B-6**	2	120	240
Total Count		**10**	**Total Linear**	**600**

Three (3) piezometers at 25 ft to 50 ft depths will be installed after drilling and sampling at selected Borings. The total piezometer footage is 100 linear feet. Water levels in piezometers will be measured 24 hours, 7 days, and 30 days after installation; the piezometers will be pulled out and boreholes will be grouted after the 30-day water level readings.

Piezometers, PZ	**Count**	**Piezometer Depths, ft**	**Total, ft.**
Charger Way Bridge: **PZ-1 at B-4**	**1**	**50**	**50**
Tollway Mainlanes: **PZ-3 at B-1 & PZ-4 at B-12**	**2**	**25**	**50**
		Total	**100**

The Engineer shall determine the location of proposed soil borings for bridge design, embankment settlement analysis, retaining walls, slope stability and along storm drain alignment in accordance with the latest edition of TxDOT's Geotechnical Manual. The Engineer shall perform soil borings (field work), soil testing and prepare the boring logs in accordance with the latest edition of TxDOT's Geotechnical Manual and Houston District's procedures and design guidelines.

1. The Engineer shall perform all geotechnical work in accordance with the latest version of TxDOT's Geotechnical Manual. All testing shall be performed in accordance with the latest version of TxDOT's Manual of Test Procedures. American Society for Testing Materials (ASTM) test procedures can be used only in the absence of TxDOT's procedures. All soil classification shall be done in accordance with the Unified Soil Classification System.
2. If applicable, the Engineer shall perform any retaining wall analyses to include the settlement analysis. This analysis must include the computation of the factor of safety for bearing capacity, global stability, overturning and sliding. In addition, the Engineer shall include allowable bearing pressure, passive earth pressure, friction factor, settlement analysis (consolidation report) and lateral earth pressure for the retaining walls.
3. If applicable, the Engineer shall perform soil borings, rock coring, coring for pavement removal items, piezometric readings, testing and analysis to include slope stability analysis, settlement analysis, and foundation design recommendations for retaining walls, overhead sign structures, along proposed storm sewer alignments, bridges, embankments, and any temporary soil retaining systems.
4. The Engineer shall provide a signed, sealed and dated geotechnical report which contains, but is not limited to, soil boring locations, boring logs, laboratory test results, generalized subsurface conditions, ground water conditions, piezometer data, analyses and recommendations for settlement and slope stability of the earthen embankments, skin friction tables and design capacity curves including skin friction and point bearing. The skin friction tables and design capacity curves must be present for piling and drilled shaft foundation.
5. The Engineer shall sign, seal and date soil boring sheets to be used in the PS&E package. The preparation of soil boring sheets must be in accordance with TxDOT Houston District standards.
6. Foundation Studies: The Engineer shall determine the location of soil borings to be drilled along the retaining wall alignments. The soil borings shall extend a minimum of 35 feet below the footing elevation or deeper as soil conditions warrant. Spacing of soil borings shall not exceed 500 feet. The Engineer shall provide a boring layout for review and comment.
7. The Engineer shall incorporate soil boring data sheets prepared, signed, sealed, and dated by the Geotechnical Engineer. The soil boring sheets shall be in accordance with TxDOT's WINCORE software as can be found on TxDOT's website.

FUNCTION CODE 130 (130) – RIGHT-OF-WAY (ROW) DATA

130.3. Utility Engineering.

A. COORDINATION OF ENGINEERING ACTIVITIES WITH UTILITY FIRM

FUNCTION CODE 145 (145, 164) – MANAGING CONTRACTED/DONATED PE

PROJECT MANAGEMENT AND ADMINISTRATION

The Engineer, in association with the FBCTRA's Project Manager shall be responsible for directing and coordinating all activities associated with the project to comply with FBCTRA policies and procedures, and to deliver that work on time.

- Project Management and Coordination. The Engineer shall coordinate all subconsultant activity to include quality of and consistency of plans and monthly progress reports. The Engineer shall coordinate with necessary local entities.

The Engineer shall:

- :Prepare monthly written progress reports.
- Develop and maintain a detailed project schedule to track project conformance to approved schedule.
- Meet on a scheduled basis with the FBCTRA to review project progress.
- Prepare, distribute, and file both written and electronic correspondence
- Prepare and distribute meeting minutes.
- Document phone calls and conference calls as required during the project to coordinate the work for various team members.
- Coordination with other agencies
- Coordination with adjacent Projects
- Management and coordination with subconsultants
- QA/QC all deliverables

FUNCTION CODE 160 (150) – ROADWAY DESIGN

DESIGN SURVEYS

The Engineer shall coordinate with the Surveyor for data required for project design. The Engineer shall include the *Survey Control Index Sheet* and a *Horizontal and Vertical Control Sheet(s)*, signed, sealed and dated by the professional engineer in direct responsible charge of the surveying and the responsible RPLS, into the plan set. The Engineer's Surveyor shall supplement previous obtained survey data as needed to complete the development of the project design.

Design Surveys include performance of surveys associated with the gathering of survey data for topography, cross-sections, all easements, utilities and other related work in order to design a project, or during layout and staking of projects for construction.

1. PURPOSE
   The purpose of a design survey is to provide field data in support of transportation systems design.

2. DEFINITIONS

A design survey is defined as the combined performance 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 need not be limited to locating existing right-of-way, cross-sections or data to create cross-sections and Digital Terrain Models (DTM), horizontal and vertical location of utilities and improvements, detailing of bridges and other structures, review of right-of-way maps, establishing control points, etc.

3. TASKS TO BE COMPLETED

3.1. Design Surveys

The Engineer's Surveyors shall perform tasks to provided additional survey needed supplement the survey previously performed including, but not limited to the following:

i. Obtain or collect data to create cross-sections and digital terrain models.
ii. Locate existing utilities and easements.
iii. Locate topographical features and existing improvements.
iv. Provide details of existing drainage features, (e.g., culverts, manholes, etc.).
v. Establish additional and verify existing control points. Horizontal and Vertical control ties must be made and tabulated, to other control points in the vicinity, which were established by other sources such as, the National Geodetic Survey (NGS), and the Federal Emergency Management Agency (FEMA), and any other local entities as directed by FBCTRA.
vi. Review right-of-way maps.
vii. Locate boreholes.
viii. Perform hydrographic surveys.
ix. Update existing control data and prepare survey control data sheets for inclusion into a construction plan set.

The Engineer's Surveyors shall also prepare a *Survey Control Index Sheet* and a *Horizontal and Vertical Control Sheet(s)*, signed, sealed and dated by the professional engineer in direct responsible charge of the surveying and the responsible RPLS for insertion into the plan set. The *Survey Control Index Sheet* shows an overall view of the project control and the relationship or primary monumentation and control used in the preparation of the project; whereas, the *Horizontal and Vertical Control sheet(s)* identifies the primary survey control and the survey control monumentation used in the preparation of the project. Both the *Survey Control Index Sheet* and the *Horizontal and Vertical Control Sheet(s)* must be used in conjunction with each other as a set.

The following information shall be shown on the *Survey Control Index Sheet:*

- Overall view of the project and primary control monuments set for control of the project
- Identification of the control points
- Baseline or centerline
- Graphic (Bar) Scale
- North Arrow
- Placement of note *"The survey control information has been accepted and incorporated into this PS&E"* which shall be signed, sealed and dated by a Texas Professional Engineer
- RPLS signature, seal, and date

The following information shall be shown on all *Horizontal and Vertical Control Sheets*:

- Location for each control point, showing baseline or centerline alignment and North arrow.
- Station and offset (with respect to the baseline or centerline alignments) of each identified control point.
- Basis of Datum for horizontal control (base control monument/benchmark name, number, datum).
- Basis of Datum for the vertical control (base control monument, benchmark name, number, datum).
- Date of current adjustment of the datum.
- Monumentation set for Control (Description, District name/number and Location ties).
- Surface Adjustment Factor and unit of measurement.
- Coordinates (State Plan Coordinates [SPC] Zone and surface or grid).
- Relevant metadata.
- Graphic (Bar) Scale.
- Placement of note "*The survey control information has been accepted and incorporated into this PS&E"* which shall be signed, sealed and dated by a Texas Professional Engineer
- RPLS signature, seal and date.

4. TECHNICAL REQUIREMENTS

4.1. Design surveys must be performed under the supervision of a RPLS currently registered with the TBPLS.

4.2. Horizontal ground control used for design surveys, furnished to the Engineer's Surveyor based on acceptable methods conducted by the Engineer's Surveyor, must meet the standards of accuracy required by the State.

Reference may be made to standards of accuracy for horizontal control traverses, as described in the TxDOT Survey Manual, latest edition, or the TSPS Manual of Practice for Land Surveying in the State of Texas, as may be applicable.

4.3. Vertical ground control used for design surveys, furnished to the Engineer's Surveyor based on acceptable methods conducted by the Engineer's Surveyor, must meet the standards of accuracy required by the State.

Reference may be made to standards of accuracy for vertical control traverses, as described in the TxDOT Survey Manual, latest edition, or the TSPS Manual of Practice for Land Surveying in the State of Texas, as may be applicable.

4.4. Side shots or short traverse procedures used to determine horizontal and vertical locations must meet the following criteria:

i. Side shots or short traverses must begin and end on horizontal and vertical ground control as described above.

ii. Standards, procedures, and equipment (may be GPS Equipment, LiDAR, Total Stations, etc.) used must be such that horizontal locations relative to the control may be reported within the following limits:

- Bridges and other roadway structures: less than 0.1 of one foot.
- Utilities and improvements: less than 0.2 of one foot.
- Cross-sections and profiles: less than 1 foot.
- Bore holes: less than 3 feet.

iii. Standards, procedures, and equipment (may be GPS Equipment, LiDAR, Total Stations, etc.) used must be such that vertical locations relative to the control may be reported within the following limits:

- Bridges and other roadway structures: less than 0.02 of one foot.
- Utilities and improvements: less than 0.1 of one foot.
- Cross-sections and profiles: less than 0.2 of one foot.
- Bore holes: less than 0.5 of one foot.

5. AUTOMATION REQUIREMENTS

a. Planimetric design files (DGN) must be fully compatible with the *MicroStation* graphics program without further modification or conversion.

b. Electronically collected and processed field survey data files must be fully compatible with the FBGPTRA's computer systems without further modification or conversion.

c. DTM must be fully compatible with the *OpenRoads civil design* system without further modification or conversion. All DTM must be fully edited and rectified to provide a complete digital terrain model with all necessary break lines.

FUNCTION CODE 160 (160) – ROADWAY DESIGN

ROADWAY DESIGN CONTROLS

The Engineer shall inform the FBCTRA of changes made from previous initial meetings regarding each exception, waiver, and variance that may affect the design. The Engineer shall cease all work under this task until the exceptions, waivers, and variances have been resolved between the Engineer and the FBCTRA unless otherwise directed by the FBCTRA to proceed. The Engineer shall identify, prepare exhibits, and complete all necessary forms for Design Exceptions and Waivers within project limits prior to the 50% Submittal. These exceptions shall be provided to the FBCTRA for coordination and processing of approvals.

A. Refine Schematic.

The Engineer shall review the schematic provided by the FBCTRA to confirm its understanding of the project and to verify completeness and accuracy of the information. The Engineer shall refine the horizontal and vertical alignment of the design schematic in English units for main lanes, ramps, and grade separation structures.

The Engineer shall determine vertical clearances at grade separations and overpasses, taking into account the appropriate percent grade and super-elevation rate. Minor modifications in the alignment must be considered to provide optimal design. Modifications must be coordinated with the FBCTRA and adjacent Engineers. The FBCTRA must approve the refined schematic prior to the Engineer proceeding to the 50% milestone submittal, and prior to starting on the bridge layouts.

B. Develop Preliminary Geometric Project Layout.

- The Engineer shall develop a preliminary geometric project layout (Layout) and a preliminary 3D corridor model for the full length of the project to be reviewed and approved by the FBCTRA prior to the Engineer proceeding with the 50% milestone submittal package.
- The Layout must consist of a planimetric file of existing features and the proposed improvements within the existing and any proposed ROW. The Layout must also include the following features: existing and proposed ROW, existing and proposed horizontal and vertical alignment and profile grade line, cross culverts, lane widths, cross slopes, ditch slopes, pavement structure, clear zone, dedicated right turn lanes, corner clips, retaining walls (if applicable), guard rail (if applicable), and water surface elevations for various rainfall frequencies, etc. Existing major subsurface and surface utilities must be shown on the layout.
- The Engineer shall develop the proposed alignment to avoid the relocation of existing utilities as much as possible. The Engineer shall consider Americans with Disabilities Act (ADA) requirements when developing the layout as well as utilizing the intersection scoring tool. The layout must be prepared in accordance with the current TxDOT *Roadway Design Manual*. The Engineer shall provide horizontal and vertical alignment of the project layout in English units for main lanes. Minor alignment alternatives must be considered to provide for an optimal design. The project layout must be coordinated with the FBCTRA and adjacent Engineers, if any. The Engineer shall also provide proposed and existing typical sections with the profile grade line (PGL), lane widths, cross slopes, ROW lines, ditch shapes, pavement structures, and clear zones depicted, etc.
- The 3D corridor model must be created using Bentley's OpenRoads tools. The 3D corridor model must have enough details to verify the feasibility of the proposed design.

Prior to proceeding with the final preliminary geometric layout, the Engineer shall also present to the FBCTRA for review and approval, alternatives for the design (e.g. flush or raised curb median) with recommendations and cost estimates for each alternative. The Engineer shall also attend all necessary meetings to discuss the outcome of the evaluations of the study.

160.1 Roadway Design.

The Engineer shall use Bentley's OpenRoads 3D Design technology in the design and preparation of the roadway plan sheets, using the version of MicroStation OpenRoads Designer and/or MicroStation Connect Edition that are implemented at TxDOT at the time. However, FBCTRA may approve the use of other versions.

The Engineer shall provide roadway plan and profile drawings using CADD standards as required by the FBCTRA. The drawings must consist of a planimetric file of existing features and files of the proposed improvements. The roadway base map must contain line work that depicts existing surface features obtained from the schematic drawing. Existing major subsurface and surface utilities must be shown if requested by the FBCTRA. Existing and proposed right-of-way lines must be shown. Depending on the width of the pavement, the plan view and profile view may be shown on separate sheets or the same sheets for main lanes, frontage roads.

The plan view must contain the following design elements:

1. Calculated roadway centerlines for mainlanes, ramps, and frontage roads, as applicable. Horizontal control points must be shown. The alignments must be calculated using OpenRoads horizontal geometry tools.
2. Pavement edges for all improvements (mainlanes, ramps, and frontage roads, if applicable).
3. Lane and pavement width dimensions.
4. The geometrics of ramps.
5. Proposed structure locations, lengths, and widths.
6. Direction of traffic flow on all roadways. Lane lines and arrows indicating the number of lanes must also be shown.
7. Drawing horizontal scale must be 1" =100'
8. Control of access line, ROW lines, and easements.
9. Begin and end superelevation transitions and cross slope changes.
10. Limits of riprap, block sod, and seeding.
11. Existing utilities and structures.
12. Benchmark information.
13. Radii call outs, curb location, Concrete Traffic Barrier (CTB), guard fence, crash safety items and *American with Disabilities Act Accessibility Guidelines (ADAAG)* compliance items.

The profile view must contain the following design elements:

1. Calculated profile grade line (PGL) for proposed mainlanes (cite direction), ramps, and frontage roads, if applicable. Vertical curve data, including "K" values must be shown. The profiles must be calculated using OpenRoads vertical geometry tools.
2. Existing and proposed profiles along the proposed centerline of the mainlanes, the outside shoulder line of ramps.
3. Water surface elevations at major stream crossing for 2, 5, 10, 25, 50, and 100-year storms.
4. Calculated vertical clearances at grade separations and overpasses, taking into account the appropriate superelevation rate, superstructure depth and required clearance.
5. The location of mainlanes, grade separations and ramps, and cross sections of any proposed or existing roadway, structure, or utility crossing.
6. Drawing vertical scale must be 1" =10'.

160.2 Typical Sections. The Engineer shall prepare typical sections for all proposed and existing roadways and structures. Typical sections must include width of travel lanes, shoulders, outer separations, border widths, curb offsets, and ROW. The typical section must also include PGL, centerline, pavement design, longitudinal joints, side slopes, sodding or seeding limits, concrete traffic barriers and sidewalks, if required, station limits, common proposed and existing structures including retaining walls, existing pavement removal, riprap, limits of embankment and excavation, etc.

160.3 Mainlane Design. The Engineer shall provide the design of mainlanes with full shoulders, entrance and exit ramps. The design must be consistent with the approved schematic or refined schematic and the current TxDOT *Roadway Design Manual*.

160.4 Cut and Fill Quantities.

A. The Engineer shall develop an earthwork analysis to determine cut and fill quantities and provide final design cross sections at 100 feet intervals. Cross sections must be created from the 3D corridor model and must be delivered in the standard TxDOT format on 11”x17” sheets or roll plots and electronic files. The Engineer shall provide all templates and corridors used to generate the design cross sections. Cross sections and quantities must include existing pavement removals. Annotation must include, at a minimum, existing and proposed ROW, side slopes (front & back), profiles, etc.

B. The Engineer shall submit 1 set of drawings specified at the 50%, and 90%, and final submittals, respectively. The Engineer shall submit the current OpenRoads generated 3D corridor model for each submittal.

160.5 Plan Preparation.

A. The Engineer shall prepare roadway plans, profiles, and typical sections for the proposed improvements. Prior to the 50% submittal, the Engineer shall schedule a workshop to review profiles, OpenRoads 3D corridor models, and cross-sections with the FBCTRA. The profile and cross sections must depict the 2, 5, 10, 25, 50, 100, and 500-year (if available) water surface elevations. The drawings must provide an overall view of the roadway and existing ground elevations with respect to the various storm design frequencies for the length of the project. This will enable the FBCTRA to determine the most feasible proposed roadway profile. The Engineer shall not proceed with developing subsequent submittals until the FBCTRA has approved the proposed profiles, 3D corridor models, and cross sections.. The roadway plans must consist of the applicable types of sheets necessary for the project and be organized in the sequence as described in the TxDOT *PS&E Preparation manual*.

FUNCTION CODE 160 (161) – ROADWAY DESIGN

DRAINAGE DESIGN

161.1. Data Collection. The Engineer shall provide the following data collection services:

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. Particular sources of data collected must include, but are not limited to, the State, County, and FEMA.
3. Review survey data and coordinate any additional surveying needs with county.
4. Meet with local government officials to obtain historical flood records. Obtain frequency of road closure and any additional high-water information from the County Maintenance office.
5. Review the Drainage Study – The Engineer shall review the final drainage study performed by DEC for the Westpark Tollway Extension Hydraulic Impact Report in June of 2022. This analysis shall determine if the drainage study complies with the drainage criteria established by the State. The analysis must include the assessment of the hydrologic and hydraulic models prepared for the previous drainage study.
    i. Data collection will be included in the Drainage Report to be submitted to the State Project Manager detailing completion.

161.2 Hydrologic Studies.

The Engineer shall conduct hydrologic analysis for the limits of project roadway, the contributing drainage area to the roadway and cross drainage structures that includes four outfalls. This analysis shall incorporate a thorough evaluation of the methodology available, comparison of the results of two or more methods, and calibration of results against measured data. The analysis shall consider the pre-construction (existing) and post-construction (proposed) conditions. Specific scope of work includes the following:

1. Delineate existing conditions drainage area boundaries for the approximately 0.79 miles of roadway Right of Way (ROW) and contributing drainage areas to the existing three cross drainage structures. This includes delineation of drainage areas to each crossing / outfall as well as further delineation of sub-drainage areas specific to each existing and proposed ditch / storm sewer. Ex-isting hydrologic studies will not be used without Engineer's assessment of validity.
2. Determine existing conditions hydrologic parameters such as impervious covered areas, overland flow paths and slopes from appropriate sources including but not limited to topographic maps, GIS modeling, the National Land Cover Dataset (NLCD), and construction plans and existing hydrologic studies. Hydrologic parameters will be calculated for approximately 0.79 miles of existing roadway ROW and contributing drainage area to the three cross drainage structures. This includes the larger drainage areas to each crossing / outfall as well as sub-drainage areas specific to each existing and proposed ditch / storm sewer.
3. Update the available hydrologic studies with Atlas 14 rainfall.
4. Calculate existing conditions discharges using appropriate hydrologic methods. Include at a minimum, the "design" frequency to be specified by the State and the 1% Annual Exceedance Probability (AEP) storm frequency. It may be required to include the full range of frequencies (50%, 20%, 10%, 4%, 2%, 1%, and 0.2% AEP). This includes development of both peak flows and full hydrographs.
5. Delineate proposed conditions drainage area boundaries for the proposed approximately 0.79 miles of roadway ROW and contributing drainage areas to the proposed three cross drainage structures. This includes delineation of drainage areas to each crossing / outfall as well as further delineation of sub-drainage areas specific to each existing and proposed ditch / storm sewer.
6. Determine proposed conditions hydrologic parameters such as impervious covered areas, overland flow paths and slopes from appropriate sources including but not limited to topographic maps, GIS modeling, and construction plans and existing hydrologic studies. Hydrologic parameters will be calculated for the approximately 0.79 miles of proposed roadway ROW and contributing drainage area to the three cross drainage structures.
7. Calculate proposed conditions discharges using appropriate hydrologic methods. Include at a minimum, the "design" frequency to be specified by the State and the 1% AEP storm frequency. It may be required to include the full range of frequencies (50%, 20%, 10%, 4%, 2%, 1%, and 0.2% AEP). This includes development of both peak flows and full hydrographs.

161.3 Hydraulic Studies - Cross-Drainage Structures.

Cross- Structures - The Engineer shall analyze 3 cross drainage structures. To accommodate the proposed roadway improvements, it is assumed that the existing cross-culverts will maintain the alignment and existing bridge crossings will be widened at a minimum. Both cross-culverts and bridge structures may also need to be expanded / reconstructed to increase capacity and accommodate the proposed improvement. This scope of work does not include the detailed design of outfall improvements within the Harris County Flood Control (HCFCD) ROW, outside of the State ROW, except for ditch outfall transitions of cross drainage culvert structures to the existing ditch. Hydraulic analysis will be performed for the following structures and following services will be provided:

Structure Number	Station	Listed Size*
2b	147+50	3 – 8'x4'
2c	152+00	2- 7'x4'
3	185+00	1 – 3'x2'

*Structure sizes are from the schematic drainage study.

Determine drainage areas and existing and proposed conditions peak flows at each crossing, based on the hydrologic analysis performed as part of Task 161.2 (FC 160(161) Roadway Design).

Develop a hydraulic model for each crossing, in HEC-RAS, and determine a reasonable downstream tailwater condition based on information available. The hydraulic model developed for the crossings in the previous design build study will be reviewed and modified based on survey information if needed and will be used as the "base model" for the crossing analysis.

Determine the existing conditions 2-, 5-, 10-, 25-, 50-, 100-, and 500-year, water surface elevations at each crossing.

The Engineer shall prepare roadway plans and profile for the proposed improvements along SH 99 lanes (at grade only). Prior to the 50% submittal the Engineer shall schedule a workshop to review profile with the State. The profiles shall depict the water surface elevations at the cross-drain structures, for the Atlas 14 rainfall 10, 25, 50, 100, and 500-year storm events (if available). The drawings must provide an overall view of the roadway and existing ground elevations with respect to the various storm design frequencies for the length of the project. This must enable the State to determine the most feasible proposed roadway profile.

Analyze each crossing to determine recommended proposed size / configuration for each drainage crossing. The improvements may include extending, adjusting, or replacing culvert crossings. Analysis recommendations should accommodate the proposed roadway design and minimize the interference with the passage of traffic or cause damage to the highway and local property in accordance with the TxDOT *Hydraulic Design Manual*, District criteria, Hydraulic Design Series 5 (HDS 5), and any specific guidance provided by the State.

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 culvert crossings for events up to an including the 1% AEP storm. If necessary, mitigation measures shall be presented, along with the advantages and disadvantages of each. Each method must consider the effects on the entire area.

161.4 Hydraulic Studies – Roadway Impact Analysis

The Engineer shall analyze ditches / storm drains for approximately 0.79 miles of roadway, with approximately 3 crossings, using software approved by the State. Most of the roadway is anticipated to be drained by roadside diches. However, storm sewer may be utilized in developed areas, if feasible. Hydraulic analysis of the existing and proposed ditch / storm sewer system, including any necessary

in-line or off-line detention, will be performed using EPA-SWMM. Specific scope of work includes the following:

Determine existing and proposed peak flows and hydrographs for each ditch / sewer section, based on the hydrologic analysis performed as part of Task 161.2. The location of the flows will be determined based on the hydraulic layout of the link and node EPA-SWMM model as to not double count routing and appropriately apply flow hydrographs to the model.

Develop preliminary detention needs for the project based on the difference in runoff volumes between existing and proposed conditions to help determine the ROW needs for the project. It is anticipated that all detention will be accounted for in the existing ROW.

Develop existing conditions EPA-SWMM model for each of the approximately 3 crossings, including equalizer crossings. The EPA-SWMM model shall include median / roadside ditches and culverts connecting ditches and shall terminate at the cross-drainage structure, which will be modeled using HEC-RAS. The EPA-SWMM model developed during the previous design build study will be reviewed and modified, if needed and will be incorporated as the existing condition model.

Determine existing conditions tailwater elevation at each of the five outfalls based on the HEC-RAS models developed for each cross-drainage structure. The design water surface elevation at each cross-drainage structure will be the starting basis for the analysis of the existing ditch system.
Assess existing drainage system in EPA-SWMM to determine existing conditions discharges to cross drainage structures and the existing hydraulic grade line through the drainage system.

Develop proposed conditions EPA-SWMM model for each of the approximately 3 crossings including equalizer crossings. The EPA-SWMM model shall include median / roadside ditches, culverts connecting ditches, trunk line storm sewer components, and shall terminate at the cross-drainage structure, which will be modeled using HEC-RAS.

Determine proposed conditions tailwater elevation at each of the four (4) outfalls based on the HEC-RAS models developed for each cross-drainage structure. The design water surface elevation at each cross-drainage structure will be the starting basis for the analysis of the proposed ditch / storm sewer system.

Assess proposed drainage system in EPA-SWMM to determine proposed conditions discharges to cross drainage structures and the proposed hydraulic grade line through the drainage system. Proposed drainage improvements shall minimize the interference with the passage of traffic or incur damage to the highway and local property in accordance with the State’s Hydraulic Design Manual, District Criteria, and any specific guidance provided by the State.

Optimize proposed drainage system in EPA-SWMM to meet design criteria and to limit discharge into outfalls to the capacity of the system, which will be determined by the Engineer. Typically, this will involve not increasing proposed discharges above existing discharges. Optimization will include, when possible, the use of in-line detention within the ditch / storm sewer system, with discharges controlled by restrictors or similar structures at interim culverts and outfalls. The Engineer shall also evaluate alternative flow routes, if necessary, to relieve system overload. Detention requirements shall be coordinated with the State. Unsteady hydrograph routing within EPA-SWMM will be performed to assess no adverse impact in both the 10% and 1% events.

Conduct a 1% AEP sheet flow analysis using the EPA-SWMM model for both existing and proposed conditions.

161.5 Ditch And Storm Drain Design.

The Engineer shall develop design details that minimize the interference with the passage of traffic or incur damage to the highway and local property. The Engineer shall provide layouts, drainage area maps, and design of all drainage components. The Engineer shall design all conventional storm drainage and cross drainage in conformance with the latest edition of TxDOT *Hydraulic Design Manual*, Houston District criteria, and any specific guidance provided by the State.

The storm drains trunk lines, laterals and inlets for main lanes, including retaining walls, will be designed for a 10% event using Geopak Drainage or OpenRoads Designer-DU software. The storm drain trunk lines, laterals and inlets for frontage roads and ramps will be designed to a 10% event. Engineer shall create 3D corridor model where ditches and detention ponds are proposed using OpenRoads Designer. The Engineer shall coordinate with the State and designers of adjacent projects to check that all proposed drainage systems accommodate the proposed construction phasing plan.

The Engineer shall perform the following:

- Delineate drainage areas for main lanes, retaining walls, bridges, and cross streets.
- Determine proposed peak flows for subcomponents of the drainage system (main lanes, retaining walls, bridges, and cross streets).
- Detailed drainage system design / calculations for the main lanes, retaining walls, and bridges (trunk lines, laterals, inlets, cross culverts, and ditches).
- Detailed drainage system design / calculations for cross streets (trunk lines, laterals, inlets, cross culverts, and ditches).

161.7 Plans, Specifications and Estimates (PS&E) Development for Hydraulics.

The Engineer shall provide the following services:

1. Prepare the PS&E package in accordance with the applicable requirements of TxDOT's specifications, standards, and manuals, including the TxDOT *PS&E Preparation Manual*. Include the following sheets and documents, as appropriate:
    a. Hydraulic Data Sheets
    b. Storm Drain Plan/Profile Sheets including profile grade line of parallel ditches
    c. Storm Sewer Lateral Sheets
    d. All other relevant sheets
2. Identify areas requiring trench protection, excavation, shoring, and de-watering.
3. Prepare overall drainage area maps
4. Prepare drainage area maps with hydrologic calculations.
5. Prepare plan and profile sheets for outfall ditches.
6. Select any necessary standard details from TxDOT's list of standards for items such as inlets, manholes, junction boxes, and end treatments.
7. Prepare details for non-standard inlets, manholes, and junction boxes.
8. Prepare drainage details for outlet protection, outlet structures, and utility accommodation structures.
9. Identify pipe strength requirements.
10. Prepare drainage facility quantity summaries.
11. Consider pedestrian facilities, utility impacts, driveway grades, retaining wall, and concrete traffic barrier drainage impacts.
12. Identify existing ground elevation profiles at the ROW lines on storm sewer plan and profile sheets.
13. Prepare Hydraulic Data Sheets for two cross drainage structures at Station 2209+00 and Station 2356+00.

14. The Engineer shall create a 3D corridor model for the proposed drainage structures and ditches with appropriate feature definitions using ORD-DU. The Engineer shall verify the following items before submitting the 3D corridor model to the State:
    i. The 3D model is accurate and is matching with the proposed drainage design and also show a tie in to the existing ditches wherever necessary.
    ii. The drainage features are properly connected to the roadway features and elements including cross section annotation. In addition, a list of the drainage model feature definition points should be provided.
    iii. Cross sections at 50-foot intervals must be generated, reviewed for accuracy and provided for TxDOT to review prior to delivery of the final ditch 3D corridor model.
15. Develop layouts for the following:
    i. Bridge deck drainage systems, including internal drainage piping within the bents where required on structures (one main lane bridge structures).

161.8 Drainage Report.

The Engineer shall provide the following services:

The Engineer shall prepare a single comprehensive drainage report of the project area, signed, sealed, and dated by a registered or licensed engineer. The drainage report must include applicable hydrologic and hydraulic models such as HY-8, ORD-DU, HEC-RAS, HEC-HMS, EPA-SWMM, and other applicable modeling tools. This modeling must evaluate existing versus proposed conditions. This shall include a draft report and a final report which addresses comments provided by the State. The drainage report shall include, at a minimum, the following sections:

- Introduction: location, study objectives, general creek and watershed information, and other pertinent facts.
- Hydrology: watershed description, soil and land use information, south of hydrologic data and methodology or models used to develop flow data, pertinent input data and parameters of hydrologic analyses, summary table of results for a full range of peak discharges.
- Hydraulics: overview of hydraulic modeling process, including data sources, specific model used, description of existing structures, drainage system characteristics, and other pertinent facts such as the sources of models; discussion of design alternatives and the results of respective hydraulic modeling for the scenarios evaluated; hydraulic model output data for existing and proposed conditions.
- Summary of Conclusions / Recommendations: summary of study objectives, alternatives considered, analysis findings, and recommended solutions.
- Exhibits: including at a minimum, location map, topography map, drainage area map, land-use map, EPA-SWMM exhibits with node and link diagram, and FEMA FIRM.
- Appendices: meeting minutes, detailed hydrologic calculations, models, model output files, photographs, and other pertinent information.
- PDF of full report and exhibits and all appendices (including hydrologic and hydraulic models).

FUNCTION CODE 160 (162) – ROADWAY DESIGN

SIGNING, PAVEMENT MARKINGS, AND SIGNALIZATION (PERMANENT)

162.1. Prepare Signing and Pavement Marking Quantities

162.2. Signing. The Engineer shall prepare drawings, specifications, and details for all signs. The Engineer shall coordinate with the FBCTRA (and other Engineers as required) for overall temporary,

interim, and final signing strategies and placement of signs outside contract limits. The Engineer shall:

- Prepare sign detail sheets for large guide signs showing dimensions, lettering, shields, borders, corner radii, etc., and shall provide a summary of large and small signs to be removed, relocated, or replaced.
- Designate the shields to be attached to guide signs.
- Illustrate and number the proposed signs on plan sheets.
- Select each sign foundation from TxDOT Standards.

162.3. Pavement Markings. The Engineer shall detail both permanent and temporary pavement markings and channelization devices on plan sheets. The Engineer shall coordinate with the FBCTRA (and other Engineers as required) for overall temporary, interim, and final pavement marking strategies. The Engineer shall select Pavement markings from the latest TxDOT standards.

The Engineer shall provide the following information on signing and pavement marking layouts:

- Roadway layout
- Center line with station numbering
- Designation of arrow used on exit direction signs
- Culverts and other structures that present a hazard to traffic
- Location of utilities
- Existing signs to remain, be removed, be relocated, or be replaced
- Proposed signs (illustrated, numbered, and showing sign size)
- Proposed overhead sign bridges to remain, to be revised, removed, relocated, or replaced
- Proposed overhead sign bridges, indicating location by plan
- Proposed markings (illustrated and quantified) which include pavement markings, object markings, and delineation
- Quantities of existing pavement markings to be removed
- Proposed delineators, object markers, and mailboxes
- The location of mainlanes, grade separations, frontage roads, and ramps
- The number of lanes in each section of proposed highway and the location of changes in numbers of lanes
- Right-of-way limits
- Direction of traffic flow on all roadways

FUNCTION CODE 160 (163) – ROADWAY DESIGN

MISCELLANEOUS

163.1. Illumination.. The Engineer shall refer to the TxDOT Highway Illumination Manual and other deemed necessary FBCTRA approved manuals for design of continuous lighting and safety lighting for all conventional, high-mast, and underpass lighting. The Engineer shall include safety lighting as part of

each design on each flashing beacon and traffic signal. The Engineer shall provide a preliminary layout for initial review and approval by the FBCTRA. The Engineer shall prepare circuit wiring diagrams showing the number of luminaires on each circuit, electrical conductors, length of runs, and service pole assemblies. Underpass lighting must be used on all structures within each project. The Engineer shall integrate existing illumination within the project limits into the proposed design. The Engineer shall coordinate with the FBCTRA to determine the location of proposed conventional, and underpass lighting. The Engineer shall provide illumination design for the following locations:

- Tollway centerline barrier mounted illumination from approximately Station 146+50 to 187+960
- Underpass Lighting Under Charger Way Bridge

163.2. Compute and Tabulate Quantities. The Engineer shall provide the summaries and quantities within all formal submittals.

163.3. Storm Water Pollution Prevention Plans (SWP3). The Engineer shall develop SWP3, on separate sheets from (but in conformance with) the TCP, to minimize potential impact to receiving waterways. The SWP3 must include text describing the plan, quantities, type, phase, and locations of erosion control devices and any required permanent erosion control.

163.4. Traffic Control Plan, Detours, and Sequence of Construction. The Engineer shall prepare Traffic Control Plans (TCP) including TCP typical sections, for the project. A detailed TCP must be developed in accordance with the latest edition of the *TMUTCD*. The Engineer shall implement the current Barricade and Construction (BC) standards and TCP standards as applicable. The Engineer shall interface and coordinate phases of work, including the TCP, with adjacent Engineers. The Engineer shall:

1. Provide a written narrative of the construction sequencing and work activities per phase and determine the existing and proposed traffic control devices (regulatory signs, warning signs, guide signs, route markers, construction pavement markings, barricades, flag personnel, temporary traffic signals, etc.) to be used to handle traffic during each construction sequence. Show proposed traffic control devices for at-grade intersections during each construction phase (stop signs, flag personnel, signals, etc.). Show temporary roadways, ramps, structures (including railroad shoo-fly), and detours required to maintain lane continuity throughout the construction phasing. If temporary shoring is required, prepare layouts and show the limits on the applicable TCP.
2. Assist the FBCTRA in coordinating mitigation of impacts to adjacent schools, emergency vehicles, pedestrians, bicyclists, and neighborhoods.
3. Develop each TCP to provide continuous, safe access to each adjacent property during all phases of construction and to preserve existing access. Notify the FBCTRA in the event existing access must be eliminated and receive approval from the FBCTRA prior to elimination of any existing access.
4. Design temporary drainage to replace existing drainage disturbed by construction activities or to drain detour pavement. Show horizontal and vertical location of culverts and required cross sectional area of culverts.
5. Prepare each TCP in coordination with the FBCTRA. The TCP must include interim signing for every phase of construction. Interim signing must include regulatory, warning, construction,

route, and guide signs. Interface and coordinate phases of work, including the TCP, with the engineers that are responsible for the preparation of the PS&E for adjacent projects.

6. Maintain continuous access to abutting properties during all phases of the TCP. Develop a list of each abutting property along the roadway alignment. Prepare exhibits , as requested by the FBCTRA.
7. Make every effort to prevent detours and utility relocations from extending beyond the proposed right-of-way lines. If it is necessary to obtain additional permanent or temporary easements and right-of-entry, notify the FBCTRA in writing of the need and justification for such action. Identify and coordinate with all utility companies for relocations required.
8. Describe the type of work to be performed for each phase of the sequence of construction and any special instructions (e.g. storm drain, culverts, bridges, railing, illumination, signals, retaining walls, signing, paving surface sequencing or concrete placement, ROW restrictions, utilities, etc.) that the contractor should be made aware of, including limits of construction, obliteration, and shifting or detouring of traffic required prior to beginning the subsequent phase.
9. Include the work limits, the location of channelizing devices, positive barrier, location and direction of traffic, work area, stations, pavement markings, and other information deemed necessary for each phase of construction.
10. Identify and delineate any outstanding ROW parcels.
11. Delineate areas of wetlands on traffic control plans.

163.5. Retaining Walls and Miscellaneous Structures. The Engineer shall develop each retaining wall design and determine the location of each soil boring needed for the foundation design of each retaining wall in accordance with the TxDOT *Geotechnical Manual*. Prior to preparation of retaining wall layouts, the Engineer shall prepare a comparative cost analysis of different types of retaining walls versus roadway embankment, pavement, soil stabilization, retaining wall types, and available ROW to determine optimum selection based on economics, construction time duration, ROW encroachments (need for construction easements), and construction feasibility. The Engineer shall submit the retaining wall layouts to obtain approval from the FBCTRA early in the plan preparation process. The Engineer shall incorporate all necessary information from above referenced manuals and respective checklists into the retaining wall layouts. For stage construction, the Engineer shall indicate limits of existing retaining walls for removal and reconstruction and determine limits of temporary retaining walls to be shown on the TCP.

For projects that have retaining walls, the Engineer shall develop the retaining wall layouts in the 3D corridor model.

The approximate limits of each retaining wall must be based on station or length. The Engineer shall notify the FBGPTRA of the type of retaining walls that will be used for each cut and fill location.

Retaining wall types considered by the Engineer must include:

- Mechanically Stabilized Earth (MSE) Walls. The Engineer shall prepare the retaining wall layouts showing plan and profile or retaining walls for design by a TxDOT approved vendor. The Engineer is responsible for design of geometry and wall stability. The Engineer shall incorporate a slope of 4:1 or flatter from the existing and finished ground line elevation to the face of the retaining wall.

The Engineer shall provide layouts (scale 1” =100’), elevations, quantity estimate, summary of quantities, typical cross sections, and structural details of all retaining walls within the project. If available, approximate lengths of the retaining walls as shown on the schematic will be specified in the

work authorization. The Engineer shall determine if any additional walls are required and verify the need for and length of the retaining walls as shown on the schematic.

If applicable, FBCTRA will provide architectural standard drawings for the retaining walls. The Engineer shall incorporate architectural standard drawings into the design details.

Retaining Wall Plan Requirements. The Engineer shall provide the following information in the retaining wall plans:

1. Layout Plan
    a. Designation of reference line
    b. Beginning and ending retaining wall stations
    c. Offset from reference line
    d. Horizontal curve data
    e. Total length of wall
    f. Indication of face of wall
    g. All wall dimensions and alignment relations (alignment data as necessary)
    h. Soil boring locations
    i. Drainage, signing, lightning, etc. that is mounted on or passing through the wall
    j. Subsurface drainage structures or utilities that could be impacted by wall construction
2. Elevation
    a. Top of wall elevations
    b. Existing and finished ground line elevations
    c. Vertical limits of measurement for payment
    d. Type, limits, and anchorage details of railing (only required if traffic railing foundation standard is not being used on the project)
    e. Top and bottom of wall profiles plotted at correct station & elevation
    f. Underdrains
    g. Any soil improvement, if applicable
    h. Drainage, signing, lighting etc. as noted above
    i. Drainage structures and utilities as noted above
3. Sectional View
    a. Reinforced volume
    b. Underdrain location
    c. Soil improvements, if applicable
4. General Guidelines for Retaining Walls
    a. The Engineer shall perform design calculations to check the external stability of the walls including slope stability, bearing, sliding, and overturning and provide detail drawings in accordance with the standard requirements of the Toll Road Authority

b. For retaining wall submittals, the Engineer shall follow the current requirements shown on the TxDOT Bridge Division website.

FUNCTION CODE 160 (170) – ROADWAY DESIGN

BRIDGE DESIGN

170.1. Bridge Layout. The Engineer shall prepare a bridge layout plan sheet for bridge. The Engineer shall determine the location of each soil boring needed for foundation design in accordance with the TxDOT *Geotechnical Manual*.

The Engineer shall submit a bridge layout early in the plan preparation process to obtain approval from FBCTRA. The Engineer shall render bridge, to the appropriate level of detail, in the 3D corridor model. The Engineer shall comply with all relevant sections of the latest edition of the TxDOT *Bridge Design Manual - LRFD*, TxDOT *Bridge Project Development Manual*, TxDOT *Bridge Detailing Guide, and AASHTO LRFD Bridge Design Specifications*, and respective checklists. Each bridge layout sheet must include bridge typical sections, structural dimensions, abutment and bent locations, and superstructure and substructure types. The Engineer shall locate and plot all soil borings and utilities, show proposed retaining walls, and, for staged construction, indicate limits of existing bridge for removal and reconstruction.

- Bridge layout must include the following:

1 Plan View

- Horizontal Curve data
- Bearing of alignment
- Bridge skew angles
- Control Stations at the beginning and end of structures
- Dimensioned widths of bridge, roadway, rail, and shoulders
- Type and limits of riprap
- Location of profile grade line
- Direction of flow
- North arrow
- Roadway functional class
- Design Speed
- Traffic data
- Existing and proposed structure numbers
- Cross-slope and superelevation data
- Traffic flow directional arrows
- Railing type
- Bent stations and bearings
- Retaining wall locations

- Approach pavement crown width
- Typical bridge section showing beam type and spacing
- Joint and seal type and spacing
- Locations of soil borings
- Any other information required in the TxDOT Bridge Project Development Manual,
- TxDOT Bridge Design Manual, and TxDOT Bridge Detailing Guide
    - 2. Profile View

  Profile grade
- Vertical curve data
- Finished roadway elevation at beginning and end of bridge
- Overall structure length
- Type and overall length of railing
- Existing and proposed ground lines clearly labeled
- Profile view grid elevations and stations
- Station of structure compatible with grid stations
- Applicable standard titles
- Type of riprap
- Type of foundation; number, size, length and loading information of foundation elements
- Length and type of span unit
- Bent numbers
- Bearing seat elevations
- Soil bore data
- Fixed or expansion condition at each beam end
- Column heights
- Any other information required in the TxDOT Bridge Project Development Manual, TxDOT Bridge Design Manual, and TxDOT Bridge Detailing Manual

170.2. Bridge Detail Summary. The Engineer shall prepare total bridge quantities, estimates, and summary sheets for each bridge and bridge class culvert.

170.3. Bridge Structural Details. The Engineer shall prepare each structural design and develop detailed structural drawings of all required details in compliance with above-listed manuals and guidelines. The Engineer shall assemble and complete all applicable FBCTRA Standard Details sheets.

Additionally, the Engineer shall:

- Perform calculations for design of bridge abutments.
- Perform calculations for bridge slab design.
- Perform calculations to determine elevations of bridge substructure and super structure elements.

- Perform calculations for bridge box beam design.
- Prepare necessary foundation details and plan sheets.
- Prepare plan sheets for abutment design.
- Prepare plan sheets for additional abutment details.
- Prepare framing plan and slab plan sheets.
- Compute and prepare tables for slab and bearing seat elevations, dead load deflections, etc.
- Design beams and prepare beam design tables.
- Prepare special provisions and special specifications in accordance to the above-listed manuals and guidelines.

DESIGN VERIFICATION, CHANGES, AND ALTERATIONS

351.1. Construction Phase Services

DESIGN DELIVERABLES

DELIVERABLES FOR PS&E DEVELOPMENT

The Engineer shall submit the following deliverables to the FBCTRA:

DEL.1. Reports.

Letter Report

- The Engineer shall prepare a letter report which includes the preliminary findings. The report must also include conceptual and generic discussions of the alternatives considered, along with a comparative cost associated with each alternative and a recommended solution.
- Recommendations at this point must be generic and conceptual in nature, mainly for discussions with the FBCTRA and the local government entities. The recommended solution must be analyzed in detail to reflect the mitigation requirements for the roadway development. Cross-Drainage Structure reports must include existing hydraulic conditions, FEMA floodplain status, proposed structure design, and proposed hydraulic conditions, preliminary detention storage volumes (if required) based on hydrograph and initial recommendations on how to mitigate the storm impact on the receiving streams.

Draft Hydraulic Report

- The Engineer shall submit three copies of a draft Hydraulic Report for review and comment. The report must document and justify all data, boundary conditions, assumptions, methodologies, and results. The text, tables, exhibits, and appendices must document clearly and concisely the work performed and results found. The report must provide recommendations for critical review by the FBCTRA. Such recommendations may include corrective actions by the FBCTRA, corrective actions by others, or need for further detailed analysis such as an unsteady model analysis or the development of mitigation measures. The text, tables, exhibits, and appendices (including computer models) must be saved on a compact disc and included with each report.

Assume one round of comments will be provided by the FBCTRA for draft reports. The Engineer shall address all FBCTRA comments.

Final Hydraulic Report

- The Engineer shall submit four originals of the finalized Hydraulic Report. The final report must be signed and sealed by a Professional Engineer.

DEL.2. Plans.

The Engineer shall provide the following information at each submittal:

1. 50% Plans Submittal
   - 1.1 One (1) pdf set of 11" x 17" plan sheetss for the FBCTRA review.
   - 1.2 Estimate of construction cost.
   - 1.3 Engineer's internal QA and QC marked up set.
   - 1.4 One set of a roll format TCP phasing layouts, one .pdf of plan sheets for TCP concept, for the FBCTRA review.
   - 1.5 A preliminary 3D model, in the most current format, created using Bentley's OpenRoads tools, and with detail to verify the design of the 60% plan sheets. The level of detail of the surface and subsurface features will be at the direction of the FBCTRA.
2. FBCTRA Bridge Review
   - 2.1 One (1) pdf set of 11" x 17" Bridge Layouts
   - 2.2 A preliminary 3D corridor model, in the most current format, created using Bentley's OpenRoads tools, and with enough detail to verify the design of the Bridge layouts.
3. Review Submittal (90%)
   - 3.1 One (1) set of 11" x 17" plan sheets for the FBCTRA Review.
   - 3.2 Estimate of construction cost.
   - 3.3 Construction schedule.
   - 3.4 New Special Specifications and Special Provisions with Form 1814, if applicable.
   - 3.5 Engineer's internal QA and QC marked up set.
   - 3.6 List of governing Specifications and Special Provisions
   - 3.7 Marked up general notes
   - 3.8 Other supporting documents.
4. Final submittal (100%)
   - 4.1 One (1) set of 11" x 17" plan sheets for the FBCTRA Review.
   - 4.2 Revised supporting documents from 90% review comments.
   - 4.3 A final 3D corridor model, in the most current format, created using Bentley's OpenRoads tools. The level of detail of the surface and subsurface features will be at the direction of the FBCTRA.
   - 4.4 A final 3D earthwork model in either .XML or .ICM format (as directed by the FBCTRA) created using Bentley's OpenRoads tools. The level of detail of the surface and subsurface features will be at the direction of the Toll Road Authority.

DEL.3. Electronic Copies.

The Engineer shall furnish the FBCTRA with electronic files of the final plans in the format of the current CADD system used by the FBCTRA, .pdf format, and in the FBCTRA's File Management System (FMS) format.

The Engineer shall also provide a separate electronic files containing cross section information (in dgn, XLR, & ASCII formats) for the FBCTRA's construction contractor to use.

The Engineer shall provide an electronic copy of the Primavera file or the latest scheduling program used by the FBCTRA for the construction time estimate.

DEL.4. Calculations.

The Engineer shall provide the following:

A 3-ring binder with all quantity and non-structural design calculations.

A bound copy of all engineering calculations, analysis, input calculations, quantities, geometric designs (OpenRoads Designer and/or OpenBridge Designer files), etc. relating to the project's structural elements. Project structural elements include, but are not limited to: bridges, retaining walls, overhead sign foundations, high-mast illumination foundations, non-standard culverts, custom headwalls, and drainage appurtenances.

Working copies of all spreadsheets and output from any programs utilized in a electronic file in a universally reliable format.

The Engineer may provide the calculations in .pdf format in lieu of the bound hard copies. The .pdf file should be submitted on a USB flash drive or in ProjectWise (if applicable).

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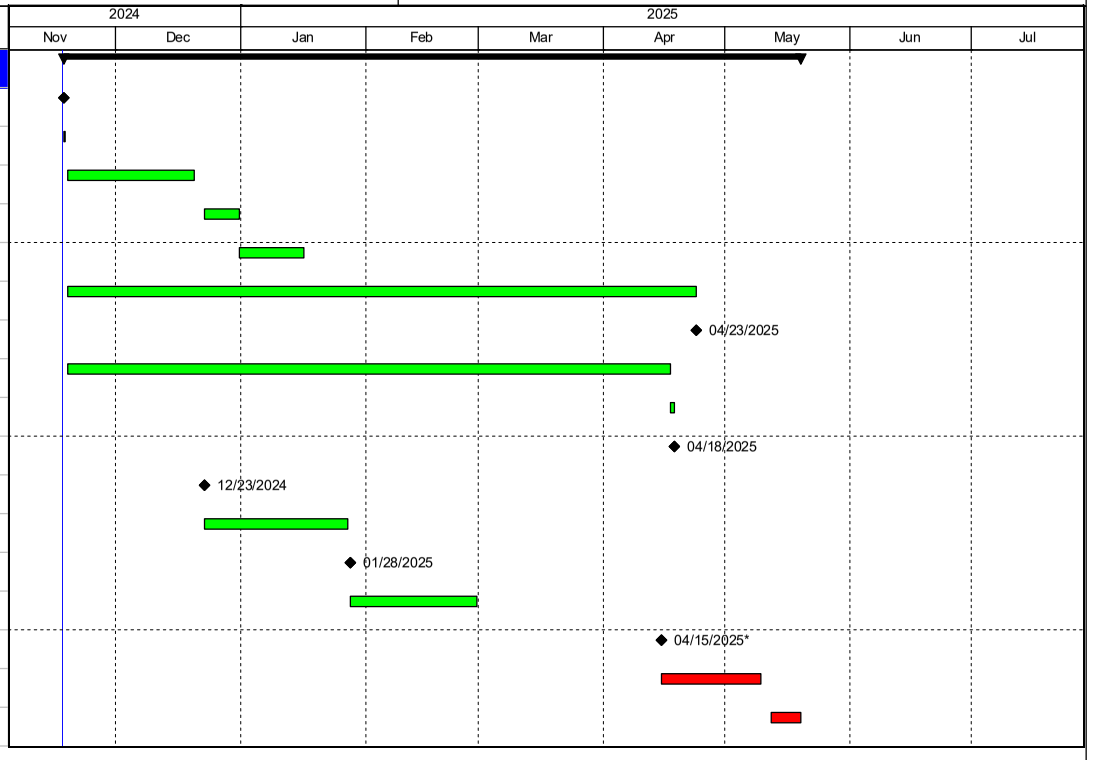
Prime Provider: Woolpert
CSJ:101-1032
Westpark Tollway From 359 to West of
Texas Heritage Parkway (1.17 Miles)

ATTACHMENT A

WA 1

Activity ID	Activity Name	Original Duration	Start	Finish
Westpark Tollway Extension from FM 359 to Texas Heritage Parkway		113	11/18/2024	05/19/2025
A1000	START DATE = EXECUTION DATE	0	11/18/2024	
A1010	KICK OFF MEETING	1	11/18/2024*	11/18/2024
A1020	DATA COLLECTION	23	11/19/2024	12/20/2024
A1022	SURVEY - TOPOGRAPHIC	5	12/23/2024	12/31/2024
A1070	FINALIZE SCHEMATIC	11	12/31/2024	01/16/2025
A1110	GEOTECHNICAL	107	11/19/2024	04/23/2025
A1170	BRIDGE LAYOUT SUBMITTAL	0		04/23/2025
A1180	DRAINAGE	108	11/19/2024	04/17/2025
A1210	FINAL DRAINAGE REPORT SUBMITTAL	1	04/17/2025	04/18/2025
A1220	TCP WORKSHOP	0		04/18/2025
A1250	50% SUBMITTAL	0		12/23/2024
A1260	50% REVIEW	23	12/23/2024	01/27/2025
A1280	90% SUBMITTAL	0		01/28/2025
A1290	90% REVIEW	23	01/28/2025	02/28/2025
A1310	100% SUBMITTAL	0		04/15/2025*
A1320	100% REVIEW	19	04/15/2025	05/09/2025
A1330	FINAL PS&E PROCESSING	5	05/12/2025	05/19/2025



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

WOOLPERT

Prime Provider: Woolpert, Inc.
Project 126-1069
WPT Ext: Over Charger Way

ATTACHMENT B - COMPENSATION FOR SCOPE OF SERVICES
Method of Payment: Lump Sum, Specified Rate,
Unit Cost

Function Code		SUBTOTALS	Woolpert	Geotech	Weisser
FC 102 (110)	Total Labor Cost (Lump Sum)	$26,240.12	$26,240.12		
	Total Labor Cost (Specified Rate)				
	Total Labor Cost (Unit Cost)				
	Other Direct Expenses				
	Total FC 110	$26,240.12			
FC 120 (120)	Total Labor Cost (Lump Sum)				
	Other Direct Expenses				
	Total FC 120				
FC 130 (130)	Total Labor Cost (Lump Sum)				
	Total Labor Cost (Specified Rate)				
	Total Labor Cost (Unit Cost)				
	Other Direct Expenses				
	Total FC 130	$0.00			
FC 130 (160)	Total Labor Cost (Lump Sum)	$15,139.72	$15,139.72		
	Other Direct Expenses				
	Total FC 164	$15,139.72			
FC 145 (164)	Total Labor Cost (Lump Sum)	$83,450.35	$83,450.35		
	Other Direct Expenses	$7,014.50	$7,014.50		
	Total FC 164	$90,464.85			
FC 160 (150)	Total Labor Cost (Lump Sum)	$40,850.00			$40,850.00
	Total Labor Cost (Specified Rate)				
	Total Labor Cost (Unit Cost)				
	Other Direct Expenses				
	Total FC 150	$40,850.00			
FC 160 (160)	Total Labor Cost (Lump Sum)	$212,898.09	$212,898.09		
	Other Direct Expenses	$0.00			
	Total FC 160	$212,898.09			
FC 160 (161)	Total Labor Cost (Lump Sum)	$182,020.80	$182,020.80		
	Other Direct Expenses				
	Total FC 161	$182,020.80			
FC 160 (162)	Total Labor Cost (Lump Sum)	$98,741.32	$98,741.32		
	Other Direct Expenses				
	Total Labor Cost (Unit Cost)				
	Total FC 162	$98,741.32			
FC 160 (163)	Total Labor Cost (Lump Sum)	$217,155.42	$217,155.42		
	Other Direct Expenses				
	Sub-Total FC 163	$217,155.42			
FC 160 (165)	Total Labor Cost (Lump Sum)				
	Other Direct Expenses				
	Total FC 165	$0.00			
FC 160 (170)	Total Labor Cost (Lump Sum)	$142,056.68	$142,056.68		
	Other Direct Expenses				
	Sub-Total FC 170	$142,056.68			
Geotechnical Unit Cost	Unit Cost	$100,000.00		$ 100,000.00	
	Other Direct Expense				
	Total FC 163	$0.00			
Grand Totals		$1,125,567.00	$984,717.00	$100,000.00	$40,850.00
(DBE%)		100.00%	87.49%	8.88%	3.63%

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Prime Provider:Woolpert, Inc.
WPT Ext
Project: 101-1069

ATTACHMENT B - COMPENSATION FOR SCOPE OF SERVICES
Method of Payment: Lump Sum

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
FEASIBILITY STUDIES - FC 102 (110)															
ROUTE & DESIGN STUDIES															
REVIEW DATA COLLECTION AND FIELD RECONNAISSANCE	8		16										24		
DESIGN CRITERIA	4		8	22									34		
REVIEW AND RE-SUBMIT EXISTING SCHEMATIC DESIGN SUMMARY REPORT (DSR)	8		16										24		
REVIEW LOCATION OF SOIL BORINGS, CORINGS,AND TESTING	8												8		
REVIEW SIGNED, SEALED GEOTECHNICAL REPORT	8												8		
HOURS SUB-TOTALS	36		40	22									98		
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS	$11,040.12		$10,800.00	$4,400.00									$26,240.12		
% DISTRIBUTION OF STAFFING	36.7%		40.8%	22.4%											
SUBTOTAL - FC 102 (110)													**$26,240.12**		

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
UTILITIES- FC 130 (160)															
UTILITIY ENGINEERING INVESTIGATION															
COORDINATE WITH UTILITY SUBCONSULTANT	16		16	16	20								68		
HOURS SUB-TOTALS	16		16	16	20								68		
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS	$4,906.72		$4,320.00	$3,200.00	$2,713.00								$15,139.72		
% DISTRIBUTION OF STAFFING	23.5%		23.5%	23.5%	29.4%										
SUBTOTAL - FC 130 (130)													**$15,139.72**		

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
MANAGING CONTRACTED/DONATED PE - FC 145 (164)															
PROJECT MANAGEMENT AND ADMINISTRATION															
PROJECT MANAGEMENT AND COORDINATION WITH THE TOLL ROAD AUTHORITY															
PREPARE MONTHLY INVOICES/PROGRESS REPORTS	5		10									10	25		
ATTEND MONTHLY MEETINGS WITH THE TOLL ROAD AUTHORITY	5		5	5									15		
PREPARE MEETING MINUTES	5		5									10	20		
PREPARE & MAINTAIN PROJECT DESIGN SCHEDULE	6		8										14		
DOCUMENT & DISTRIBUTE CORRESPONDENCES	4		6	10				6				10	36		
DOCUMENT PHONE CALLS	6		6	4								12	28		
COORDINATION W/ OTHER AGENCIES.	6		6	4							4	2	22		
MNGMNT & COORD. W/SUBCONSULTANTS	12		12	12	12			16	6		8		78		
QA/QC ALL DELIVERABLES	12	60	12	12	24				8		8	12	148		
HOURS SUB-TOTALS	61	60	70	47	36			22	14		20	56	386		
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS	$18,706.87	$15,542.40	$18,900.00	$9,400.00	$4,883.40			$3,300.00	$2,380.00		$5,002.00	$5,335.68	$83,450.35		
% DISTRIBUTION OF STAFFING	15.8%	15.5%	18.1%	12.2%	9.3%			5.7%	3.6%		5.2%	14.5%			
SUBTOTAL - FC 145 (164)													**$83,450.35**		

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
ROADWAY DESIGN - FC 160 (160)															
ROADWAY DESIGN CONTROLS															
PS&E (ROADWAY ITEMS)															
TITLE SHEET	2		2	4	8			8	2	8			34	1	34
PROJECT LAYOUT SHEETS (SCALE 1"=100') (DOUBLE BANKED)	1		1	2	4			20	6	20			54	3	18
INDEX OF SHEETS	1		1	4	6			6	1	6			25	3	8
EXISTING TYPICAL SECTIONS	1		2	4	4			8	2	8			29	2	15
PROPOSED TYPICAL SECTIONS	2		2	4	8			20	8	20			64	4	16
SUMMARY OF ROADWAY QUANTITIES	2		2	4	8			8	2	8			34	1	34
SUMMARY OF REMOVAL QUANTITIES	1		1	2	4			12	1	8			29	1	29
REMOVAL SHEETS (SCALE 1"=100') (DOUBLE BANKED)	1		1	2	4			12	2	16			38	3	13
HORIZONTAL ALIGNMENT& SUPERELEVATION DATA SHEETS	2		2	4	8			12	4	12			44	2	22
ROADWAY P&P SHEETS (SCALE: H 1"=100' V 1"=10') does this include ramp layouts(2) (ML 7, RAMP 2, FRTG 3)	8		16	32	48			120	40	160			424	12	35
MISC ROADWAY DETAILS	2		2	4	4			8		12			32	1	32
SOIL BORINGS LOG SHEETS	2		2	4	4			8	2	12			34	13	3
EARTHWORK CROSS SECTIONS	8		8	15	40			90	24	90			275	30	9
ROADWAYS STANDARD DETAILS	2		4	4	6			8	2	8			34	14	2
PREPARE 50% SUBMITTAL	4	20	4	6	4			12	2	8			60		
PREPARE 90% SUBMITTAL	4	20	4	8	12			12	2	8			70		
PREPARE 100% SUBMITTAL	4	20	4	12	16			16	4	16			92		
HOURS SUB-TOTALS	47	60	58	115	188			380	104	420			1,372	90	
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS	$14,413.49	$15,542.40	$15,660.00	$23,000.00	$25,502.20			$57,000.00	$17,680.00	$44,100.00			$212,898.09		
% DISTRIBUTION OF STAFFING	3.4%	4.4%	4.2%	8.4%	13.7%			27.7%	7.6%	30.6%					
SUBTOTAL - FC 160 (160)													**$212,898.09**		

Prime Provider:Woolpert, Inc.
WPT Ext
Project: 101-1069

ATTACHMENT B - COMPENSATION FOR SCOPE OF SERVICES
Method of Payment: Lump Sum

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
ROADWAY DESIGN - FC 160 (161)															
DRAINAGE															
DATA COLLECTION															
A. COLLECT AVAILABLE APPLICABLE DATA				2				8					10		
B. REVIEW SURVEY DATA AND COORDINATE ANY ADDITIONAL SURVEYING NEEDS WITH FBCTRA				2				4					6		
C. MEET WITH LOCAL GOVERNMENT OFFICALS TO OBTAIN HISTORIAL FLOOD RECORDS			4					4					8		
HYDROLOGIC STUDIES (0.8 MILES PLUS CONTRIBUTING AREA TO 3 CROSSINGS AND 4 OUTFALLS)															
A. DELINEATE / REVIEW EXISTING DRAINAGE AREAS				2				4	2	2			10		
B. DETERMINE EXISTING HYDROLOGIC PARAMETERS		1	2	4				12					19		
C. CALCULATE EXISTING DISCHARGES				2				4					6		
E. DELINEATE PROPOSED DRAINAGE AREAS		1	2	2				6	4				15		
F. DETERMINE PROPOSED HYDROLOGIC PARAMETERS			2	2				12	2				18		
G. CALCULATE PROPOSED DISCHARGES		1	2	2				4					9		
HYDRAULIC STUDIES - CROSS CULVERTS (3 CROSS DRAINAGE STRUCTURES)															
A. ASSIGN HYDROLOGY TO HYDRAULIC MODELS								2					2		
B. DEVELOP HYDRAULIC MODELS FOR 3 EXISTING CROSSINGS		2	2	4				16					24		
C. DETERMINE EXISTING WATER SURFACE ELEVATIONS				2				4					6		
D. ANALYZE CROSSINGS AND RECOMMEND IMPROVEMENTS		2	2	4				12					20		
E. QUANTIFY IMPACTS AND RECOMMEND MITIGATION			2	2				6					10		
HYDRAULIC STUDIES - ROADWAY IMPACT ANALYSIS (0.8 MILES ROADWAY)															
A. ASSIGN HYDROLOGY TO SWMM MODEL				4				4					8		
B. DEVELOP PRELIMINARY DETENTION NEEDS FOR THE PROJECT		2	2	4			4	12	4				28		
C. DEVELOP EPA-SWMM MODEL FOR EXISTING OUTFALL SYSTEMS (4 OUTFALL SYSTEMS)		2	4	6				20	8				40		
D. DETERMINE EXISTING TAILWATER CONDITIONS				2				4					6		
E. ANALYZE EXISTING DRAINAGE SYSTEMS AND DETERMINE HYDRAULIC GRADE LINE (HGL)		2	2	4				6	2				16		
F. DEVELOP EPA-SWMM MODEL FOR 6 PROPOSED OUTFALL SYSTEMS		6	4	8				24	4	2			48		
G. DETERMINE PROPOSED TAILWATER CONDITIONS				2				2					4		
H. ANALYZE / DESIGN PROPOSED DRAINAGE SYSTEMS AND DETERMINE HGL		2	4	4				6	2				18		
I. OPTIMIZE DRAINAGE SYSTEMS TO MITIGATE IMPACTS (IN-LINE AND OFF-LINE)		4	4	7			4	20	2	2			43		
J. CONDUCT EXTREME EVENT SHEET FLOW ANALYSIS		2	2					8	2				14		
DITCH AND STORM SEWER DESIGN															
DETERMINE PROPOSED PEAK FLOWS		2	2	8				12					24		
DETAILED DITCH DESIGN		2	2	8				24					36		
DRAINAGE REPORT															
A. PREPARE DRAFT DRAINAGE REPORT (INCLUDING EXHIBITS)			6	32				16	10			16	80		
B. PREPARE FINAL DRAINAGE REPORT (INCLUDING EXHIBITS)			2	8				8	4			8	30		
PS&E (DRAINAGE ITEMS)															
SUMMARY OF DRAINAGE QUANTITIES		1	1		6			16	20				44	2	22
OVERALL DRAINAGE AREA MAPS (1"=1000')		1	1		4			8	4	8			26	1	26
INTERNAL DRAINAGE AREA MAPS (1"=100')		2	4		24			48	32	48			158	5	32
HYDRAULIC DATA SHEETS (INLETS & STORM SEWER)		1	1		12			12	8	16			50	4	13
STORM SEWER PLAN AND PROFILES (EB & WB MAINLANES) (1"=100')		2	6		40			64	40	60			212	6	35
STORM SEWER LATERALS		1	1		16			20	4	12			54	2	27
DRAINAGE DETAILS			1					10	2	10			23	1	23
DRAINAGE STANDARD DETAILS			1		2			4		2			9	2	5
HOURS SUB-TOTALS		39	68	127	104		8	446	156	162		24	1,134	23	
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS		$10,102.56	$18,360.00	$25,400.00	$14,107.60		$1,333.92	$66,900.00	$26,520.00	$17,010.00		$2,286.72	$182,020.80		
% DISTRIBUTION OF STAFFING		3.4%	6.0%	11.2%	9.2%		0.7%	39.3%	13.8%	14.3%		2.1%			
SUBTOTAL - FC 160 (161)													**$182,020.80**		

TASK DESCRIPTION	PROJECT MANAGER	SENIOR PROJECT ENGINEER	SR TRAFFIC ENGINEER	DESIGN ENGINEER	ENGINEER IN TRAINING	CADD TECHNICIAN	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
ROADWAY DESIGN - FC 160 (162)										
SIGNING, PVMT. MARKING, & SIGNAL										
SUMMARY OF S&PM QUANTITIES	1	4	8	12	40	16		81	4	20
SIGNING AND PAVEMENT MARKING LAYOUTS	2	4	16	20	40	40		122	6	20
LARGE SIGN DETAILS	1	2	8	12	20	20		63	2	31
SIGNING & PAVMENT MARKING STANDARDS	1	2	8	8	16	16		51	8	6
SIGNING SUMMARIES (LARGE AND SMALL)	1	2	12	16	30	10		71	7	10
PAVEMENT MARKINGS	1	2	12	16	35	35		101	7	14
PAVEMENT MARKING QUANTITIES	2	2	16	24	32	24		100	4	25
OVERHEAD SIGN ELEVATION LAYOUT	2	2	16	16	24	40		100	5	20
HOURS SUB-TOTALS	10	19	96	124	237	201		688	43	
CONTRACT RATE PER HOUR	$306.67	$270.00	$176.07	$135.65	$150.00	$105.00	$95.28			
TOTAL LABOR COSTS	$3,203.00	$5,160.00	$16,902.72	$16,820.60	$35,550.00	$21,105.00		$98,741.32		
% DISTRIBUTION OF STAFFING	0.9%	1.7%	8.5%	10.9%	20.9%	17.7%				
SUBTOTAL - FC 160 (162)								**$98,741.32**		

Prime Provider:Woolpert, Inc.
WPT Ext
Project: 101-1069

ATTACHMENT B - COMPENSATION FOR SCOPE OF SERVICES
Method of Payment: Lump Sum

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
ROADWAY DESIGN - FC 160 (163)															
MISCELLANEOUS (ROADWAY)															
ILLUMINATION															
LIGHTING LAYOUTS	2		8	16	24			40	24	40			154	7	22
UNDERPASS SAFETY LIGHTING	1		4	8				12	12	12			49	2	25
CIRCUIT DIAGRAMS	1		8	12	18			24	2	24			89	4	22
ELECTRICAL SERVICE DATA CHART	1		4	6				8	8	8			35	1	35
ILLUMINATION STANDARDS	1		2	4	8			24	5	12			56	26	2
ILLUMINATION QUANTITY SHEET	1		4	8	16			24	4	16			73	4	18
QUANTITIES, SPECIFICATIONS & ESTIMATE:															
GENERAL NOTES, SPECIFICATIONS AND PROVISIONS	2		4	8	12			20		8			54	8	7
SWP3															
SW3P LAYOUT SHEETS (SCALE 1"=100') (DOUBLE BANKED)	1		1	4	8			20	2	24			60	3	20
SW3P STANDARDS	1		1	2				2		2			8	4	2
SUMMARY OF SW3P QUANTITY SHEETS	1		1	2	4			12	1	8			29	1	29
TRAFFIC CONTROL PLAN, DETOURS & SEQUENCE OF CONSTRUCTION															
SUMMARY OF TRAFFIC CONTROL QUANTITIES	1		2	4	4			16		8			35	4	9
TCP NARRATIVE	1		1	1	1			1	1	2			6	1	6
ADVANCE SIGNING LAYOUTS	0		0	1	1			1	1	3			7	1	7
TCP TYPICAL SECTIONS	2		3	8	8			8	2	8			37	6	6
TCP PLAN LAYOUTS	8		8	16	32			60	20	80			224	6	37
DETOUR LAYOUTS	2		1	2	2			6	1	10			23	3	8
BRIDGE @ INTERSECTION STAGING DETAILS	1		1	2	2			3	2	4			15	2	8
TCP STANDARDS	1		2	2	3			3	1	8			19	30	1
RETAINING WALLS AND MISCELLANEIOUS STRUCTURES															
RETAINING WALL LAYOUT SHEETS (6)	4		8	12	20			32	4	40			120	6	20
RETAINING WALL STANDARDS	1		1	2				2		2			8	4	2
SUMMARY OF RETAINING WALL QUANTITY SHEETS	1		1	2	4			12	1	8			29	1	29
CONSTRUCTABILITY REVIEW	4	60	8	12									83		
QUANTITIES, SPECIFICATIONS & ESTIMATE:															
GENERAL NOTES, SPECIFICATIONS AND PROVISIONS, SPEC LIST, ENGINEERS CERTIFICATION	4		6	8	4								22		
CONSTRUCTION TIME DETERMINATION (PRIMAVERA)	3		4	6	12							16	41		
CONSTRUCTION COST EST. (50, 90, & FINAL) WITH VARIANCE REPORT	6		8	12	16			24					66		
	49	60	89	158	198			354	90	327		16	1340	124	
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS	$14,950.16	$15,542.40	$24,097.50	$31,600.00	$26,790.88			$53,100.00	$15,215.00	$34,335.00		$1,524.48	$217,155.42		
% DISTRIBUTION OF STAFFING	3.6%	4.5%	6.7%	11.8%	14.7%			26.4%	6.7%	24.4%		1.2%			
SUBTOTAL - FC 160 (163)													**$217,155.42**		

TASK DESCRIPTION	PROJECT MANAGER	QUALITY MANAGER	SENIOR PROJECT ENGINEER	PROJECT ENGINEER	DESIGN ENGINEER	SENIOR HYDRAULIC ENGINEER	HYDRAULIC ENGINEER	ENGINEER IN TRAINING	SENIOR CADD TECHNICIAN	CADD TECHNICIAN	SENIOR HYDROLOGIST	ADMIN/ CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS	LABOR HRS PER SHEET
ROADWAY DESIGN - FC 160 (170)															
BRIDGE DESIGN															
FORT BEND WESTPARK TOLLWAY OVER CHARGER WAY (NEW, 81' x 340', TX I GIRDER, 3 SPANS (120'-100'-120'))															
BRIDGE LAYOUT															
BRIDGE LAYOUT SHEET			8	12				2	28	6			56	1	56
TYP SECTION SHEET			8							26			34	1	34
REVIEW EXISTING DOCUMENTATION AND INFORMATION			8										8		
PBLR SUBMITTAL to WESTPARK TOLLWAY	2		6	12						10			30		
CALCULATIONS FOR FOUNDATION DESIGN															
FOUNDATION DESIGN (INCLUDING DESIGN OF COLUMN & DS CONNECTION DETAILS)			16					32					48		
CALCULATIONS FOR SUBSTRUCTURE DESIGN															
ABUTMENT 1				8				24					32		
ABUTMENT 4				8				24					32		
BENTS 2			16					32					48		
BENTS 3			16					32					48		
CALCULATIONS FOR SUPERSTRUCTURE DESIGN															
CALCULATIONS FOR CONCRETE GIRDER DESIGN & GIRDER DESIGN TABLE (UNIT 1)			8					18					26		
CALCULATIONS TO DETERMINE ELEVATIONS OF BRIDGE SUBSTRUCTURE & SUPERSTRUCTURE ELEMENTS				8				24					32		
SHEETS PRODUCTION															
EQ SHEETS			10					16		4			30	1	30
FOUNDATION LAYOUT SHEET			4					10	20				34	1	34
ABUTMENT 1 PLAN & DETAILS SHEETS				4				10	24				38	2	19
ABUTMENT 4 PLAN & DETAILS SHEETS				4				10	24				38	2	19
PLANS SHEETS FOR SUBSTRUCTURE DETAILS (BENT SHEETS+COLUMNS)			10					20	40				70	2	35
AESTHETIC DETAILS			4					8	12				24	2	12
FRAMING PLAN SHEETS				6				12		14			32	1	32
GIRDER UNIT PLAN SHEETS				4				8		20			32	1	32
GIRDER UNIT SECTION, MISC. DETAILS, EQ TABLES, ETC.			6					12		18			36	1	36
IGND				8						8			16	1	16
COMPUTE AND PREPARE TABLES FOR BEARING SEAT ELEVATIONS, DEAD LOAD DEFLECTIONS, AND OTHER DESIGN ELEMENTS				8				20		4			32		
PREPARE AND SUBMIT CALCULATION PACKAGE	2		8					24					34		
SELECT AND ASSEMBLE APPLICABLE TXDOT BRIDGE STANDARDS			6							8			14		
HOURS SUB-TOTALS	4		134	82				338	148	118			824	16	
CONTRACT RATE PER HOUR	$306.67	$259.04	$270.00	$200.00	$135.65	$223.31	$166.74	$150.00	$170.00	$105.00	$250.10	$95.28			
TOTAL LABOR COSTS	$1,226.68		$36,180.00	$16,400.00				$50,700.00	$25,160.00	$12,390.00			$142,056.68		
% DISTRIBUTION OF STAFFING	0.5%		16.3%	10.0%				41.0%	18.0%	14.3%					
SUBTOTAL - FC 160 (170)													**$142,056.68**		

Prime Provider:Woolpert, Inc.
WPT Ext
Project: 101-1069

ATTACHMENT B - COMPENSATION FOR SCOPE OF SERVICES
Method of Payment: Lump Sum

DESCRIPTION											
FEASIBILITY STUDIES - FC 102 (110)											$26,240.12
UTILITY - FC 130 (160)											$15,139.72
MANAGING CONTRACTED/DONATED PE - FC 145 (164)											$83,450.35
ROADWAY DESIGN - FC 160 (160)											$212,898.09
ROADWAY DESIGN - FC 160 (161)											$182,020.80
ROADWAY DESIGN - FC 160 (162)											$98,741.32
ROADWAY DESIGN - FC 160 (163)											$217,155.42
ROADWAY DESIGN - FC 160 (170)											$142,056.68
SUBTOTAL LABOR EXPENSES											**$977,702.50**
OTHER DIRECT EXPENSES	**COST/UNIT**	**UNIT**	**QUANTITY**								
Mileage (# of miles) (current state rate)	$0.655	Mile	900								$589.50
Courier Service	$45.00	EACH	15								$675.00
Photocopies B/W (11"X17")	$0.25	EACH	10000								$2,500.00
Photocopies B/W (8 1/2"x11")	$0.15	EACH	3500								$525.00
Photocopies Color (11"x17")	$1.25	EACH	1000								$1,250.00
Photocopies Color (8 1/2"x11")	$1.00	EACH	1000								$1,000.00
Plots (B/W on Bond)	$1.00	per sq. ft	300								$300.00
Plots (Color on Bond)	$1.75	per sq. ft	100								$175.00
CDs	$2.00	EACH									
USB Flash (up to 32 GB	$10.00	EACH									
SUBTOTAL DIRECT EXPENSES											$7,014.50

SUMMARY	
TOTAL LUMP COSTS ONLY	$977,702.50
NON-SALARY (OTHER DIRECT EXPENSES) ONLY	$7,014.50
GRAND TOTAL FOR WOOLPERT ONLY	$984,717.00

Subprovider:Weisser Engineering and Survey
WPT Ext: At Charger Way
Project: 101-1069

ATTACHMENT B - COMPENSATION FOR SCOPE OF SERVICES
Method of Payment: Lump Sum Unit Cost

TASK DESCRIPTION	SUPPORT MANAGER	LICENSED STATE LAND SURVEYOR	SURVEYOR (RPLS) SENIOR	SURVEYOR (RPLS)	SURVEY TECHNICIAN (SIT)-SENIOR	CADD OPERATOR SENIOR	FIELD COORDINATOR	ABSTRACT-OR	ADMINI-STRATIVE / CLERICAL	TOTAL LABOR HRS. & COSTS	NO OF DWGS
ROADWAY DESIGN - FC 160 (150)											
DESIGN SURVEYS											
TOPOGRAPHIC SURVEY:			18		32	72			2	124	
CONTROL: VERIFY EXISTING CONTROL POINTS. ESTABLISH ADDITIONAL CONTROL AS NEEDED. TIE TO OTHER CONTROL POINTS IN PROJECT VICINITY ESTABLISHED BY OTHER ENTITIES AS DIRECTED BY THE STATE.			16		40	40			2	98	
HOURS SUB-TOTALS			34		72	112			4	222	
CONTRACT RATE PER HOUR	$210.00	$175.00	$175.00	$125.00	$125.00	$100.00	$110.00	$145.00	$75.00		
TOTAL LABOR COSTS			$5,950.00		$9,000.00	$11,200.00			$300.00	$26,450.00	
% DISTRIBUTION OF STAFFING			15.3%		32.4%	50.5%			1.8%		
SUBTOTAL - FC 160 (150)										**$26,450.00**	

TASK DESCRIPTION	1-PERSON FIELD CREW	2-PERSON FIELD CREW	3-PERSON FIELD CREW							TOTAL LABOR HRS. & COSTS	NO OF DWGS
ROADWAY DESIGN - FC 160 (150)											
TOPOGRAPHIC SURVEY: COLLECT DESIGN SURVEY INFORMATION TO SUPPLEMENT THE EXISTING PLANIMETRIC AND DTM FILES.			60							60	
CONTROL: VERIFY EXISTING CONTROL POINTS. ESTABLISH ADDITIONAL CONTROL AS NEEDED. TIE TO OTHER CONTROL POINTS IN PROJECT VICINITY ESTABLISHED BY OTHER ENTITIES AS DIRECTED BY THE STATE.			20							20	
										0	
HOURS SUB-TOTALS			80							80	
CONTRACT RATE PER HOUR	$130.00	$155.00	$180.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00		
TOTAL LABOR COSTS			$14,400.00							$14,400.00	
% DISTRIBUTION OF STAFFING			100.0%								
SUBTOTAL - UNIT COSTS										**$14,400.00**	

DESCRIPTION										TOTAL LABOR HRS.	TOTAL LABOR HRS. & COSTS
RIGHT OF WAY DATA - FC 160 (150) (LUMP SUM)										222	$26,450.00
RIGHT OF WAY DATA - FC 160 (150) (LUMP SUM)										80	$14,400.00
SUBTOTAL LABOR EXPENSES										302	**$40,850.00**

SUMMARY - GRAND TOTAL COSTS	
TOTAL LUMP SUM & OTHER DIRECT EXPENSES	$40,850.00
GRAND TOTAL COSTS FOR LANDTECH	$40,850.00

Project Name: FM 1093 Westpark Tollway Mainlanes Extension - CSJ 101-1032, Fort Bend County, Texas

Consultant: Woolpert Engineerng

Proposal No. GP2024-1013

Date: November 18, 2024

Borings: 2@100' for bridge; 8@45' retaining wall [360 LF] Piezometer: 2@50' [100 LF]

ADDITIONAL SERVICES

TASK DESCRIPTION	Unit	Unit Rate
GEOTECHNICAL		
Subsurface Field Investigation		
Mobilization/Demobilization	LS	$1,012.00
Drilling and Sampling (continuous) 0-20'	LF	$27.00
Drilling and Sampling (intermittent) 20'-50'	LF	$32.00
Drilling and Sampling (intermittent) 50'-150'	LF	$45.00
Surcharge for Drilling and Sampling Over 100'	LF	$12.00
ATV Surcharge	LF	$11.00
TDH Drilling and Sampling Surcharge	EA	$33.00
Technician for Staking, Utilities Clearance, Coordination	HRS	$96.00
Piezometer Installation	LF	$26.00
Piezometer Abandonment	LF	$21.00
Grouting (Tremie Method)	LF	$13.00
24-Hour, 7- and 30-day PZ Water Level Readings	HRS	$96.00
Vehicle Charge	HRS	$13.00
Logging (NICET II)	HRS	$96.00
Laboratory Tests		
Liquid and Plastic Limits - Atterberg Limits (ASTM D-4318)	EA	$76.00
Percent Passing No. 200 Sieve (ASTM D-1140)	EA	$59.00
Moisture Content (ASTM D-2216)	EA	$12.00
Unconsolidated Compression (ASTM D-2166)	EA	$54.00
Unconsolidated Undrained (ASTM D-2850)	EA	$77.00
Consolidated-Undrained Triaxial Test (ASTM D-4767) *3-stage w/3 samples/set	SET	$2,400.00
Specific Gravity	EA	$71.00
Crumb Tests (ASTM D-6572)	EA	$46.00
Double Hydrometer Tests (ASTM D-4221), with D_{90} and D_{50}	EA	$266.00
Consolidation Tests	EA	$1,200.00
Sieve Analysis	EA	$164.00

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 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."

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY
CERTIFICATION OF FILING

Certificate Number:
2024-1239283

Date Filed:
11/15/2024

Date Acknowledged:

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.
Woolpert, Inc.
Houston, TX United States

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.
Fort Bend County Toll Road Authority

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.
101-1032
Roadway reconstruction for approximately 1 mile at the PS&E level including survey, geotech, utility coordination, drainage design, bridge layouts

4 Name of Interested Party	City, State, Country (place of business)	Nature of interest (check applicable)	
		Controlling	Intermediary
Cattran, Scott	Houston, TX United States	X	
McKlurkin, Kirk	Houston, TX United States	X	
Rashid, Salman	Houston, TX United States	X	

5 Check only if there is NO Interested Party. ☐

6 UNSWORN DECLARATION

My name is Sam Talje, and my date of birth is 09/02/1961.

My address is 14202 Miramar (street), Houston (city), TX (state), 77065 (zip code), USA (country).

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Harris County, State of Texas, on the 15th day of November (month), 20 24 (year).

Signature of authorized agent of contracting business entity
(Declarant)