

STATE OF TEXAS           §  
   §  
 COUNTY OF FORT BEND   §

### **AGREEMENT FOR PROFESSIONAL ENGINEERING SERVICES**

THIS AGREEMENT is made and entered into by and between Fort Bend County, (hereinafter "County"), a body corporate and politic under the laws of the State of Texas, and Pierce, Goodwin Alexander & Linville, Inc. (hereinafter "Contractor"), a company authorized to conduct business in the State of Texas.

### WITNESSETH

WHEREAS, County desires that Contractor provide certain professional engineering services for the proposed reconstruction of US 90A from 2,200' west of SH 99 to 2,800' east of SH 99 including a grade separation, under the Fort Bend County 2013 Mobility Bond Program - US 90A at SH 99 Grade Separation – Project No. 13409 (hereinafter "Services") pursuant to SOQ 14-025; and

WHEREAS, Contractor represents that it is qualified and desires to perform such services.

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

### AGREEMENT

#### **Section 1. Scope of Services**

Contractor shall render Services to County as defined in the Proposal dated April 27, 2017 (attached hereto as Exhibit A).

#### **Section 2. Personnel**

2.1 Contractor 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 Contractor shall furnish and maintain, at its own expense, adequate and sufficient personnel, in the opinion of County, to perform the Scope of Services when and as required and without delays.

2.2 All employees of Contractor shall have such knowledge and experience as will enable them to perform the duties assigned to them. Any employee of Contractor who, in the opinion of County, is incompetent or by his conduct becomes detrimental to the project shall, upon request of County, immediately be removed from association with the project.

### **Section 3. Compensation and Payment**

3.1 Contractor's fees shall be calculated at the rates set forth in the attached Exhibit A. The Maximum Compensation for the performance of Services within the Scope of Services described in Exhibit A is one million eight hundred eighty-five thousand eight hundred fifty dollars and 29/100 (\$1,885,850.29). In no case shall the amount paid by County under this Agreement exceed the Maximum Compensation without written agreement executed by the parties.

3.2 All performance of the Scope of Services by Contractor including any changes in the Scope of Services and revision of work satisfactorily performed will be performed only when approved in advance and authorized by County.

3.3 County will pay Contractor based on the following procedures: Upon completion of the tasks identified in the Scope of Services, Contractor shall submit to County staff person designated by the County Engineer, one (1) electronic (pdf) copy and two (2) original hard copies of invoices showing the amounts due for services performed in a form acceptable to County. County 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 for processing. County shall pay each such approved invoice within thirty (30) calendar days. County reserves the right to withhold payment pending verification of satisfactory work performed.

### **Section 4. Limit of Appropriation**

4.1 Contractor clearly understands and agrees, such understanding and agreement being of the absolute essence of this Agreement, that County shall have available the total maximum sum of one million eight hundred eighty-five thousand eight hundred fifty dollars and 29/100 (\$1,885,850.29) specifically allocated to fully discharge any and all liabilities County may incur.

4.2 Contractor does further understand and agree, said understanding and agreement also being of the absolute essence of this Agreement, that the total maximum compensation that Contractor may become entitled to and the total maximum sum that County may become liable to pay to Contractor shall not under any conditions, circumstances, or interpretations thereof exceed one million eight hundred eighty-five thousand eight hundred fifty dollars and 29/100 (\$1,885,850.29).

### **Section 5. Time of Performance**

Time for performance of the Scope of Services under this Agreement shall begin with receipt of the Notice to Proceed and end no later than twenty-four (24) months thereafter. Contractor shall complete the tasks described in the Scope of Services, within this time or within such additional time as may be extended by the County.

## **Section 6. Modifications and Waivers**

6.1 The parties may not amend or waive this Agreement, except by a written agreement executed by both parties.

6.2 No failure or delay in exercising any right or remedy or requiring the satisfaction of any condition under this Agreement, and no course of dealing between the parties, operates as a waiver or estoppel of any right, remedy, or condition.

6.3 The rights and remedies of the parties set forth in this Agreement are not exclusive of, but are cumulative to, any rights or remedies now or subsequently existing at law, in equity, or by statute.

## **Section 7. Termination**

7.1 Termination for Convenience – County may terminate this Agreement at any time upon forty-eight (48) hours written notice.

### **7.2 Termination for Default**

7.2.1 County may terminate the whole or any part of this Agreement for cause in the following circumstances:

7.2.1.1 If Contractor fails to perform services within the time specified in the Scope of Services or any extension thereof granted by the County in writing;

7.2.1.2 If Contractor materially breaches any of the covenants or terms and conditions set forth in this Agreement or fails to perform any of the other provisions of this Agreement or so fails to make progress as to endanger performance of this Agreement in accordance with its terms, and in any of these circumstances does not cure such breach or failure to County's reasonable satisfaction within a period of ten (10) calendar days after receipt of notice from County specifying such breach or failure.

7.2.2 If, after termination, it is determined for any reason whatsoever that Contractor was not in default, or that the default was excusable, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the County in accordance with Section 7.1 above.

7.3 Upon termination of this Agreement, County shall compensate Contractor in accordance with Section 3, above, for those services which were provided under this Agreement prior to its termination and which have not been previously invoiced to County. Contractor's final invoice for said services will be presented to and paid by County in the same manner set forth in Section 3 above.

7.4 If County 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 Contractor.

## **Section 8. Ownership and Reuse of Documents**

All documents, data, reports, research, graphic presentation materials, etc., developed by Contractor as a part of its work under this Agreement, shall become the property of County upon completion of this Agreement, or in the event of termination or cancellation thereof, at the time of payment under Section 3 for work performed. Contractor shall promptly furnish all such data and material to County on request.

## **Section 9. Inspection of Books and Records**

Contractor will permit County, or any duly authorized agent of County, to inspect and examine the books and records of Contractor for the purpose of verifying the amount of work performed under the Scope of Services. County's right to inspect survives the termination of this Agreement for a period of four years.

## **Section 10. Insurance**

10.1 Prior to commencement of the Services, Contractor shall furnish County with properly executed certificates of insurance which shall evidence all insurance required and provide that such insurance shall not be canceled, except on 30 days' prior written notice to County. Contractor shall provide certified copies of insurance endorsements and/or policies if requested by County. Contractor shall maintain such insurance coverage from the time Services commence until Services are completed and provide replacement certificates, policies and/or endorsements for any such insurance expiring prior to completion of Services. Contractor shall obtain such insurance written on an Occurrence form (or a Claims Made form for Professional Liability insurance) from such companies having Best's rating of A/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:

10.1.1 Workers' Compensation insurance. Substitutes to genuine Workers' Compensation Insurance will not be allowed. Employers' Liability insurance with limits of not less than \$1,000,000 per injury by accident, \$1,000,000 per injury by disease, and \$1,000,000 per bodily injury by disease.

10.1.2 Commercial general liability insurance with a limit of not less than \$1,000,000 each occurrence and \$2,000,000 in the annual aggregate. Policy shall cover liability for bodily injury, personal injury, and property damage and products/completed operations arising out of the business operations of the policyholder.

10.1.3 Business Automobile Liability insurance with a combined Bodily Injury/Property Damage limit of not less than \$1,000,000 each accident. The policy shall cover liability arising from the operation of licensed vehicles by policyholder.

10.1.4 Professional Liability insurance may be made on a Claims Made form with limits not less than \$1,000,000.

10.2 County and the members of Commissioners Court shall be named as additional insured to all required coverage except for Workers' Compensation and Professional Liability. All Liability policies including Workers' Compensation written on behalf of Contractor, excluding Professional Liability, shall contain a waiver of subrogation in favor of County and members of Commissioners Court.

10.3 If required coverage is written on a claims-made basis, Contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of the contract; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of 2 years beginning from the time that work under the Agreement is completed.

#### **Section 11. Indemnity**

**CONTRACTOR SHALL INDEMNIFY AND DEFEND COUNTY AGAINST ALL LOSSES, LIABILITIES, CLAIMS, CAUSES OF ACTION, AND OTHER EXPENSES, INCLUDING REASONABLE ATTORNEYS FEES, ARISING FROM ACTIVITIES OF CONTRACTOR, ITS AGENTS, SERVANTS OR EMPLOYEES, PERFORMED UNDER THIS AGREEMENT THAT RESULT FROM THE NEGLIGENT ACT, ERROR, OR OMISSION OF CONTRACTOR OR ANY OF CONTRACTOR'S AGENTS, SERVANTS OR EMPLOYEES.**

#### **Section 12. Confidential and Proprietary Information**

12.1 Contractor acknowledges that it and its employees or agents may, in the course of performing their responsibilities under this Agreement, be exposed to or acquire information that is confidential to County. Any and all information of any form obtained by Contractor or its employees or agents from County in the performance of this Agreement shall be deemed to be confidential information of County ("Confidential Information"). Any reports or other documents or items (including software) that result from the use of the Confidential Information by Contractor shall be treated with respect to confidentiality in the same manner as the Confidential Information. Confidential Information shall be deemed not to include information that (a) is or becomes (other than by disclosure by Contractor) publicly known or is contained in a publicly available document; (b) is rightfully in Contractor's possession without the obligation of nondisclosure prior to the time of its disclosure under this Agreement; or (c) is independently developed by employees or agents of Contractor who can be shown to have had no access to the Confidential Information.

12.2 Contractor agrees to hold Confidential Information in strict confidence, using at least the same degree of care that Contractor uses in maintaining the confidentiality of its own confidential information, and not to copy, reproduce, sell, assign, license, market, transfer or otherwise dispose of, give, or disclose Confidential Information to third parties or use Confidential Information for any purposes whatsoever other than the provision of Services to County hereunder, and to advise each of its employees and agents of their obligations to keep Confidential Information confidential. Contractor shall use its best efforts to assist County in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limitation of the foregoing, Contractor shall advise County

immediately in the event Contractor learns or has reason to believe that any person who has had access to Confidential Information has violated or intends to violate the terms of this Agreement and Contractor will at its expense cooperate with County in seeking injunctive or other equitable relief in the name of County or Contractor against any such person. Contractor agrees that, except as directed by County, Contractor will not at any time during or after the term of this Agreement disclose, directly or indirectly, any Confidential Information to any person, and that upon termination of this Agreement or at County's request, Contractor will promptly turn over to County all documents, papers, and other matter in Contractor's possession which embody Confidential Information.

12.3 Contractor acknowledges that a breach of this Section, including disclosure of any Confidential Information, or disclosure of other information that, at law or in equity, ought to remain confidential, will give rise to irreparable injury to County that is inadequately compensable in damages. Accordingly, County may seek and obtain injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies that may be available. Contractor acknowledges and agrees that the covenants contained herein are necessary for the protection of the legitimate business interest of County and are reasonable in scope and content.

12.4 Contractor in providing all services hereunder agrees to abide by the provisions of any applicable Federal or State Data Privacy Act.

12.5 Contractor expressly acknowledges that County is subject to the Texas Public Information Act, TEX. GOV'T CODE ANN. §§ 552.001 *et seq.*, as amended, and notwithstanding any provision in the Agreement to the contrary, County will make any information related to the Agreement, or otherwise, available to third parties in accordance with the Texas Public Information Act. Any proprietary or confidential information marked as such provided to County by Consultant shall not be disclosed to any third party, except as directed by the Texas Attorney General in response to a request for such under the Texas Public Information Act, which provides for notice to the owner of such marked information and the opportunity for the owner of such information to notify the Attorney General of the reasons why such information should not be disclosed.

### **Section 13. Independent Contractor**

13.1 In the performance of work or services hereunder, Contractor shall be deemed an independent contractor, and any of its agents, employees, officers, or volunteers performing work required hereunder shall be deemed solely as employees of contractor or, where permitted, of its subcontractors.

13.2 Contractor and its agents, employees, officers, or volunteers shall not, by performing work pursuant to this Agreement, be deemed to be employees, agents, or servants of County and shall not be entitled to any of the privileges or benefits of County employment.

#### **Section 14. Notices**

14.1 Each party giving any notice or making any request, demand, or other communication (each, a "Notice") pursuant to this Agreement shall do so in writing and shall use one of the following methods of delivery, each of which, for purposes of this Agreement, is a writing: personal delivery, registered or certified mail (in each case, return receipt requested and postage prepaid), or nationally recognized overnight courier (with all fees prepaid).

14.2 Each party giving a Notice shall address the Notice to the receiving party at the address listed below or to another address designated by a party in a Notice pursuant to this Section:

County: Fort Bend County Engineering Department  
Attn: County Engineer  
301 Jackson Street  
Richmond, Texas 77469

With a copy to: Fort Bend County  
Attn: County Judge  
401 Jackson Street, 1<sup>st</sup> Floor  
Richmond, Texas 77469

Contractor: Pierce Goodwin Alexander & Linville, Inc.  
Attn: Costas Georghiou, P.E., Principal  
3131 Briarpark Drive, Suite 200  
Houston, Texas 77042

14.3 A Notice is effective only if the party giving or making the Notice has complied with subsections 14.1 and 14.2 and if the addressee has received the Notice. A Notice is deemed received as follows:

14.3.1 If the Notice is delivered in person, or sent by registered or certified mail or a nationally recognized overnight courier, upon receipt as indicated by the date on the signed receipt.

14.3.2 If the addressee rejects or otherwise refuses to accept the Notice, or if the Notice cannot be delivered because of a change in address for which no Notice was given, then upon the rejection, refusal, or inability to deliver.

#### **Section 15. Compliance with Laws**

Contractor 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 by County, Contractor shall furnish County with certification of compliance with said laws, statutes, ordinances, rules, regulations, orders, and decrees above specified.

## **Section 16. Performance Representation**

16.1 Contractor represents to County that Contractor has the skill and knowledge ordinarily possessed by well-informed members of its trade or profession practicing in the greater Houston metropolitan area and Contractor will apply that skill and knowledge with care and diligence to ensure that the Services provided hereunder will be performed and delivered in accordance with the local professional standard of care.

16.2 Contractor will materially conform to all requirements and specifications contained in the attached Exhibit A.

## **Section 17. Assignment**

17.1 Neither party may assign any of its rights under this Agreement, except with the prior written consent of the other party. That party shall not unreasonably withhold its consent. All assignments of rights are prohibited under this subsection, whether they are voluntarily or involuntarily, by merger, consolidation, dissolution, operation of law, or any other manner.

17.2 Neither party may delegate any performance under this Agreement.

17.3 Any purported assignment of rights or delegation of performance in violation of this Section is void.

## **Section 18. Applicable Law**

The laws of the State of Texas govern all disputes arising out of or relating to this Agreement. The parties hereto acknowledge that venue is proper in Fort Bend County, Texas, for all legal actions or proceedings arising out of or relating to this Agreement and waive the right to sue or be sued elsewhere. Nothing in the Agreement shall be construed to waive the County's sovereign immunity.

## **Section 19. Successors and Assigns**

County and Contractor 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.

## **Section 20. Third Party Beneficiaries**

This Agreement does not confer any enforceable rights or remedies upon any person other than the parties.

## **Section 21. Severability**

If any provision of this Agreement is determined to be invalid, illegal, or unenforceable, the remaining provisions remain in full force, if the essential terms and conditions of this Agreement for each party remain valid, binding, and enforceable.



**Section 22. Publicity**

Contact with citizens of Fort Bend County, media outlets, or governmental agencies shall be the sole responsibility of County. Under no circumstances whatsoever, shall Contractor release any material or information developed or received in the performance of the Services hereunder without the express written permission of County, except where required to do so by law.

**Section 23. Captions**

The section captions used in this Agreement are for convenience of reference only and do not affect the interpretation or construction of this Agreement.

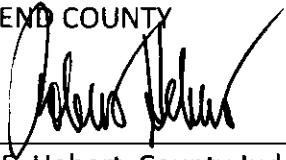
**Section 24. Conflict**

In the event there is a conflict between this Agreement and the attached exhibits, this Agreement controls.

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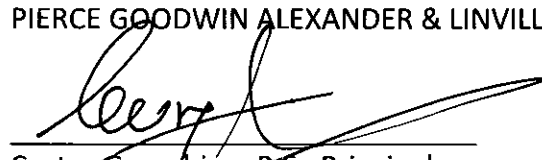
IN WITNESS WHEREOF, the parties hereto have signed or have caused their respective names to be signed to multiple counterparts to be effective on the signed by the last party hereto.

FORT BEND COUNTY

  
Robert E. Hebert, County Judge

5-23-2017  
Date

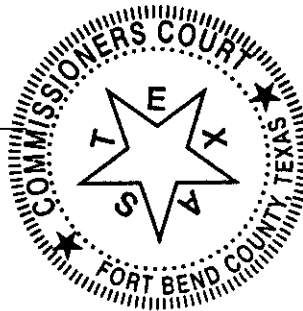
PIERCE GOODWIN ALEXANDER & LINVILLE, INC

  
Costas Georghiou, P.E., Principal

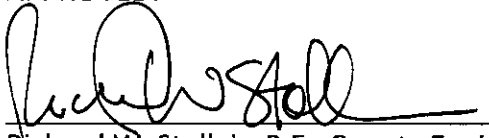
May 4, 2017  
Date

ATTEST:

  
Laura Richard, County Clerk



APPROVED:

  
Richard W. Stolleis, P.E., County Engineer

APPROVED AS TO LEGAL FORM:

  
Marcus D. Spencer, First Assistant County Attorney

#### AUDITOR'S CERTIFICATE

I hereby certify that funds are available in the amount of \$1,885,850<sup>29</sup> to accomplish and pay the obligation of Fort Bend County under this contract.

  
Robert Ed Sturdivant, County Auditor

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# EXHIBIT A

April 27, 2017

Richard W. Stolleis, PE  
Fort Bend County Engineer  
301 Jackson St.  
Richmond, Texas 77469

Dear Mr. Stolleis:

PGAL is pleased to submit this proposal for engineering services for the construction of a new grade separation on US 90A at the Grand Parkway (SH 99). The following is a summarized scope of services and a draft of the overall budget for the complete design effort.

The scope includes project management and engineering services required for the preparation of plans, specifications and estimates (PS&E) and related documents, for the proposed reconstruction of US 90A, (CSJ 0027-08-137), from approximately 2,200 feet west, (Cunningham Creek Blvd.), of SH 99 to approximately 2,800 feet east, (Gateway Blvd.), of SH 99 in Fort Bend County. A detailed project scope organized per TXDOT guidelines is included in Exhibit A-1. A summary of services to be provided include, but are not limited to the following:

**FEASIBILITY STUDIES (FUNCTION CODE 110)**

- Data Collection and Field Reconnaissance. The Engineer shall collect, review and evaluate data, if available, from the State, the Federal Emergency Management Agency (FEMA), the United States Army Corps of Engineers (USACE), local municipalities, and other governmental agencies.
- Design Criteria. The Engineer shall develop the roadway design criteria based on the controlling factors specified by the State.
- Preliminary Cost Estimates. The Engineer shall develop a preliminary cost estimate using the State Average Low Bid Unit Price
- Design Concept Conference. In accordance with the State's Project Development Process Manual, the Engineer, in cooperation with the State, shall plan, attend and document the Design Concept Conference (DCC) to be held prior to the 30 percent milestone submittal.
- Geotechnical Borings and Investigations: The Engineer shall prepare a geotechnical report that evaluates the existing soil conditions and provides recommendations for bridge design, embankment settlement analysis, retaining walls, slope stability and along storm drain alignment in accordance with the latest edition of the State's Geotechnical Manual. The Engineer shall evaluate available boring information obtained for the Grand Parkway project and recommend utilization of suitable boring information.

### **SOCIAL/ECON/ENVIRON STUDIES (FUNCTION CODE 120)**

- Informal Meetings. The Engineer shall provide technical assistance, preparation of exhibits for, and minutes of informal meetings requested by the public to discuss the pending impacts to neighborhoods and businesses due to roadway shutdowns, detours and access restrictions or as deemed necessary.
- Environmental Permits Issues and Commitments (EPIC) Sheets. The Engineer shall complete the latest version of the EPIC sheets per information provided by the State.
- Environmental Study Review. The Engineer shall review the final environmental documents and evaluate for implementation into the PS&E package.

### **RIGHT-OF-WAY FUNCTION CODE (130)**

- Right-of-Way Map. The Engineer shall review and evaluate the proposed or existing right-of-way map to verify that all construction staging and alignment considerations have been taken into account. The Engineer shall be responsible for identifying and delineating any temporary construction easements in areas outside the State's Right of Way.
- Utility Locations and Layouts. The Engineer shall coordinate with the State to determine the location of each existing and proposed utility and attend meetings with the various utility companies to discuss potential conflicts. The Engineer shall identify and coordinate with each utility company for relocations required within each construction easement or right-of entry. The Engineer shall gather all existing utility information and furnish a DWG to identify utility conflicts.
- Access Management. The Engineer shall coordinate and evaluate access management within the project limits in accordance with the latest State Access Management Manual or as directed by the State.

### **MANAGING CONTRACTED PE FUNCTION CODE (145)**

The Engineer, in association with the State's Project Manager shall be responsible for directing and coordinating all activities associated with the project to comply with State policies and procedures, and to deliver that work on time. The Engineer shall inform Ft Bend County's Project Engineer of all meetings with the State and sub-consultants. The Engineer shall copy the County's Project Engineer on all project related email correspondence.

The Engineer shall:

- Prepare monthly written progress reports.
- Develop and maintain a detailed project schedule to track project conformance to Exhibit C, Work Schedule, for each work authorization. The schedule submittals shall be hard copy and electronic format.
- Meet on a scheduled basis with the State and Ft Bend County 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.

### **TOPOGRAPHIC SURVEYS FUNCTION CODE (150)**

Design Surveys shall include performance of surveys associated with the gathering of survey data for topography, cross-sections, and other related work in order to design the project. The Engineer shall coordinate with TxDOT and the Ft Bend County Toll Road Authority to obtain existing survey information from the US 90A Schematic and/or Grand Parkway Project respectively.

The Engineer 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.

#### **ROADWAY DESIGN FUNCTION CODE (160)**

The roadway design task shall include the following:

- Refine Schematic. The Engineer shall refine the horizontal and vertical alignment of the design schematic for main lanes, ramps, direct connector, frontage roads, cross streets, including grade separation structures. The Engineer shall determine vertical clearances at grade separations and overpass. Minor modifications in the alignment will be provided to ensure that the future direct connector can be built without rebuilding any of the new facilities.
- Preliminary Geometric Project Layout. The Engineer shall develop a preliminary geometric project layout for the full length of the project to be reviewed and approved by the State prior to the Engineer proceeding with the 30% milestone submittal package.
- Plan and Profile sheets for main lanes, frontage roads and ramps and cross streets.
- Existing and proposed typical sections for all proposed and existing roadways and structures.
- Intersection layout detailing the pavement design and drainage design at the intersection of each cross street. The layout must include the horizontal and vertical alignments, curb returns, geometrics, transition length, stationing, pavement, drainage details, and American with Disabilities Act Accessibility Guidelines (ADAAG) compliance items.
- The Engineer shall develop an earthwork analysis to determine cut and fill quantities and provide final design cross sections at 100 feet intervals.
- The Engineer shall incorporate the pavement design developed by the State for this project. If the pavement design is not available, the State may request the Engineer to perform pavement design and submit to State for review and approval.

#### **DRAINAGE DESIGN FUNCTION CODE (161)**

- Hydrologic Studies: The Engineer shall provide a drainage report that evaluates the existing and proposed conditions in the depressed area, evaluates the existing pump station and makes recommendations for improvements to the pump station and any required mitigation measures. A detailed scope for the hydrologic studies is outlined in Exhibit A-1.
- Drainage Plans: Drainage plans and details shall include:
  - Overall drainage area map.
  - Hydrologic Data Sheets
  - Hydraulic Data Sheets
  - Existing drainage area maps
  - Proposed drainage area maps
  - Storm sewer plan and profile sheets
  - Lateral profiles sheets
  - Subsurface drainage at retaining walls
  - Drainage structure details
  - Detention pond layouts and details, if required
  - Bridge deck drainage
  - Drainage quantity summaries

### **SIGNING, PAVEMENT MARKINGS AND SIGNALIZATION FUNCTION CODE (162)**

- The Engineer shall prepare drawings, specifications, and details for all signs. The Engineer shall coordinate with the State 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 State Standards.
- The Engineer shall detail both permanent and temporary pavement markings and channelization devices on plan sheets. The Engineer shall coordinate with the State for overall temporary, interim, and final pavement marking strategies.
- If authorized, the Engineer shall prepare traffic signal warrant studies to support their recommendation for the continuous activation of the existing traffic signals or the proposed traffic signal based on projected volumes.
- The Engineer shall identify and prepare Traffic Signal Plans for all warranted traffic signals.
- The Engineer shall provide elevations for Overhead Sign Bridges with sign panels showing the road cross section and pertinent elevations and minimum clearances. The Engineer shall specify TxDOT standards to be used for the construction of the truss, truss towers and foundations.

### **MISCELLANEOUS ROADWAY DESIGN FUNCTION CODE (163)**

The miscellaneous roadway design task shall include the following services:

- Retaining Walls: The Engineer shall provide layouts, elevations, quantity estimate, summary of quantities, typical cross sections and structural details of all retaining walls within the project.
- Traffic Control Plans: The Engineer shall prepare Traffic Control Plans (TCP) including TCP typical sections, for the project. Task will also include coordination with State in scheduling a Traffic Control Workshop and submittal of the TCP for approval by the Traffic Control Approval Team (TCAT).
- Temporary Traffic Signals and Illumination: The Engineer shall develop plans for the adjustment or realignment of traffic signal heads. The Engineer shall address lighting of signalized intersections and shall coordinate with local utilities as approved by the State.
- Illumination: The Engineer shall prepare design for conventional, high-mast, and underpass lighting as required for the project. Future lighting requirements for the direct connector shall be coordinated with the State.
- Storm Water Pollution Prevention Plans (SW3P): The Engineer shall develop SW3P to minimize potential impact to receiving waterways. The SW3P must include text describing the plan, quantities, type, phase and locations of erosion control devices and any required permanent erosion control.
- Computation and Tabulation of Quantities: The Engineer shall compute quantities provide the summaries and quantities within all formal submittals.
- Special Utility Details: The Engineer shall develop special details to accommodate or adjust water and sanitary utilities.
- Miscellaneous Structural Details: The Engineer shall provide necessary details required to supplement standard details.

- **Agreements (Railroad, etc.) and Layouts:** The Engineer shall prepare each railroad or other agency agreement, exhibit, and layout sheet in accordance with the requirements of each railroad and as directed by the State. The Engineer shall coordinate with each railroad or agency and the State to determine submittal requirements, processing schedules, and exhibit formats. The Engineer shall submit each exhibit to the State for review and processing.
- **Estimate:** The Engineer shall independently develop and report quantities necessary to construct the contract in standard State bid format at the specified milestones and Final PS&E submittals.
- **Contract time determination:** The Engineer shall prepare a detailed contract time estimate to determine the approximate time required for construction of the project in calendar and working days (based on the State standard definitions of calendar and working days) at the 95% and Final PS&E milestone.
- **Specifications and General Notes:** The Engineer shall identify necessary standard specifications, special specifications, special provisions and the appropriate reference items.
- **Constructability Review:** The Engineer shall provide Independent Quality Review of the constructability PS&E sets.

### **Traffic Management Systems (Permanent) FUNCTION CODE (165)**

The Engineer shall design and provide details as a part of the State's Intelligent Transportation System to be managed from the Combined Transportation, Emergency and Communications Center (CTECC). The design must include elements such as lane-use control signals, variable message signs, closed-circuit Television (TV) cameras, and loop or other vehicle detection devices. The Engineer shall prepare the design and details including conduit and cable, support structures, control equipment, etc. necessary to implement the system. Design specifications shall be defined in the work authorization. The Engineer shall also coordinate with the State Computerized Transportation Management Systems (CTMS) Section should the State have a computerized traffic management system under construction or in place and operating within the project limits.

### **BRIDGE DESIGN FUNCTION CODE (170)**

The Engineer shall prepare bridge layouts for each bridge and bridge class culvert. Detailed listing of all scope items for bridge design are included in Exhibit A-1.

The Engineer shall prepare all work in accordance with the latest version of applicable State's procedures, specifications, manuals, guidelines, standard drawings, and standard specifications or previously approved special provisions and special specifications, which include: the *PS&E Preparation Manual*, *Roadway Design Manual*, *Hydraulic Design Manual*, the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*, *Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges (latest Edition)*, and other State approved manuals. When design criteria are not identified in State manuals, the Engineer shall notify the State and refer to the American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Street*, (latest Edition). In addition, the Engineer shall follow the State's District guidelines in developing the Plan, Specification, and Estimate (PS&E) package. The Engineer shall prepare a single PS&E package in a form suitable for letting through the State's construction contract bidding and awarding process.



The estimated cost for the preparation of plans, specifications and estimate for the project is approximately \$1,885,850. It is anticipated that the design effort will take approximately 12 months. Attached please find a preliminary design schedule for your review.

We very much appreciate the confidence of Fort Bend County in allowing us to execute this critically important project for Precinct 4 and are ready to meet and discuss any comments at your convenience.

Very truly yours,

A handwritten signature in black ink, appearing to read 'C. Georghiou', with a stylized flourish extending to the right.

Costas Georghiou, PE  
Principal

## EXHIBIT A-1

### SERVICES TO BE PROVIDED BY THE ENGINEER

The Engineer shall provide project management and engineering services required for the preparation of plans, specifications and estimates (PS&E) and related documents, for the proposed reconstruction of US 90A, (CSJ 0027-08-137), from approximately 2,200 feet west, (Cunningham Creek Blvd.), of SH 99 to approximately 2,800 feet east, (Gateway Blvd.), of SH 99 in Fort Bend County. These services will include, but are not limited to, preparing roadway and bridge design, hydrologic and hydraulic design, traffic signal design, survey, and geotechnical data collection, and construction phase services necessary to support the design process. The project schematic has been completed by TxDOT and the project is already environmentally cleared.

### GENERAL REQUIREMENTS

**1.1. Design Criteria.** The Engineer shall prepare all work in accordance with the latest version of applicable State's procedures, specifications, manuals, guidelines, standard drawings, and standard specifications or previously approved special provisions and special specifications, which include: the *PS&E Preparation Manual*, *Roadway Design Manual*, *Hydraulic Design Manual*, the *Texas Manual on Uniform Traffic Control Devices* (TMUTCD), *Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges* (latest Edition), and other State approved manuals. When design criteria are not identified in State manuals, the Engineer shall notify the State and refer to the American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Street*, (latest Edition). In addition, the Engineer shall follow the State's District guidelines in developing the Plan, Specification, and Estimate (PS&E) package. The Engineer shall prepare a single PS&E package in a form suitable for letting through the State's construction contract bidding and awarding process.

The Engineer shall identify, prepare exhibits and complete all necessary forms for each Design Exception and Waiver required within project limits prior to the 30% project completion submittal. The Engineer shall submit each exception and waiver to Fort Bend County and the State for coordination and processing of approvals. If subsequent changes require additional exceptions, the Engineer shall notify County and the State 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 notify the State and secure permission to enter private property to perform any surveying, environmental, engineering or geotechnical activities needed off State right-of-way. In pursuance of the State's policy with the general public, 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 and shall request concurrence from the State prior to each entry.

The Engineer shall notify the State and coordinate with adjacent projects on all controls at project interfaces. The Engineer shall document the coordination effort, and each engineer shall provide written concurrence regarding the agreed project controls and interfaces.

The Engineer shall prepare each exhibit necessary for approval by each railroad, utility, and other governmental or regulatory agency in compliance with the applicable format and guidelines required by each entity and as approved by the State. The Engineer shall notify the State in writing prior to beginning any work on any outside agency's exhibit.

**1.3. Progress Reporting and Invoicing.** The Engineer shall invoice according to Function Code breakdowns shown in Exhibit A of the Contract for Engineering Services. The Engineer shall submit each invoice in a format acceptable to the County.

The Engineer shall submit a monthly written progress report to the County's and the State's Project Manager regardless of whether the Engineer is invoicing for that month. The Engineer's written progress report shall 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 an estimated construction contract time schedule, using the latest version of Primavera software or any State's 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 State personnel in interpreting the schedules. The Engineer shall schedule milestone submittals at 30%, 60%, 90% and final project completion phases. The Engineer shall advise the State in writing if the Engineer is not able to meet the scheduled milestone review date.

Once the project goes to letting, all electronic files shall be delivered within 30 days of written request in conformance with the latest version of the State's Document and Information Exchange.

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

The Engineer shall prepare a letter of transmittal to accompany each document submittal to the State. At a minimum, the letter of transmittal must include the State's Control-Section-Job (CSJ) number, the highway number, County, project limits, State's contract number, and State's work authorization number.

**1.4. Traffic Control.** The Engineer shall provide all planning, labor, and equipment to develop the Traffic Control Plan (TCP) for design related field work such as surveying and geotechnical investigations. The Engineer shall comply with the requirements of the most recent edition of the TMUTCD. The Engineer shall submit a copy of the TCP to the State for approval prior commencing any work on any State roadway. The Engineer shall provide all signs, flags, and safety equipment needed to execute the approved TCP. The Engineer shall notify the State in writing twenty-four (24) hours in advance of executing each TCP requiring a lane closure, and shall have received written concurrence from the State prior to beginning the lane closure. The Engineer's field crew shall possess a copy of the approved TCP on the job site at all times and shall make the TCP available to the State for inspection upon request. The Engineer shall assign charges for any required traffic control to the applicable function code.

**1.5. Coordination.** The Engineer is contracting with Fort Bend County for the engineering services for this project. As such, the Engineer shall coordinate issues and communications with State's internal resource areas through the State's Project Manager while also maintaining close communication with Fort Bend County on all issues. The State will communicate the resolution of issues and provide the Engineer direction through the State's Project Manager. The Engineer will in turn coordinate such resolutions with Fort Bend County for approval and concurrence.

**1.6. 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 County, 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.

**1.7. 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 State'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 State in advance, the State, 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 State. If, at any time, during the course of reviewing a survey submittal it becomes apparent to the State that the submittal contains errors, omissions, or inconsistencies, the State 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.

**1.8. Use of the State's Standards.** The Engineer shall identify and insert as frequently as is feasible the applicable, current State's Standard Details, District Standard Details, or miscellaneous details that have been approved for use in the plan. The Engineer shall sign, seal, and date each Standard and miscellaneous detail if the Standard selected has not been adopted for use in a District. The Engineer shall obtain approval for use of these details during the early stages of design from the State Project Manager or designated State Area Engineer. 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 their design.

**1.9. Organization of Plan Sheets.** The PS&E shall be complete and organized in accordance with the latest edition of the State's 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 State's policies and procedures, and the District's PS&E Checklist.

**1.10. Limited Access to State's DCIS.** The Engineer shall receive limited access to the State's DCIS to update responsible engineer information, sign, seal and date, build specification list and develop Project estimate.

As shown on the table below, the Engineer shall access and update DCIS with the following function codes.

DCIS Update Screens	Required Access Criteria for DCIS	Function Code
S01-Responsible Engineer Update S03-Sealing, Signing & Dating P04-Project Estimate C03-Build Specifications	Consultant Registered Professional Engineer (PE)	CONENG
P04-Project Estimate C03-Build Specifications	Consultant does not have to be a PE	CONEST

When requested by the State, the Engineer shall sign the following TxDOT forms: 1828, Information Security Compliance Agreement; 1980, Request for External Access to the State's Information Systems; 2110, Information Resources Confidentiality Agreement, and DR-IRI Information Access Request Form. These access rights will be revoked after the project is let.

**1.11. Organization of Design Project Folder and Files (Electronic Project Files).** The Engineer shall organize the electronic project files in accordance with the State's File Management System (FMS) format. With the approval of the State, the Engineer may maintain the project files in the State's ProjectWise container.

## **TASK DESCRIPTIONS AND FUNCTION CODES**

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

### **FEASIBILITY STUDIES - FUNCTION CODE (110)**

**110.1. Data Collection and Field Reconnaissance.** The Engineer shall collect, review and evaluate data described below. The Engineer shall notify the State in writing whenever the Engineer finds disagreement with the information or documents:

1. Data, if available, from the State, including “as-built plans”, existing schematics, right-of-way maps, Existing cross sections, existing planimetric mapping, environmental documents, existing channel and drainage easement data, existing traffic counts, accident data, Bridge Inspection records, Project Management Information system (PMIS) data, identified endangered species, identified hazardous material sites, current unit bid price information, current special provisions, special specifications, and standard drawings.
2. Documents for existing and proposed development along proposed route from local municipalities and local ordinances related to project development.
3. Utility plans and documents from appropriate municipalities and agencies.
4. Flood plain information and studies from the Federal Emergency Management Agency (FEMA), the United States Army Corps of Engineers (USACE), local municipalities, and other governmental agencies..
5. Conduct field reconnaissance and collect data including a photographic record of notable existing features.

**110.2. Design Criteria.** The Engineer shall develop the roadway design criteria based on the controlling factors specified by the State (*i.e.* 4R, 3R, 2R, or special facilities), by use of the funding categories, design speed, functional classification, roadway class and any other set criteria as set forth in *PS&E Preparation Manual*, *Roadway Design Manual*, *Bridge Design Manual*, *Hydraulic Design Manual*, and other deemed necessary State approved manuals. In addition, the Engineer shall prepare the Design Summary Report (DSR) and submit it electronically. The Engineer shall obtain written concurrence from the State prior to proceeding with a design if any questions arise during the design process regarding the applicability of State’s design criteria.

**110.3. Preliminary Cost Estimates.** The Engineer shall develop a preliminary cost estimate using the Average Low Bid Unit Price. The Engineer shall estimate the total project cost including preliminary engineering, final engineering, right-of-way

(ROW) acquisition, environmental compliance and mitigation, construction, utility relocation, and construction engineering inspection (CEI).

**110.4. Design Concept Conference.** In accordance with the State's Project Development Process Manual, the Engineer, in cooperation with the State, shall plan, attend and document the Design Concept Conference (DCC) to be held prior to the 30 percent milestone submittal. In preparation for the DCC, the Engineer shall complete a State's Design Summary Report to serve as a checklist for the minimum required design considerations. The conference will provide for a brainstorming session in which decision makers, stakeholders and technical personnel may discuss and agree on:

1. Roadway and drainage design parameters
2. Engineering and environmental constraints
3. Project development schedule
4. Other issues as identified by the State
5. Identify any Design Exceptions and Waivers
6. Preliminary Construction Cost Estimate

**110.5. Geotechnical Borings and Investigations:** 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 the State's Geotechnical Manual. The Engineer shall evaluate available geotechnical boring information obtained for the Grand Parkway project and recommend utilization of suitable boring information. The location and depth of available borings will be incorporated on the boring layout to be submitted to the State. The State will review and provide comments for a boring layout submitted by the Engineer showing the general location and depths of the proposed borings. Once the Engineer receives the State's review comments they shall perform soil borings (field work), soil testing and prepare the boring logs in accordance with the latest edition of the State's Geotechnical Manual and State District's procedures and design guidelines. The bore hole locations shall be marked for the survey crew. The Engineer shall coordinate geotechnical findings with TxDOT for main lane and frontage road pavement design and provide recommendations for temporary pavement.

1. All geotechnical work should be performed in accordance with the latest version of the State's Geotechnical Manual. Ground water elevations shall be noted per the Geotechnical Manual. All testing shall be performed in accordance with the latest version of the State's Manual of Test Procedures. American Society for Testing Materials (ASTM) test procedures can be used only in the absence of the State's procedures. All soil classification should be done in accordance with the Unified Soil Classification System.

2. 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. The Engineer shall perform soil borings, coring for pavement removal items, piezometric readings, testing and analysis to include slope stability analysis, settlement analysis, and foundation design recommendations along storm drain alignment, retaining walls, overhead sign structures, 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. It is expected that the State will provide the pavement design for the proposed main lanes and frontage roads as well as temporary pavement. In the event that the State cannot provide the pavement design, the Engineer shall perform the pavement design and submit recommendations to the State for approval.

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 a State's District standards.

6. Foundation Studies: The Engineer shall coordinate with the State to 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 the State's 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 the State's WINCORE software as can be found on the Texas Department of Transportation (TxDOT) website.

## **SOCIAL/ECON/ENVIRON STUDIES - FUNCTION CODE (120)**

**120.1. Informal Meetings.** The Engineer shall provide technical assistance, preparation of exhibits for, and minutes of informal meetings requested by the public to discuss the pending impacts to neighborhoods and businesses due to roadway shutdowns, detours and access restrictions or as deemed necessary.



**120.2. Environmental Permits Issues and Commitments (EPIC) Sheets.** The Engineer shall complete the latest version of the EPIC sheets per information provided by the State. These sheets must be signed, sealed and dated by the Engineer as indicated in signature block. The final sheets must be submitted for the State's signature.

**120.3. Environmental Study Review.** The State shall provide the draft and final environmental document to the Engineer for review and implementation into the PS&E package. The Engineer shall consider the constructability issues as it relates to the environmental impacts.

### **RIGHT-OF-WAY - FUNCTION CODE (130)**

#### **FC 130 – Right-of-Way Data**

All standards, procedures and equipment used by the Engineer's Surveyor shall be such that the results of the survey will be in accordance with Board Rule 663.15, as promulgated by the Texas Board of Professional Land Surveyors.

The Engineer shall locate the existing ROW within the project limits from the current project control monuments and prepare a layout map for the project.

**130.1. Right-of-Way Map.** The Engineer shall review and evaluate the proposed or existing right-of-way map to verify that all construction staging and alignment considerations have been taken into account. The Engineer shall make every effort to prevent detours and utility relocations from extending beyond the proposed right-of-way lines. The Engineer shall notify the State in writing if it is necessary to obtain additional construction easements or rights-of-entry and shall provide justification for such action. The Engineer shall be responsible for identifying and delineating any temporary construction easements in areas outside the State's Right of Way. The State shall secure the necessary legal instruments.

**130.2. Utility Locations and Layouts.** The Engineer shall coordinate with the State to determine the location of each existing and proposed utility and attend meetings with the various utility companies to discuss potential conflicts. The Engineer shall identify and coordinate with each utility company for relocations required within each construction easement or right-of entry. The Engineer shall gather all existing utility information and furnish a DWG to identify utility conflicts. The Engineer shall prepare utility conflict list and update such list at the 30%, 60% and 90% stage and participate in the state's utility coordination meetings with affected utilities and prepare meeting minutes of such meetings. The Engineer shall produce utility adjustment layouts for affected water and sanitary utilities.

**130.3. Access Management.** The Engineer shall coordinate and evaluate access management within the project limits in accordance with the latest State Access Management Manual or as directed by the State.

## **MANAGING CONTRACTED PE - FUNCTION CODE (145)**

The Engineer, in association with the State's Project Manager shall be responsible for directing and coordinating all activities associated with the project to comply with State policies and procedures, and to deliver that work on time. The Engineer shall inform Ft Bend County's Project Engineer of all meetings with the State and sub-consultants. The Engineer shall copy the County's Project Engineer on all project related email correspondence.

Project Management and Coordination. The Engineer shall coordinate all sub-consultant activity to include quality of and consistency of plans and administration of the invoices 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 Exhibit C, Work Schedule, for each work authorization. The schedule submittals shall be hard copy and electronic format.
- Meet on a scheduled basis with the State and Ft Bend County 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.

## **TOPOGRAPHIC SURVEYS - FUNCTION CODE (150)**

### **Design Surveys and Construction Surveys**

Design Surveys and Construction Surveys include performance of surveys associated with the gathering of survey data for topography, cross-sections, and other related work in order to design a project, or during layout and staking of projects for construction. The Engineer shall coordinate with TxDOT and the Ft Bend County Toll Road Authority to obtain existing survey information from the US 90A Schematic and/or Grand Parkway Project respectively.

#### **1. PURPOSE**

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

The purpose of a construction survey is to provide field data in support of highway construction.

## 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.

A construction survey is defined as the combined performance of reconnaissance, field work, analysis, computation, and documentation necessary to provide the horizontal and vertical position of specific ground points to be used by the construction contractor for determining lines and grades.

## 3. TASKS TO BE COMPLETED

### 3.1. Design Surveys

The Surveys shall perform tasks including, but not limited to the following:

- i. Obtain or collect data to create cross-sections and digital terrain models.
- ii. Locate existing utilities.
- iii. Locate topographical features and existing improvements.
- iv. Provide details of existing bridge structures.
- v. Provide details of existing drainage features, (e.g., culverts, manholes, etc.).
- vi. Locate wetlands.
- vii. 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 the State.

- viii. Locate existing right-of-ways.
- ix. Review right-of-way maps.
- x. Locate boreholes.
- xi. Perform hydrographic surveys.
- xii. Update existing control data and prepare survey control data sheets, as directed by the State for inclusion into a construction plan set.

The 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 State's forms for these sheets can be downloaded from the State's website.

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 employed by the State
- RPLS signature, seal, and date
- The State's title block containing District Name, County, Highway, and CSJ

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 employed by the State.
- RPLS signature, seal and date.
- The State's title block containing District Name, County, Highway, and CSJ.

#### 4. TECHNICAL REQUIREMENTS

- 4.1. Design surveys and construction surveys must be performed under the supervision of a RPLS currently registered with the TBPLS.
- 4.2. Horizontal ground control used for design surveys and construction surveys, furnished to the Surveyor by the State or based on acceptable methods conducted by the 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 and construction surveys, furnished to the Surveyor by the State or based on acceptable methods conducted by the 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 State's *MicroStation V8i* graphics program without further modification or conversion.

- b. Electronically collected and processed field survey data files must be fully compatible with the State's computer systems without further modification or conversion. All files must incorporate only those feature codes currently being used by the State.
- c. DTM must be fully compatible with the State's *GEOPAK* 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.

## **DELIVERABLES**

The deliverables to be specified in individual work authorizations for design surveys and construction surveys shall be any combination of the following:

- Digital Terrain Models (DTM) and the Triangular Irregular Network (TIN) files in a format acceptable by the State.
- Maps, plans, or sketches prepared by the Surveyor showing the results of field surveys.
- Computer printouts or other tabulations summarizing the results of field surveys.
- Digital files or media acceptable by the State containing field survey data (ASCII Data files).
- Maps, plats, plans, sketches, or other documents acquired from utility companies, private corporations, or other public agencies, the contents of which are relevant to the survey.
- Field survey notes, as electronic and hard copies.
- An 8 ½ inch by 11 inch survey control data sheet for each control point which must include, but need not be limited to, a location sketch, a physical description of the point including a minimum of two reference ties, surface coordinates, a surface adjustment factor, elevation, and the horizontal and vertical datums used. A pre-formatted survey control data sheet form in MicrosoftOffice Word 2010 format will be provided by the State.
- A digital and hard copy of all computer printouts of horizontal and vertical conventional traverses, GPS analysis and results, and survey control data sheets.

- All GEOPAK GPK files and/or OpenRoads GEOPAK files.
- Survey reports in a format requested by the State.

## **ROADWAY DESIGN - FUNCTION CODE (160)**

The Engineer shall inform the State 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 State unless otherwise directed by the State to proceed. The Engineer shall identify, prepare exhibits, and complete all necessary forms for Design Exceptions and Waivers within project limits prior to the 30% Submittal. These exceptions shall be provided to the State for coordination and processing of approvals.

### **160.1. Geometric Design.** The Engineer shall:

- A. **Refine Schematic.** The Engineer shall review the schematic provided by the State to confirm their 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, direct connectors, frontage roads, cross streets, including 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 State and adjacent Engineers. The State must approve the refined schematic prior to the Engineer proceeding to the 30% milestone submittal, and prior to starting on the bridge layouts.
- B. **Preliminary Geometric Project Layout.** The Engineer shall develop a preliminary geometric project layout (Layout) and a preliminary 3D model if requested by the State, for the full length of the project to be reviewed and approved by the State prior to the Engineer proceeding with the 30% 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. The Layout must be prepared in accordance with the current Roadway Design Manual. The Engineer shall provide horizontal and vertical alignment of the project layout in English units for main lanes and cross streets. Minor alignment alternatives must be considered to provide for an optimal design. The project layout must be coordinated with the State 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 model, if requested by the State, must be created using Bentley's OpenRoads GEOPAK tools. The 3D 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 State 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.

## **160.2. Roadway Design.**

If requested by the State, the Engineer shall use Bentley's OpenRoads 3D Design technology in the design and preparation of the roadway plan sheets.

The Engineer shall provide roadway plan and profile drawings using CADD standards as required by the State. 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 State. Existing and proposed right-of-way lines must be shown. Plan and Profile must be shown on separate or same sheets (this depends upon width of pavement) for main lanes, frontage roads, and direct connectors. The plan view must contain the following design elements:

1. Calculated roadway centerlines for mainlanes, ramps, cross streets and frontage roads, as applicable. Horizontal control points must be shown. The alignments must be calculated using GEOPAK.
2. Pavement edges for all improvements (mainlanes, direct connectors, ramps, cross streets, driveways and frontage roads, if applicable).
3. Lane and pavement width dimensions.
4. The geometrics of ramps, auxiliary and managed lanes.
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 scale shall 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 for proposed main lanes (cite direction), direct connectors, ramps, cross streets and frontage roads, if applicable. Vertical curve data, including "K" values must be shown.
2. Existing and proposed profiles along the proposed centerline of the main lanes, the outside shoulder line of ramps, and the outside gutter line of the designated (north, south, east or west) bound frontage roads.
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 interchanges, main lanes, grade separations and ramps (shall include cross sections of any proposed or existing roadway, structure, or utility crossing).
6. Drawing vertical scale to be 1"=10'.

### **160.3. 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, managed lanes, and ROW. The typical section must also include Proposed Profile Gradeline (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.

**160.4. Main lane and Frontage Road Design:** The Engineer shall provide the design of main lanes with full shoulders, frontage roads, entrance and exit ramps, managed lanes and auxiliary lanes. The design must be consistent with the approved schematic or refined schematic and the current *TxDOT Roadway Design Manual*.

**160.5. Interchange.** The Engineer shall be responsible for the complete design of the main lanes and ramps as shown on the schematic. The interchange design must be consistent with the schematic design and must include a plan and profile of the

frontage roads, intersection layout, drainage structures, sidewalks, geometrics, signalization, turnaround details, and transitions to existing roadway. The Engineer shall verify that the direct connector shown on the schematic does not interfere with any part of the US 90 A and that direct connector foundations can be built in the future.

**160.6. Cross Streets.** The Engineer shall provide an intersection layout detailing the pavement design and drainage design at the intersection of each cross street. The layout must include the horizontal and vertical alignments, curb returns, geometrics, transition length, stationing, pavement, drainage details, and American with Disabilities Act Accessibility Guidelines (ADAAG) compliance items. The Engineer shall design for full pavement width to the ROW and provide a transition to the existing roadway.

**160.7. Cut and Fill Quantities.** 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 delivered in standard GEOPAK format on 11"x17" sheets or roll plots and electronic files. The Engineer shall provide all criteria and input files used to generate the design cross sections. Cross sections and quantities must include existing pavement removals. Annotation shall include at a minimum existing and proposed ROW, side slopes (front & back), profiles, etc.

The Engineer shall submit \_\_\_\_ sets of drawings at the 30%, 60%, and 90%, and final submittals, respectively. If requested by the State, the Engineer shall also submit the current OpenRoads generated 3D model for each submittal.

The Engineer shall submit 12 sets of drawings at the 30%, 60%, and 90%, and final submittals, respectively.

**160.8. Plan Preparation.** The Engineer shall prepare roadway plans, profiles and typical sections for the proposed improvements. Prior to the 30% submittal, the Engineer shall schedule a workshop to review profiles and cross-sections with the State. The profile and cross sections must depict the 2, 5, 10, 25, 50, 100 and 500 year (if available) water surface elevations. The drawings will 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 State to determine the most feasible proposed roadway profile. The State will approve the proposed profiles, 3D models (if applicable), and cross sections before the Engineer continues with the subsequent submittals. This scope of services and the corresponding cost proposal are based on the Engineer preparing plans to construct freeway main lanes, direct connectors, ramps, frontage roads, and cross streets at intersections. The roadway plans must consist of the types and be organized in the sequence as described in the *PS&E Preparation manual*.

**160.9 Pavement Design.** If applicable, the Engineer shall incorporate the pavement design developed by the State for this project. If the pavement design is not

available, the State may request the Engineer to perform pavement design and submit to State for review and approval.

**160.10. Pedestrian and Bicycle Facilities.** The Engineer shall coordinate with the State to incorporate pedestrian and bicycle facilities as required or shown on the project's schematic. All pedestrian and bicycle facilities must be designed in accordance with the latest Americans with Disabilities Act Accessibility Guidelines (ADAAG), the Texas Accessibility Standards (TAS), and the AASHTO Guide for the Development of Bicycle Facilities

### **DRAINAGE DESIGN - FUNCTION CODE (161)**

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 Federal Emergency Management Agency (FEMA).
3. Collect available Flood Insurance Rate Maps (FIRMs), Flood Insurance Study (FIS) study data, and models.
4. Collect existing drainage reports for the existing pump station, including hydraulic models, record drawings, of pump station and outfall structures. The Engineer shall obtain the methods used for sizing the pumps.
5. Review survey data and coordinate any additional surveying needs with State.
6. At the State's request, existing drainage structures shall be represented in a 3D MicroStation model.
7. Meet with local government officials to obtain historical flood records. Interview local residents or local government employees to obtain additional high-water information if available. Obtain frequency of road closure and any additional high-water information from the District Maintenance office.
8. Submit a letter report to the State Project Manager detailing completion of data collection.

161.2. Hydrologic Studies. The Engineer shall provide the following services:

1. Incorporate in the hydrologic study a thorough evaluation of the methodology available, comparison of the results of two or more methods, and calibration of results against measured data, if available.

2. Calculate discharges using appropriate hydrologic methods and as approved by the State.
3. Consider the pre-construction and post-construction conditions in the hydrologic study.
4. Obtain the drainage area boundaries and hydrologic parameters such as impervious covered areas, and overland flow paths and slopes from appropriate sources including, but are not limited to, topographic maps, GIS modeling, construction plans, and existing hydrologic studies. The Engineer shall not use existing hydrologic studies without assessing of their validity. If necessary, obtain additional information such as local rainfall.
5. Include, at a minimum, the "design" frequency to be specified in the criteria and the 1% Annual Exceedance Probability (AEP) storm frequency. The report must include the full range of frequencies (50%, 20%, 10%, 4%, 2%, 1%, and 0.2% AEP).
6. Compare calculated discharges to the effective FEMA flows. If calculated discharges are to be used in the model instead of the effective FEMA flows, full justification must be documented.

161.3. Complex Hydraulic Design and Documentation. The Engineer shall provide the following services:

1. Gather information regarding existing drainage facilities and features from existing plans and other available studies or sources.
2. Perform hydraulic design and analysis using appropriate hydraulic methods, which may include computer models such as HEC-RAS, unsteady HEC-RAS or 2D models such as SWMM. 2D models shall not be developed without the express permission of the State. Data entry for appropriate hydraulic computer programs shall consist of a combination of both on-the-ground survey and other appropriate sources including but not limited to topographic maps, GIS modeling, and construction plans and existing hydrologic studies.
3. Use the current effective FEMA models, where appropriate, as a base model for the analysis. If a "best available data" model is provided by the local floodplain administrator, it must be utilized accordingly for this analysis. Review the provided base model for correctness and updated as needed. If the provided effective model is not in a HEC-RAS format, convert it to HEC-RAS for this analysis.
4. If the appropriate hydrologic model requires storage discharge relationships, develop HEC-RAS models or other State's approved models that will compute these storage discharge relationships along the channel.
5. Consider pre-construction, present and post-construction conditions, as well as future widening, as determined in the Work Authorization.
6. Quantify impacts, beneficial or adverse, in terms of increases in peak flow rates and water surface elevations for the above listed hydraulic conditions

and hydrologic events. Impacts will be determined both upstream and downstream of the bridge crossings.

7. If required, compute right of way corridor 1% AEP flood plain volumes for existing and proposed roadway elevations. The Engineer shall provide mitigation to offset a decrease in 1% AEP flood plain volumes.
8. Use hydrograph calculations and peak flows to determine the storage required.
9. If necessary, present mitigation measures along with the advantages and disadvantages of each. Each method must consider the effects on the entire area. Include approximate construction costs in the report.
10. Provide hand calculations which quantify the cut and fill within the 1% AEP flood plain, if any.

#### 161.4. Storm Drains

The Engineer shall provide the following services:

1. Design and analyze storm drains using software as approved by the State.
2. Size inlets, laterals, trunk line and outfall. Develop designs that 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. Storm drain design software shall be selected as directed by the State.
3. Determine hydraulic grade line starting at the outfall channel for each storm drain design. Use the design water surface elevation of the outfall as the starting basis (tailwater) for the design of the proposed storm sewer system.
4. Calculate manhole headlosses. Compute manhole head losses as per FHWA's HEC-22.
5. Limit discharge into existing storm drains and existing outfalls to the capacity of the existing system, which will be determined by the Engineer. Evaluate alternate flow routes or detention, if necessary, to relieve system overload. Determine the amount of the total detention storage to control storm drain runoff for the design frequency based on hydrograph routing for the full range of frequencies (50%, 20%, 10%, 4%, 2%, 1%, and 0.2% AEP), as well as a rough estimate of the available on-site volume. When oversized storm drains are used for detention, the Engineer shall evaluate the hydraulic gradeline throughout the whole system, within project limits, for the design frequency or frequencies. The Engineer shall coordinate with the State any proposed changes to the detention systems. The State will assess the effects of such changes on the comprehensive drainage studies.
6. Identify areas requiring trench protection, excavation, shoring, and dewatering.

161.5. Cross-Drainage Structures: The Engineer shall provide the following services:

1. Determine drainage areas and flows for cross culvert drainage systems.
2. Determine the sizing of the drainage crossings. The scope may include extending, adjusting or replacing non bridge-class culvert crossing or crossings at approximate schematic stations 4+00 and 45+00. Develop designs that minimize the interference with the passage of traffic or cause 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. Cross drainage design shall be performed using HY-8 or HEC RAS.

161.6. Temporary Drainage Facilities: The Engineer shall provide the following services:

1. Develop plans for all temporary drainage facilities necessary to allow staged construction of the project and to conform with the phasing of adjacent construction projects without significant impact to the hydraulic capacity of the area. Drainage area maps are not required for temporary drainage.

161.7. Plans, Specifications and Estimates (PS&E) Development for Hydraulics: The Engineer shall provide the following services:

- a. Prepare the PS&E package in accordance with the applicable requirements of the State's specifications, standards, and manuals, including the PS&E Preparation Manual. Include the following sheets and documents, as appropriate:
  - i. Hydrologic Data Sheets
  - ii. Hydraulic Data Sheets
  - iii. Scour Data Sheets (if applicable)
  - iv. Culvert Layout Sheets
  - v. Storm Drain Plan/Profile Sheets
  - vi. Detention Pond Layouts
  - vii. Detention Pond Details
  - viii. Roadway Plan & Profile Sheets including profile grade line of parallel ditches, if applicable.
  - ix. All other relevant sheets
- b. Prepare culvert cross sections and identify each cross section's station location.

- c. Identify areas requiring trench protection, excavation, shoring and de-watering.
- d. Prepare drainage area maps.
- e. If applicable, prepare plan and profile sheets for storm drain systems and outfall ditches.
- f. Select any necessary standard details from State or District's list of standards for items such as inlets, manholes, junction boxes and end treatments.
- g. Prepare details for non-standard inlets, manholes and junction boxes.
- h. Prepare drainage details for outlet protection, outlet structures and utility accommodation structures
- i. Identify pipe strength requirements
- j. Prepare drainage facility quantity summaries
- k. Identify potential utility conflicts and, if feasible, design to mitigate or avoid those identified conflicts.
- l. Consider pedestrian facilities, utility impacts, driveway grades, retaining wall and concrete traffic barrier drainage impacts.
- m. Identify existing ground elevation profiles at the ROW lines on storm sewer plan and profile sheets.
- n. Locate soil borings every 500 feet along the storm sewer alignment and take piezometric readings at 2000 foot intervals.
- o. Prepare Hydraulic Data Sheets for any bridge or cross drainage structures at the outfall channel and indicate site location (e.g., station and name of creek or bayou), if applicable.
- p. Develop a 3D model of the proposed drainage structures using the SUE or SUEDA capabilities of the Bentley Civil Product, if requested by the State.
- q. Develop layouts for the following:
  - i. Subsurface drainage at retaining walls.



- ii. Outfall channels within existing ROW.
- iii. Bridge deck drainage systems, including internal drainage piping within the bents where required on structures.
- iv. Detention ponds, associated outlet structures, and details, if applicable. If information is not available at the time of initial scoping, this work shall be considered as additional work.

## **SIGNING, PAVEMENT MARKINGS AND SIGNALIZATION (PERMANENT) - FUNCTION CODE (162)**

**162.1. Signing.** The Engineer shall prepare drawings, specifications, and details for all signs. The Engineer shall coordinate with the State (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 State Standards.

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

The Engineer shall provide the following information on sign 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, to be removed, to be relocated or replaced.
- Proposed signs (illustrated, numbered and 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 interchanges, 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.

**162.3. Traffic Warrant Studies.** The Engineer shall prepare a traffic signal warrant study to support their recommendation for the continuous activation of an existing traffic signal or a proposed traffic signal based on projected volumes. Each warrant study must include addressing pedestrian signals along with obtaining both traffic and pedestrian counts.

The Engineer shall implement each proposed traffic signal improvement within existing State ROW unless otherwise approved by the State. The Engineer shall refer to latest version of the *TMUTCD*, *Traffic Signal Manual*, and The State's roadway (ramp) and traffic standards for work performed for either temporary or permanent traffic signals. The Engineer shall develop and include a timing plan for each signal improvement.

**162.4. Traffic Signals.** Based upon the results of the Traffic Warrant Studies, the Engineer shall identify and prepare Traffic Signal Plans for all warranted traffic signals. The Engineer shall confirm the power source for all signals and coordinate with the appropriate utility agency. Traffic Signal Plans must be signed and sealed by a Texas Registered Professional Engineer. The Engineer shall develop all quantities, general notes, specifications and incorporate the appropriate agency standards required to complete construction. Traffic signal poles, fixtures, signs, and lighting must be designed per the Green Ribbon Report recommendations and standards.

The Engineer shall provide the following information in the Traffic Signal Plans:

1. Layout
  - a. Estimate and quantity sheet
    - (1) List of all bid items
    - (2) Bid item quantities
    - (3) Specification item number
    - (4) Paid item description and unit of measure
  - b. Basis of estimate sheet (list of materials)
  - c. General notes and specification data.
  - d. Condition diagram
    - (1) Highway and intersection design features
    - (2) Roadside development
    - (3) Traffic control including illumination

- e. Plan sheet(s)
    - (1) Existing traffic control that will remain (signs and markings)
    - (2) Existing utilities
    - (3) Proposed highway improvements
    - (4) Proposed installation
    - (5) Proposed additional traffic controls
    - (6) Proposed illumination attached to signal poles.
    - (7) Proposed power pole source
  - f. Notes for plan layout
  - g. Phase sequence diagram(s)
    - (1) Signal locations
    - (2) Signal indications
    - (3) Phase diagram
    - (4) Signal sequence table
    - (5) Flashing operation (normal and emergency)
    - (6) Preemption operation (when applicable)
    - (7) Contact responsible Agency to obtain interval timing, cycle length and offset
  - h. Construction detail sheets(s)
    - (1) Poles (State standard sheets)
    - (2) Detectors
    - (3) Pull Box and conduit layout
    - (4) Controller Foundation standard sheet
    - (5) Electrical chart
  - i. Marking details (when applicable)
  - j. Aerial or underground interconnect details (when applicable)
2. General Requirements
    - a. Contact local utility company
      - (1) Confirm power source
    - b. Prepare governing specifications and special provisions list
    - c. Prepare project estimate
    - d. Conduct traffic counts and prepare Traffic Signal Warrant Studies for all proposed and existing traffic signals at designated locations.
  3. Summary of Quantities
    - a. Small signs tabulation
    - b. Large signs tabulation including all guide signs
  4. Sign Detail Sheets
    - a. All signs except route markers
    - b. Design details for large guide signs
    - c. Dimensioning (letters, shields, borders, etc.)
    - d. Designation of shields attached to guide signs

**162.5 Overhead Sign Structures.** The Engineer shall provide elevations for Overhead Sign Bridges with sign panels showing the road cross section and pertinent elevations and minimum clearances. The Engineer shall specify TxDOT standards to be used for the construction of the truss, truss towers and foundations.

## **FUNCTION CODE (163) – MISCELLANEOUS ROADWAY DESIGN**

The Engineer shall provide the following services:

**163.1. 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 *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 walls type, 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 early in the plan preparation the retaining wall layouts to obtain approval from the State. 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 designed using Bentley's OpenRoads 3D modelling Technology, the retaining walls shall be represented in the 3D model.

The approximate limits of each retaining wall shall be based on Station or length. The Engineer shall notify the State the type of retaining walls that will be used for and Cut and Fill location. Retaining wall types must include:

- Spread Footing Walls (High Footing Pressure Design and Low Footing Pressure Design). The Engineer shall select a spread footing wall for fill situation when considerable room behind the walls is available for forming, constructing, and backfilling the footings and stem. The Engineer shall notify the State when the quantity is less than 1000 square feet to have as option in the plans to cast in place a spread footing wall design. This selection has to be approved to State.
- Mechanically Stabilized Earth (MSE) Walls. The Engineer shall prepare the retaining wall layouts showing plan and profile or retaining walls for design by a State 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.
- Concrete Block Walls (Structural and Landscape).
- Tied Back Walls.

- Soil Nailed Walls.
- Rock Nailed Walls.
- Drilled Shaft Walls.
- Temporary MSE Walls.

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. Approximate lengths of the retaining walls as shown on the schematic are listed as below. 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, the State will provide architectural standard drawings. The Engineer shall incorporate architectural standard drawings into design details. The specific requirements for each item are as follows:

#### 1. Layout Plan

- (1) Designation of reference line
- (2) Beginning and ending retaining wall stations
- (3) Offset from reference line
- (4) Horizontal curve data
- (5) Total length of wall
- (6) Indicate face of wall
- (7) All wall dimensions and alignment relations (alignment data as necessary)
- (8) Soil boring locations
- (9) Drainage, signing, lightning, etc. that is mounted on or passing through the wall.
- (10) Subsurface drainage structures or utilities which 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 if Traffic Railing foundation standard is not being used on this 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 detail drawings in accordance with the standard requirements of the State.
  - (b) For retaining wall submittals, the Engineer shall check State's Bridge Division website for current requirements.

**163.2. Traffic Control Plan, Detours, Sequence of Construction.** The Engineer shall prepare Traffic Control Plans (TCP) including TCP typical sections, for the project. The Engineer shall complete Form 2229-Significant Project Procedures along with Page 4 of Form 1002, specifically titled Accelerated Construction Procedures. 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. The Engineer shall show proposed traffic control devices at grade intersections during each construction phase (stop signs, flagperson, signals, etc.). The Engineer shall 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. Coordinate with the State in scheduling a Traffic Control Workshop and submittal of the TCP for approval by the Traffic Control Approval Team (TCAT). The Engineer shall assist the State 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. The Engineer shall notify the State in the event existing access must be eliminated, and must receive approval from the State prior to any elimination of existing access.
4. Design temporary drainage to replace existing drainage disturbed by construction activities or to drain detour pavement. The Engineer shall show horizontal and vertical location of culverts and required cross sectional area of culverts.

5. Prepare each TCP in coordination with the State. The TCP must include interim signing for every phase of construction. Interim signing must include regulatory, warning, construction, route, and guide signs. The Engineer shall interface and coordinate phases of work, including the TCP, with adjacent Engineers, which 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. The Engineer shall develop a list of each abutting property along its alignment. The Engineer shall prepare exhibits for and attend meetings with the public, as requested by the State.
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, the Engineer shall notify the State in writing of the need and justification for such action. The Engineer shall identify and coordinate with all utility companies for relocations required.
8. Describe the type of work to be performed for each phase of 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 to include limits of construction, obliteration, and shifting or detouring of traffic prior to the proceeding 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.

**163.3. Temporary Traffic Signals and Illumination:** The Engineer shall immediately notify the State if the Engineer determines that an existing traffic signal or roadway illumination will be affected by the project. The Engineer shall address the adjustment or realignment of traffic signal heads and the use of detection for mainlanes and side streets on the plans as directed by the State. The Engineer shall obtain traffic movement counts to address any new timing plans to minimize the impact during construction and to determine the storage length needed for left and right turn movements. The Engineer shall address lighting of signalized intersections and shall coordinate with local utilities as approved by the State.

**163.4. Illumination.** The Engineer shall refer to TxDOT's *Highway Illumination Manual* and other deemed necessary State 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 State. The Engineer shall prepare circuit wiring diagrams showing the number of luminaries on each circuit, electrical conductors, length of runs, 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 State to determine the location of proposed high-mast, conventional, and underpass lighting.

**163.5. StormWater Pollution Prevention Plans (SW3P).** The Engineer shall develop SW3P, on separate sheets from (but in conformance with) the TCP, to minimize potential impact to receiving waterways. The SW3P must include text describing the plan, quantities, type, phase and locations of erosion control devices and any required permanent erosion control.

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

**163.7. Special Utility Details (Water, Sanitary Sewer, etc.)** The Engineer shall develop special details to accommodate or adjust utilities. Prior to developing any special utility detail, the Engineer shall notify the State in writing regarding each utility conflict that may require an accommodation. As directed by the State the Engineer shall coordinate with each utility to develop each special detail. The Engineer shall develop each utility detail or accommodation in compliance with the State's *Utility Accommodation Rules*. The Engineer shall prepare each plan sheet, detail sheet, special specification, special provision, and special note required to incorporate the details into the State's plans.

**163.8. Miscellaneous Structural Details.** The Engineer shall provide necessary details required to supplement standard details.

**163.9. Agreements (Railroad, etc.) and Layouts.** The Engineer shall prepare each railroad or other agency agreement, exhibit, and layout sheet in accordance with the requirements of each railroad and as directed by the State. The Engineer shall coordinate with each railroad or agency and the State to determine submittal requirements, processing schedules, and exhibit formats. The Engineer shall submit each exhibit to the State for review and processing.

**163.11. Estimate.** The Engineer shall independently develop and report quantities necessary to construct the contract in standard State bid format at the specified milestones and Final PS&E submittals. The Engineer shall prepare each construction cost estimates using Estimator or any approved method. The estimate shall be provided at each milestone submittal or in DCIS format at the 95% and Final PS&E submittals per State's District requirement.

**163.12. Contract time determination.** The Engineer shall prepare a detailed contract time estimate to determine the approximate time required for construction of the project in calendar and working days (based on the State standard definitions of calendar and working days) at the 95% and Final PS&E milestone. The schedule must include tasks, subtasks, critical dates, milestones, deliverables, and review



requirements in a format which depicts the interdependence of the various items and adjacent construction packages. The Engineer shall provide assistance to the State in interpreting the schedule.

**163.13. Specifications and General Notes.** The Engineer shall identify necessary standard specifications, special specifications, special provisions and the appropriate reference items. The Engineer shall prepare General Notes from the District's *Master List of General Notes*, Special Specifications and Special Provisions for inclusion in the plans and bidding documents. The Engineer shall provide General Notes, Special Specifications and Special Provisions in the required format.

**163.14. Constructability Review.** The Engineer shall provide Independent Quality Review of the constructability PS&E sets.

The Engineer shall perform constructability reviews at major project design milestones (e.g. 30%, 60%, 90%, 95% and final plan) to identify potential constructability issues and options that would provide substantial time savings during construction. The constructability review must be performed for all roadway and structural elements such as Sequence of Work/Traffic Control, Drainage (Temporary and Permanent), Storm Water Pollution Prevention Plan (SW3P), Environmental Permits, Issues and Commitments (EPIC) addressed, identify Utility conflicts; ensuring accuracy and appropriate use of Items, Quantities, General Notes, Standard and Special Specifications, Special Provisions, Contract Time/Schedule, Standards; and providing detailed comments in an approved format. Reviews must be captured in a Constructability Log identifying areas of concern and potential conflict. The Engineer shall provide the results of all Constructability reviews and recommendations to the State at major project design milestone submittals.

#### **Traffic Management Systems (Permanent) - FUNCTION CODE (165)**

The Engineer shall design and provide details as a part of the State's Intelligent Transportation System to be managed from the Combined Transportation, Emergency and Communications Center (CTECC). The design must include elements such as lane-use control signals, variable message signs, closed-circuit Television (TV) cameras, and loop or other vehicle detection devices. The Engineer shall prepare the design and details including conduit and cable, support structures, control equipment, etc. necessary to implement the system. Design specifications shall be defined in the work authorization. The Engineer shall also coordinate with the State Computerized Transportation Management Systems (CTMS) Section should the State have a computerized traffic management system under construction or in place and operating within the project limits.

#### **BRIDGE DESIGN - FUNCTION CODE (170)**

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

Prior to preparation of each bridge layout, the Engineer shall prepare a comparative cost analysis of bridge structures to determine: (1) the optimum bridge beams for vertical clearance over railroads, roadway, or waterways, (2) the optimum bridge structure versus roadway embankment, pavement, soil stabilization, and retaining walls, and (3) to determine optimum in bridge beams for the direct connectors.

The Engineer shall submit a 3D model (if applicable) and bridge layout for each structure early in the plan preparation process to obtain approval from the State. The Engineer shall submit a bridge layout for each structure early in the plan preparation process to obtain approval from the State. The Engineer shall comply with all relevant sections of the latest edition of the *State's LRFD Bridge Design Manual, Bridge Project Development Manual, 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, 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.

**170.2. Bridge Detail Summary.** The Engineer shall prepare total bridge quantities, estimates, and summary sheets for each bridge or 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 State 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 VERIF/CHANGES/ALTER CONSTRUCTION PHASE SERVICES - FUNCTION CODE (309)**

The Engineer shall provide Construction Phase Services at the written request of the State's Project Manager. The written request must include a description of the work requested, a mutually agreed upon time limit, and any special instructions for coordination and submittal. These services shall include, but are not limited to the following:

1. Attend preconstruction meeting
2. Attend partnering meeting
3. Attend field meetings and make visits to site
4. Calculate quantities and assist the area engineer in preparing change orders
5. Review and approval of shop drawings
6. Review and approval of forming details
7. Responding to requests for information (RFIs)
8. Providing minor redesign (major redesign should be handled with a contract supplement), which will include changes to the affected plan sheets and an updated copy of the 3D model (if applicable).
9. Answering general questions
10. Providing clarification
11. Other project related tasks in support of the State during construction

### **Deliverables**

#### **Plans**

The Engineer shall provide to the State the following information at each submittal. Additional sets will be provided to Fort Bend County as requested:

1. 30% Plans Submittal
  - 1.1. Eight sets of 11" x 17" plan sheets for the State District Review and 4 sets for Ft Bend County Review with a PDF.
  - 1.2. Estimate of construction cost.
  - 1.3. Engineer's internal QA and QC markup set.
  - 1.4. Form 1002 and Design Exceptions with existing and proposed typical sections, location map and design exception exhibits.
  - 1.5. If applicable, a Preliminary 3D model, in DGN format, created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil tools, and with detail to verify the design of the 30% plan sheets.
  - 1.6.

2. Between 30% Submittal and 60% Submittal:

- 2.1. Eight sets of 11" x 17" bridge and retaining wall layouts for the State District review and 4 sets for Ft Bend County Review with a PDF.
- 2.2. External stability analysis for retaining walls.
- 2.3. Engineer's internal QA and QC marked up set.
- 2.4. One set of a roll format TCP phasing layouts, one .pdf of plan sheets for TCP concept, and significant project procedures form (State Form 2229) to present at the TCAT for the State review.
- 2.5. One set of a roll format of illumination plan concept to State review.
- 2.6. If applicable, a preliminary 3D model, in DGN format, created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil tools, and with detail to verify the design of the Bridge and Retaining Wall layouts.
- 2.7.

3. 60% Plans Submittal:

- 3.1. Eight sets of 11" x 17" plan sets for the State District review and 4 sets for Ft Bend County Review with a PDF.
- 3.2. Estimate of construction cost.
- 3.3. Engineer's internal QA and QC marked up set.
- 3.4. One set of a roll format TCP phasing layouts, one .pdf of plan sheets for TCP concept, and significant project procedures form (State Form 2229) to present at the TCAT for the State review.
- 3.5. Utility conflict list.
- 3.6. If applicable, a preliminary 3D model, in DGN format, created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil 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 State.
- 3.7.

4. State Bridge Review

- 4.1. Seven sets of Bridge Layouts and 4 sets for Ft Bend County Review with a PDF.  
If applicable, a preliminary 3D model, in DGN format, created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil tools, and with enough detail to verify the design of the Bridge layouts.

5. Review Submittal (90%)

- 5.1. 10 sets of 11" x 17" plan sheets for the State District Review and 4 sets for Ft Bend County Review with a PDF.
- 5.2. Estimate of construction cost.
- 5.3. Marked up general notes
- 5.4. Construction contract time determination.

- 5.5. New Special Specifications and Special Provisions with Form 1814, if applicable.
- 5.6. Engineer's internal QA and QC marked up set.
- 5.7. Other supporting documents.
- 5.8. If applicable, a detailed 3D model, in DGN format, created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil tools, and with detail to verify the design of the 90% plan sheets. The level of detail of the surface and subsurface features will be at the direction of the State.

6. District Review Submittal (95%):

- 6.1. 12 sets of 11" x 17" plan sheets for the State district review and 4 sets for Ft Bend County Review with a PDF.
- 6.2. List of governing Specifications and Special Provisions in addition to those required.
- 6.3. Marked up general notes.
- 6.4. Plans estimate.
- 6.5. New Special Specifications and Special Provisions with Form 1814, if applicable.
- 6.6. Triple Zero Special Provisions.
- 6.7. Engineer sign, seal and date supplemental sheets (8 ½" x 11").
- 6.8. Contract time determination summary.
- 6.9. Significant project procedures form.
- 6.10. Right-of-Way and utilities certification.
- 6.11. Temporary road closure letters.
- 6.12. Construction speed zone request.
- 6.13. Engineer's internal QA and QC marked-up set.
- 6.14. Other supporting documents.
- 6.15. If applicable, a detailed 3D model, in DGN format, created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil tools, and with detail to verify the design of the 95% plan sheets. The level of detail of the surface and subsurface features will be at the direction of the State.

7. Final submittal (100%).

- 7.1. 14 paper sets of 11" x 17" and 4 sets for Ft Bend County with a PDF.
- 7.2. Revised supporting documents from 95% review comments.
- 7.3. If applicable, a final 3D model, in DGN format, LandXML format and other format (as directed by the State) created using Bentley's OpenRoads, OpenBridge and/or 3D MicroStation\Civil tools. The level of detail of the surface and subsurface features will be at the direction of the State.

## **Electronic Copies**

The Engineer shall furnish the State with a CD or DVD of the final plans in the format of current CADD system used by the State, .pdf format, and in the State's File Management System (FMS) format.

The Engineer shall also provide separate CD or DVD containing cross section information (in dgn, XLR, & ASCII formats) for the State contractor to use.

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

With the approval of the State, and in lieu of the above, the Engineer may maintain the project files in the State's ProjectWise container. The handoff of the electronic files will be via email to the State, with a URN link to the project location in ProjectWise provided in the email.

## **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 (GEOPAK GPK 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 on a CD or DVD 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 CD,DVD, or in ProjectWise (if applicable).

## **EXHIBIT A-2**

### **SERVICES TO BE PROVIDED BY THE STATE**

The State shall provide the following to the County and the Engineer:

- Available as-built plans for US 90A and SH 99.
- Electronic copy of approved schematic.
- Copies of approved environmental documents and approvals.
- Provide access to DCIS for Consultant.
- Electronic copies of adjacent project plans and topographic information.
- Available studies and drawings related to pump station.
- Detailed design for US 90A main lane bridge based on bridge layout developed by consultant.

# CERTIFICATE OF INTERESTED PARTIES

FORM 1295

1 of 1

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:  
2017-202335

Date Filed:  
05/04/2017

Date Acknowledged:

**1 Name of business entity filing form, and the city, state and country of the business entity's place of business.**

Pierce Goodwin Alexander and Linville, Inc. dba PGAL  
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

**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.**

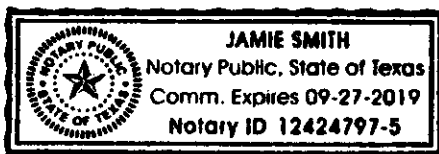
2013 Mobility Bond Project#134  
Project management and engineering services

4	Name of Interested Party	City, State, Country (place of business)	Nature of interest (check applicable)	
			Controlling	Intermediary
	Gerber, Jeffrey	Houston, TX United States	X	
	Brown, Kenneth	Alexandria, VA United States	X	
	Linville, Jack	Houston, TX United States	X	
	Weiner, Jeffrey	Houston, TX United States	X	
	Andrews, David	Houston, TX United States	X	
	Nestler, Ian	Boca Raton, FL United States	X	

5 Check only if there is NO Interested Party. ☐

**6 AFFIDAVIT**

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.



AFFIX NOTARY STAMP / SEAL ABOVE

*George*  
Signature of authorized agent of contracting business entity

Sworn to and subscribed before me, by the said Costas Georgiou, this the 4th day of May, 2017, to certify which, witness my hand and seal of office.

*Jamie Smith*  
Signature of officer administering oath

Jamie Smith  
Printed name of officer administering oath

Sr. Billing Specialist  
Title of officer administering oath



**CERTIFICATE OF INTERESTED PARTIES****FORM 1295**

1 of 1

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  
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Pierce Goodwin Alexander and Linville, Inc. dba PGAL  
Houston, TX United States

**Certificate Number:**  
2017-202335

**Date Filed:**  
05/04/2017

**Date Acknowledged:**  
05/23/2017

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Fort Bend County

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2013 Mobility Bond Project#134  
Project management and engineering services

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			Controlling	Intermediary
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	Brown, Kenneth	Alexandria, VA United States	X	
	Linville, Jack	Houston, TX United States	X	
	Weiner, Jeffrey	Houston, TX United States	X	
	Andrews, David	Houston, TX United States	X	
	Nestler, Ian	Boca Raton, FL United States	X	

**5 Check only if there is NO Interested Party.**☐**6 AFFIDAVIT**

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

\_\_\_\_\_  
Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said \_\_\_\_\_, this the \_\_\_\_\_ day of \_\_\_\_\_,  
20\_\_\_\_\_, to certify which, witness my hand and seal of office.

\_\_\_\_\_  
Signature of officer administering oath

\_\_\_\_\_  
Printed name of officer administering oath

\_\_\_\_\_  
Title of officer administering oath