



## **PROFESSIONAL SERVICES AGREEMENT**

(version 9-16-2019)

This AGREEMENT (“Agreement”) is entered by and between **WSP USA Inc.** (“Professional”), located at **16200 Park Row, Suite 200, Houston, TX 77084** and the **City of League City** (“City”), a home-rule municipality, located at 300 W. Walker St., League City, Texas 77573 on the date set forth below.

### **Terms:**

1. **Scope of Services:** Professional will perform the services as set forth in **Exhibit A**, which is attached and incorporated herein, and which can be generally described as **engineering services that include the development of plans and specifications for the North Extension of Landing Boulevard Project**. Services related to design, bid, or construction of a public work shall conform to the requirements set forth in **Exhibit B**. If there is a conflict between the terms of this Agreement and Exhibits A or B, the terms of this Agreement will prevail.
2. **Term and Termination:** This Agreement shall commence on **January 6, 2020** and shall expire on **July 15, 2021**. City reserves the right to terminate this Agreement for convenience upon seven (7) days written notice to Professional. Upon such termination, City shall pay Professional, at the rate set out in **Exhibit A**, for services satisfactorily performed up through the date of termination. Notwithstanding any provision in this Agreement to the contrary, City will not be required to pay or reimburse Professional for any services performed or for expenses incurred by Professional after the date of the termination notice that could have been avoided or mitigated by Professional.
3. **Compensation:** Professional shall be paid for the services as set forth in **Exhibit A**. In no event shall the total compensation exceed **\$2,317,350.77** during the term of this Agreement. City shall tender payment (including progress/partial payments) for services only after such services are completed and are deemed to be acceptable under this Agreement, in the sole reasonable discretion of City. Professional must submit to City invoices for all services provided, which invoices must include details and dates of service. Payment by City shall be made within thirty (30) days of receipt of an invoice, except for any portion of the invoiced amount that City disapproves as not compliant under this Agreement, in the sole reasonable discretion of City. If City disapproves any amount submitted for payment by Professional, City shall give Professional specific reasons for disapproval in writing.
4. **Insurance:** Professional **is** required during the Contract Term to maintain insurance as set forth below:
  - (a) Comprehensive General Commercial Liability insurance covering bodily injury and property damage, with minimum coverage limits—exclusive of defense costs—of \$1,000,000 per occurrence and \$2,000,000 aggregate;
  - (b) Professional Liability (errors and omissions/malpractice) insurance with minimum coverage limits—exclusive of defense costs—of \$2,000,000 per occurrence; and
  - (c) If at any point during the Contract Term it is foreseeable that Professional will enter upon City premises:
    - (i) Worker’s Compensation coverage with statutory limits for the State of Texas, and
    - (ii) Commercial Automobile Liability coverage with minimum coverage limits—exclusive of defense costs—of \$1,000,000 per occurrence and \$2,000,000 aggregate.All policies must contain a waiver of subrogation against City. Comprehensive General Liability and Commercial Automobile Liability policies must name the City as Additional Insured. Professional shall pay

all insurance deductibles and deductibles must not exceed \$10,000 unless approved in advance by City. Professional shall provide City Certificates of Insurance evidencing these insurance requirements prior to the start of work.

5. **Liquidated Damages:** Professional acknowledges that time is of the essence in performing this Agreement. City and Professional (collectively, the “Parties”) agree that if Professional is late due to its unexcused failure in performing any service designated as Time Critical on the Scope of Services attached to this Agreement, City will suffer loss, damages, or other harm from Professional’s delay. The Parties agree that the amount of loss, damages, or harm likely to be incurred as a result of Professional’s delay is incapable or difficult to precisely estimate, and therefore the Parties desire to stipulate the amount of such loss, damages, or harm. Accordingly, Professional shall have deducted from any amounts owed under this Agreement liquidated damages equal to the number of calendar days of the unexcused delay(s) times the daily rate, which rate shall be one-tenth of one percent (0.1%) times the compensation shown in the Scope of Services for such Time Critical service. The Parties further agree that: (i) the liquidated damages specified herein are not a penalty but rather bear a reasonable relationship to, and is not plainly or grossly disproportionate to, the probable loss likely to be incurred by City as a result of Professional’s delay; (ii) one of the reasons for City and Professional to agree to such amounts is the uncertainty and cost of litigation regarding the question of actual damages; and (iii) City and Professional are sophisticated business parties and negotiated this Agreement at arm’s length. In not event shall any liquidated damages assessed under this Article 5 exceed \$1,000,000 (“LD Cap”). This LD Cap does not apply or limit any damages not falling within those liquidate damages under this Article 5.
6. **Independent Professional:** Professional is an independent Professional and is not an employee, partner, joint venture, or agent of City. Professional understands and agrees that he/she will not be entitled to any benefits generally available to City employees. Professional shall be responsible for all expenses necessary to carry out the services under this Agreement and shall not be reimbursed by City for such expenses except as otherwise provided in this Agreement.
7. **Intellectual Property:** This Agreement shall be an Agreement for services and the parties intend and consider any work created as a result of this Agreement, including any and all documentation, images, products or results, to be a work (the “Work”) for hire under federal copyright law. Ownership of the Work shall belong to and remain the exclusive property of City. The Work may be edited at any time within City’s discretion. If the Work would not be considered a work-for-hire under applicable law, Professional hereby assigns, transfers, and conveys any and all rights, title and interest to City, including without limitation all copyrights, patents, rights of reproduction, rights to ownership, and right to secure registrations, renewals, reissues and extensions thereof. As the sole copyright holder of the Work, City maintains and asserts the rights to use, reproduce, make derivative works from, and/or edit the Work in any form of medium, expression or technology now known or hereafter developed, at any time within City’s discretion. Professional shall not sell, disclose or obtain any other compensation for the services provided herein or the Work. If the Work is one to which the provisions of 17 U.S.C. § 106A apply, Professional hereby waives and appoints City to assert on Professional's behalf Professional's moral rights or any equivalent rights regarding the form or extent of any alteration to the Work (including, without limitation, removal or destruction) or the making of any derivative works based on the Work, including, without limitation, photographs, drawings or other visual reproductions of the work, in any medium, for City’s purposes.
8. **Confidentiality:** During the course of the services to be provided under this Agreement, Professional may become privy to confidential information of City. Professional agrees to treat as confidential the information or knowledge that becomes known to Professional during performance of this Agreement and to not use, copy, or disclose such information to any third party unless authorized in writing by City. This provision does not restrict the disclosure of any information that is required to be disclosed under applicable law. Professional shall promptly notify City of any misuse or unauthorized disclosure of City’s confidential information and upon expiration of this Agreement shall return to City all confidential information in Professional’s possession or control. Professional shall further comply with all information security policies of City that may apply and shall not make any press releases, public statements or

advertisement referring to the services provided under this Agreement or the engagement of Professional without the prior written approval of City.

9. **Representations:** Professional shall perform its services and conduct all operations in conformity with all applicable federal, state, and local laws, rules, regulations, and ordinances. For any service performed on premises owned or controlled by City, Professional warrants and agrees that Professional will perform said services in compliance with all City rules, including but not limited to, prohibitions related to tobacco use, alcohol, and other drugs.
10. **Licenses/Certifications:** Professional represents and warrants that it will obtain and maintain in effect, and pay the cost of, all licenses, permits or certifications that may be necessary for Professional's performance of this Agreement. If Professional is a business entity, Professional warrants, represents, covenants, and agrees that it is duly organized, validly existing and in good standing under the laws of the state of its formation; and is duly authorized and in good standing to conduct business in the State of Texas, that it has all necessary power and has received all necessary approvals to execute and deliver the Agreement and is authorized to execute this Agreement according to its terms on behalf of Professional.
11. **Performance/Qualifications:** Professional agrees and represents that Professional has the personnel, experience, and knowledge necessary to qualify Professional for the particular duties to be performed under this Agreement. Professional services performed under this Agreement shall be performed consistent with generally prevailing professional or industry standards.
12. **Conflict of Interest:** Professional warrants, represents, and agrees that Professional presently has no interest and shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with Professional's performance of the services hereunder. Professional further warrants and affirms that no relationship or affiliation exists between Professional and City that could be construed as a conflict of interest with regard to this Agreement.
13. **INDEMNIFICATION: PROFESSIONAL SHALL INDEMNIFY AND HOLD HARMLESS CITY, AND EACH OF ITS OFFICIALS, OFFICERS, AGENTS AND EMPLOYEES FROM AND AGAINST ALL CLAIMS, ACTIONS, SUITS, DEMANDS, PROCEEDINGS, COSTS, DAMAGES AND LIABILITIES, INCLUDING WITHOUT LIMITATION ATTORNEYS' FEES AND REASONABLE LITIGATION COSTS, ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM ANY ACTS OR OMISSIONS OF PROFESSIONAL OR ANY AGENT, EMPLOYEE, SUBPROFESSIONAL, OR SUPPLIER OF PROFESSIONAL IN THE EXECUTION OR PERFORMANCE OF THIS CONTRACT, TO THE EXTENT THE CLAIM ARISES FROM NEGLIGENCE, WRONGFUL ACT, BREACH OF CONTRACT OR VIOLATION OF LAW.**
14. **Force Majeure:** Neither party shall be liable to the other for (i) any delay in performance; (ii) any other breach; (iii) any loss or damage; or (iv) any contribution to or aggravation of any of the foregoing; arising solely from uncontrollable forces such as fire, theft, storm, war, or any other cause that could not have been reasonably avoided by the party's exercise of due diligence.
15. **Notices:** Any notice given under this Agreement by either party to the other may be effected either by personal delivery in writing or by mail, registered or certified postage prepaid with return receipt requested. Mailed notices shall be addressed to the addresses of the Parties as they appear in the contract. Notices

delivered personally shall be deemed communicated at the time of actual receipt. Mailed notices shall be deemed communicated three (3) days after mailing.

16. **Texas Family Code Child Support Certification:** Pursuant to Section 231.006 of the Texas Family Code, Professional certifies that it is not ineligible to receive the award of or payments under the Agreement and acknowledges that the Agreement may be terminated, and payment may be withheld if this certification is inaccurate.
17. **State Auditor:** Professional understands that acceptance of funds under the Agreement constitutes acceptance of the authority of the Texas State Auditor's Office, or any successor agency (collectively, the "Auditor"), to conduct an audit or investigation in connection with those funds. Professional agrees to cooperate with the Auditor in the conduct of the audit or investigation, including without limitation providing all records requested. Professional will include this provision in all contracts with permitted subprofessionals.
18. **Jurisdiction:** Any disputes under this Agreement shall be brought in a court of competent jurisdiction in Galveston, Texas and governed by Texas law.
19. **Alternative Dispute Resolution:** To the extent that Chapter 2260, Texas Government Code, is applicable to this Contract and is not preempted by other applicable law, the dispute resolution process provided for in Chapter 2260 and the related rules adopted by the Texas Attorney General Pursuant to Chapter 2260, shall be used by City and Professional to attempt to resolve any claim for breach of contract made by Professional that cannot be resolved in the ordinary course of business. The Director of Finance of City shall examine Professional's claim and any counterclaim and negotiate with Professional in an effort to resolve such claims. This provision shall not be construed as a waiver by City of its right to seek redress in the courts.
20. **Entire Agreement:** This Agreement contains the entire understanding between the Parties and supersedes all prior agreements, arrangements, and understanding, oral or written between the Parties relating to this Agreement. This Agreement may not be modified except by mutual written agreement of the Parties executed subsequent to this Agreement.
21. **Eligibility to Receive Payment:** Professional certifies that, as a matter of state law, it is not ineligible to receive the Agreement and payments pursuant to the Agreement and acknowledges that the Agreement may be terminated, and payment withheld if this representation is inaccurate.
22. **Payment of Debt/Delinquency to State:** Professional certifies that it is not indebted to the City of League City and is current on all taxes owed to the City of League City. Professional agrees that any payments owing to Professional under the Agreement may be applied directly toward any debt or delinquency that Professional owes the City of League City regardless of when it arises, until such debt or delinquency is paid in full.
23. **Products and Materials Produced in Texas:** If Professional will provide services under the Agreement, Professional covenants and agrees that in performing its duties and obligations under the Agreement, it will purchase products and materials produced in Texas when such products and materials are available at a price and delivery time comparable to products and materials produced outside of Texas.
24. **Risk of Loss:** If applicable, all work performed by Professional pursuant to the Agreement will be at Professional's exclusive risk until final and complete acceptance of the work by City. In the case of any loss or damage to the work prior to City's acceptance, bearing such loss or damage will be Professional's responsibility.
25. **Publicity:** Professional shall not use City's name, logo or likeness in any press release, marketing materials or other public announcement without receiving City's prior written approval.

26. **Legal Construction/Severability:** In the event that any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision, and this Agreement shall be construed as if such invalid, illegal or unenforceable provisions had never been contained in it. To this end, the provisions of this Agreement are declared to be severable. The Parties may mutually agree to renegotiate the Agreement to cure such illegality/invalidity or unconstitutionality if such may be reasonably accomplished.
27. **Limitations:** The Parties are aware that there are constitutional and statutory limitations on the authority of City to enter into certain terms and conditions of the Agreement, including, but not limited to, those terms and conditions relating to liens on City's property; disclaimers and limitations of warranties; disclaimers and limitations of liability for damages; waivers, disclaimers and limitations of legal rights, remedies, requirements and processes; limitations of periods to bring legal action; granting control of litigation or settlement to another party; liability for acts or omissions of third parties; payment of attorneys' fees; dispute resolution; indemnities; and confidentiality (collectively, the "Limitations"). Any terms and conditions related to the Limitations will not be binding on City except to the extent authorized by the laws and Constitution of the State of Texas.
28. **Sovereign Immunity:** The Parties agree that neither the execution of the Agreement by City nor any other conduct, action or inaction of any City representative relating to the Agreement constitutes a waiver of sovereign immunity by City.
29. **Authority:** Professional warrants and represents that Professional has full power and authority to enter into and perform this Agreement and to make the grant of rights contained herein. The person signing on behalf of City represents that he/she has authority to sign this Agreement on behalf of City.
30. **Non-Waiver:** The Parties specifically agree that neither the occurrence of an event giving rise to a breach of contract claim nor the pendency of a claim constitute grounds for the suspension of performance by Professional. No covenant or condition of this Agreement may be waived except by written consent of the waiving party. Forbearance or indulgence by one party in any regard whatsoever shall not constitute a waiver of the covenant or condition to be performed by the other party.
31. **Prohibition on Boycotting Israel:** Pursuant to Section 2270.002 of the Texas Government Code, by executing this Agreement Professional verifies that Professional: (1) does not boycott Israel; and (2) will not boycott Israel during the term of this Agreement.
32. **Prohibition Against Business with Iran, Sudan or Foreign Terrorists Organizations:** Professional warrants, covenants, and represents that Professional is not engaged in business with Iran, Sudan, or any company identified on the list referenced in Section 2252.152 of the Texas Government Code.

Executed on this 2nd day of January, 2020 (date to be filled in by City Secretary)

WSP USA INC. - "Professional"

James Caughorn, Senior Area Manager

CITY OF LEAGUE CITY - "City"

John Baumgartner, P.E., City Manager

Attest:

*FOR* *Jeanne Hammach*  
Diana Stapp, City Secretary

Approved as to Form:

*McV. A*  
Office of the City Attorney

## Exhibit A

**Scope of Services/Description of Products/Payment Schedule**  
(45 number of pages, including this page)

See Next Page

## ATTACHMENT C

### SERVICES TO BE PROVIDED BY THE ENGINEER

The Engineer shall provide engineering services required for approximately 1.7 miles of Landing Boulevard approximately miles from FM 518 to IH 45 along existing and predominately new location right-of-way. The existing roadway is two lanes in each direction. The proposed improvements call for a four-lane divided facility (two lanes in each direction) with an approximate 10'-36' median that may be used to further expand the width of the facility to a six-lane facility (an additional lane in each direction) in the future. These services may include but are not limited to the preparation of complete Plans, Specifications and Estimates (PS&E), the preparation of roadway and bridge design, preliminary engineering report, design field survey, hydraulic studies, environmental studies, intersection layouts, subsurface utility engineering, utility coordination.

### 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 each 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 the City for coordination and processing of approvals. If subsequent changes require additional exceptions, the Engineer shall notify the City 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 City 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 City prior to each entry.

The Engineer shall notify the City and coordinate with adjacent engineers 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. In the event the Engineer and the other adjacent engineers are unable to agree, the Engineer and each adjacent engineer shall meet jointly with the City for resolution. The City will have authority over the Engineer's disagreements and the City's decision will be final.

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 City in writing prior to beginning any work on any outside agency's exhibit.

**1.3. Progress Reporting and Invoicing. Progress Reporting and Invoicing.** The Engineer shall invoice according to the Engineering Services and Exhibit "B" - *Fee Schedule*, of each Work Authorization. The Engineer shall submit each invoice in a format acceptable to the City.

With each invoice, the Engineer shall include a completed Projected vs. Actual Contract Invoices form. The Engineer shall submit a monthly written progress report to the City'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 City'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 City personnel in interpreting the schedules. The Engineer shall schedule milestone submittals at 30%, 60%, 90%, 95% and final project completion phases. The Engineer shall advise the City 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 (Attachment G).



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

The Engineer shall prepare a letter of transmittal to accompany each document submittal to the City. At a minimum, the letter of transmittal must include the City's project number, the highway number, County, project limits, City's contract number, and City's work authorization number.

**1.4. Traffic Control.** The Engineer shall prepare Traffic Control Plans (TCP) in coordination with adjacent section. These plans shall also be prepared in accordance with the Texas Manual on Uniform Traffic Control Devices for Streets and Highways (latest edition). The Engineer shall 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 person, temporary traffic signals, etc.) to be used to handle traffic including at grade intersections during each construction sequence. The Engineer shall show temporary roadways, ramps and detours required to maintain lane continuity throughout the construction phasing. Where detours are required, the Engineer shall develop typical cross sections, calculate quantities, and show horizontal and vertical alignment information. The Engineer shall provide a detailed layout and arrangement of construction signs, construction pavement marking, traffic control devices (including temporary signals and signal heads). Continuous, safe access to all properties during all phases of construction is mandatory. The Engineer shall develop TCP to preserve existing curb cuts (if applicable). The Engineer shall 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.

**1.5. State-Controlled Waters.** The placement of a new structure or modification of an existing structure(s) within State-Controlled waters will require confirmation that said structure(s) lie within the General Land Office (GLO) state owned land and whether the crossing is tidally influenced or not. Consequently, the Engineer shall request, as early in the design process as possible, that the State determine whether the proposed improvements are found within the tidal GLO, is a submerged GLO property or a non-tidal GLO property. The State may request assistance from the Engineer to prepare an exhibit demonstrating the location of the proposed improvements on the GLO State Owned Map for the project location of an assigned State's District.

**1.6. Coordination.** The Engineer shall coordinate issues and communications with City's internal resource areas through the City's Project Manager. The City will communicate the resolution of issues and provide the Engineer direction through the City's Project Manager.

**1.7. Level of Effort.** For each work authorization, 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 City, the Engineer shall provide written justification regarding whether 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.

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

**1.9. 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 City Project Manager. In addition, these details shall be accompanied by the appropriate general notes, special specifications, special provisions, and method of payment. The Engineer shall retain the responsibility for the appropriate selection of each Standard identified for use within their design.

**1.10. 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 City's policies and procedures, and the District's PS&E Checklist.

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

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

**1.12. 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.

**TASK DESCRIPTIONS AND FUNCTION CODES**

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

**FUNCTION CODE 102(110) – FEASIBILITY STUDIES**

**ROUTE AND DESIGN STUDIES**

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

1. Data, if available, from the City, including "as-built plans", existing schematics, right-of-way maps, Subsurface Utility Engineering (SUE) mapping, existing cross sections, existing planimetric mapping, environmental documents, existing channel and drainage easement data, existing traffic counts, accident data, Bridge Inspection records, 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 independently develop and report quantities at submittal 30%, 60%, 90%, 95% and Final PS&E submittals. The estimate will be based on latest unit prices at the time of the estimate.

**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 City 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 City'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.

1. All geotechnical work should be performed in accordance with the latest version of the State's 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. If applicable, the Engineer shall perform any retaining wall analyses to include the settlement analysis. This analysis must include the computation of the factor of safety for bearing capacity, global stability, overturning and sliding. In addition, the Engineer shall include allowable bearing pressure, passive earth pressure, friction factor, settlement analysis (consolidation report) and lateral earth pressure for the retaining walls.
3. If applicable, the Engineer shall perform soil borings, 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.
5. If applicable, the Engineer shall perform scour analysis to include Grain Size distribution curves with D50 value.
6. 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.
7. Foundation Studies: The Engineer shall coordinate with the City 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.
8. 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.

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

**SOCIAL, ECONOMIC AND ENVIRONMENTAL STUDIES AND PUBLIC INVOLVEMENT**

**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. This is not to be confused with the formal public meetings held during the National Environmental Policy Act (NEPA) process during schematic approval for Public Involvement. It is not anticipated that the Engineer's participation will be needed for the NEPA process. Assistance (exhibits, attendance, etc.) may be required for a formal public meeting/hearing associated with schematic approval work.

**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 Study from phase I shall be reviewed and implemented into the PS&E package. The Engineer shall consider the constructability issues as it relates to the environmental impacts.

**120.4. Environmental Exhibits.** The Engineer shall prepare the necessary exhibits for the environmental study to be performed by others. The Engineer shall coordinate with the Environmental Project Manager and the State's Environmental Engineer for the preparation of these exhibits.

**120.5. Cut and Fill Exhibits.** If the information is available, the Engineer shall prepare cut and fill exhibits for delineated wetland.

#### **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 Surveyor shall establish the existing right-of-way basemap 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 existing Right-of-Way lines. The following shall apply to right-of-way acquisition.

#### **Parcel Plats**

1. A parcel plat will be prepared for each parcel of land to be acquired. The State has developed standard formats for parcel plats, copies of which the Surveyor will request and secure for all purposes. Parcel plats will include each and every item of information shown on the right-of-way map that concerns the individual parcel, including a reference to the source of bearings and datum used and note the point of commencing.
2. All parcel plats will be (8-1/2" x 11") signed and sealed by a Registered Professional Land Surveyor.
3. Note referencing legal description.

**Field Note Descriptions** - A field note description will be prepared for each parcel of land to be acquired. Field note descriptions will include, but need not be limited to, the following:

1. The field note description will begin with a general description that will include, as a minimum:
  - a. State, county, and city within which the proposed parcel of land to be acquired is located.
  - b. A reference to unrecorded and recorded subdivisions by name, lot, block, and recording data to the extent applicable.
  - c. A reference, by name, to the grantor and grantee, date, and recording data of the most current instrument(s) of conveyance describing the parent tract.
2. The field note description will continue with a metes and bounds description that will include, as a minimum:
  - a. A point of commencing (outside property corner).
  - b. A point of beginning on proposed R.O.W. line.
  - c. A series of courses, identified by number and proceeding in a clockwise direction, describing the perimeter of the parcel of land to be acquired, and delineated with appropriate bearings, distances, and curve data.
  - d. A description (8-1/2" x 11") of all monumentation set or found to include, as a minimum, size and material.
    - i. All field note descriptions will be signed and sealed by a Registered Professional Land Surveyor.
    - ii. Note referencing parcel plat.

If it is necessary to obtain additional construction easements and/or 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 within these construction easements and/or right-of entries (short of litigation).

**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. At the State's request, the existing and proposed utilities shall be represented in a 3D MicroStation model.

**130.2.1 Utility Locations and Layouts.** Upon approval by League City, the Engineer shall perform the utility investigation work involving the research and identification of all private and public utilities within the project limits. The process shall involve researching all available database for the existence of public utilities such as sanitary, storm sewers, and waterlines within the project limits. For private utilities, request for information letters containing, project location maps and required forms, shall be sent out to all utility companies informing them of the pending improvement project and requesting specific information such as-built drawings. Upon receipt from the utility companies of their existing utility information a design file is created illustrating all utilities within the project limits. This file is then used to create a "conflict list" which identifies all potential conflicts between the existing utilities and the proposed project improvements. The Engineer shall coordinate with the utility company, TxDOT and the City of League City and hold utility coordination meetings at the 30, 60, and 90 percent milestones.

**130.2.2 Utility Adjustments.** The Engineer's Surveyor will field locate all utility markings provided by DIGTESS respondents and those provided by the Engineer.

The Engineer's Surveyor will field locate all utility markings provided by DIGTESS respondents and those provided by the Engineer.

Deliverables

The State's Photogrammetry Mapping Legend as supplemented by the Surveyor.

Parcel Plats, Calculation Sheets and Metes and Bounds Descriptions to TxDOT Standards.

**130.2.3 Land Acquisition.** Acquisition of all parcels will be provided by the City of League City, and will conform to TxDOT standards and the provisions of the Uniform Real Property Acquisition and Relocation Assistance Act of 1970.

WSP will provide a land planner to assist the City in the valuation of Parcel(s) and determine adjustments (if any) that can be made to the site allowing the property to maintain current operations. Specific location included in this scope include: U-Haul Storage Facility, CVS, Sonoma Corp

**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 City.

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

## **PROJECT MANAGEMENT AND ADMINISTRATION**

The Engineer, in association with the City'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.

Project Management and Coordination. The purpose of this task is to provide the overall management of the contract including scheduling, invoicing, and progress reports. The progress report will list outstanding issues that need resolution as well as progress of the tasks and estimated completion dates for the work. The Engineer will attend coordination and interim progress review meetings to be scheduled on an as needed basis. Meeting minutes will be prepared and distributed within five working days after the meeting. The Engineer will provide overall coordination with subconsultants.

The Engineer shall:

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

### **FUNCTION CODE 160(150) - ROADWAY DESIGN**

### **FUNCTION CODE 160(150) – ROADWAY DESIGN**

#### **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.

#### **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 State will request design surveys on an as needed basis. 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.

### 3.2. Construction Surveys

The State will request construction surveys on an as needed basis. The Surveys shall perform tasks including, but not limited to the following:

- i. Stake existing or proposed right-of-ways.
- ii. Stake existing or proposed baseline/centerline.
- iii. Stake proposed bridge structures.
- iv. Stake proposed drainage structures (e.g., manholes, culverts, etc.).
- v. Set grade stakes.
- vi. Recover and check existing control points.

- vii. Establish additional control points.
- viii. Check elevations and locations of structures.
- ix. Determine and resolve conflicts associated with survey data.

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.

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

### **ROADWAY DESIGN CONTROLS**

The Engineer shall inform the City 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 City unless otherwise directed by the City 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 City for coordination and processing of approvals.

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

- A. Refine Schematic (This task may be deleted if the schematic is not available and replaced with Preliminary Geometric layout). 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.**

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 mainlanes (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 mainlanes, 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, mainlanes, 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. Mainlane and Frontage Road Design:** The Engineer shall provide the design of mainlanes with full shoulders, 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.** Not Applicable

**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 and 50 feet intervals in curves. Cross sections shall be delivered in

standard Bentley OpenRoads format on 11"x17" sheets at each of respective deliverable.

**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, OpenRoads 3D models (if applicable) and cross-sections with the City. 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 City to determine the most feasible proposed roadway profile. The City 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. Wetlands Information.** From the information provided by the City, the wetland areas are to be staked, fenced and the delineation surveyed by the Engineer. The survey data must be electronically transferred to the Plan and Profile (P&P) sheets and the volumes calculated for the delineated areas.

**160.10. Pavement Design.** The Engineer shall incorporate the pavement design as supplied by TxDOT. Suggested pavement section is 10" CRCP. Pavement section will be approved by TxDOT and confirmed through geotechnical analysis.

**160.11. Pedestrian and Bicycle Facilities.** The Engineer shall coordinate with the City 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.

## **FUNCTION CODE 160(161) - ROADWAY DESIGN**

### **DRAINAGE**

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. Review survey data and coordinate any additional surveying needs with State.
5. 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.
6. 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 in this Work Authorization. The study will analyze sheet flow patterns and quantify runoff flow rates for existing and proposed (pre and post project) conditions using the most current approved rainfall data (NOAA ATLAS 14).
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 from official sites such as airports.
5. Include, at a minimum, the "design" frequency 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.
6. Quantify impacts, beneficial or adverse, in terms of increases in peak flow rates and water surface elevations for the above listed hydraulic conditions and hydrologic events. Impacts will be determined both upstream and downstream of the bridge crossings.
7. Compute right of way corridor 1% AEP flood plain volumes for existing and proposed roadway elevations. 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. 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. Quantify the cut and fill within the 1% AEP flood plain.
11. Prepare Drainage Report incorporating all the above items.

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 shall be performed by utilizing the GEOPAK Drainage or any State's approved software.
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. Maintain the existing flow into existing outfalls. 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.
5. Identify areas requiring trench protection, excavation, shoring, and de-watering.

161.5. . Scour Analysis. The Engineer shall provide the following services:

1. Perform a scour analysis for each proposed bridge structure.
2. Prepare each scour analysis using a State-approved methodology (HEC-18). The Engineer shall select the methodology based on the site conditions such as the presence of cohesive or cohesionless soil, rock or depth of rock, proposed foundation type, and existing site performance. The Engineer shall follow the methodology outlined in the State Geotechnical Manual. The Engineer shall coordinate with the State prior to commencing any work on any Stream Migration Study. This coordination must include consultation with the appropriate State technical expert.
3. Provide the State the potential scour depths, envelope and any recommended countermeasures including bridge design modifications and/or revetment.
4. Provide the State a Scour Analysis sheet and fill out Form 2605 (scour Summary Sheet for Known Foundation).

161.6. Environmental Permits:

The Engineer shall notify the State project manager when site conditions may require environmental permits such as Nationwide Permit, §404 Individual Permits (including mitigation and monitoring) and U. S. Coast Guard and U.S. Army Corps of Engineers §10 Permits.

161.7. Local Drainage Authority Coordination:

The Engineer shall coordinate with local drainage authority to ensure compliance with their criteria. Coordination may include the issuance of a Drainage Impact Study, applicable permit submissions and FEMA's Condition Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR). Studied streams shall include Clear Creek (HCFCD Unit No. A100-00-00) and Tributary 10.08 to Clear Creek (HCFCD Unit No. A111-00-00).

161.8. 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
  - 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. Identify areas requiring trench protection, excavation, shoring and de-watering.
- c. Prepare drainage area maps.

- d. Prepare plan and profile sheets for storm drain systems and outfall ditches.
- e. Select any necessary standard details from State or District's list of standards for items such as inlets, manholes, junction boxes and end treatments.
- f. Prepare details for non-standard inlets, manholes and junction boxes.
- g. Prepare drainage details for outlet protection, outlet structures and utility accommodation structures.
- h. Identify pipe strength requirements.
- i. Prepare drainage facility quantity summaries.
- j. Identify potential utility conflicts and, if feasible, design to mitigate or avoid those identified conflicts.
- k. Consider pedestrian facilities, utility impacts, driveway grades, retaining wall and concrete traffic barrier drainage impacts.
- l. Identify existing ground elevation profiles at the ROW lines on storm sewer plan and profile sheets.
- m. Locate soil borings every 500 feet along the storm sewer alignment and take piezometric readings at 2000 feet intervals.
- n. 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).
- o. 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.

## **FUNCTION CODE 160(162) - ROADWAY DESIGN**

### **SIGNING, PAVEMENT MARKINGS AND SIGNALIZATION (PERMANENT)**

**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.

If requested by the State, the Engineer shall provide a 3D model with the proposed pavement marking stenciled onto the model.

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

**FUNCTION CODE 160(163) - ROADWAY DESIGN**

**MISCELLANEOUS (ROADWAY)**

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 City 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.
12. At the request of the State, the TCP phasing shall be designed using Bentley's OpenRoads 3D modeling technology.

### **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 provide illumination layout plans, electrical circuit plans and details for continuous and safety lighting at intersections and along the project limits, as well as at all other locations identified within the project limits. The Engineer shall prepare exhibits as required to obtain agreements with adjacent municipalities. The Engineer shall tabulate all quantities and provide summary sheets. Lighting poles, fixtures, and attachment details shall be designed per the Urban Planner's recommendations and standards.

**163.5. StormWater Pollution Prevention Plans (SW3P).** The Engineer shall prepare drawings based on the latest NPDES, Harris County Stormwater Quality Standards (HCSWQS) requirements, and TxDOT standards to minimize impact on receiving waterways and developments outside the ROW. The SW3P sheets will include the location of erosion control devices and any required temporary and permanent erosion control measures. The plan shall also include all the required erosion control details and standard sheets.

**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.** Not Applicable

**163.10. Testimony for Right of Way Hearings.** If required, the Engineer shall support and testify in possible Right of Way hearings, as the Engineer of Record for the project. As requested by the State or the Attorney General's office, the Engineer shall be required to do the following:

- Research, study, analyze and review the project and the assigned parcels for acquisition;
- Prepare litigation designs and standard 8.5 x 11 inch, 11 x 17 inch or 24 x 36 inch paper exhibits. These deliverables are considered to be litigation documents and not engineering documents requiring a P.E. seal;
- Be available to prepare for and testify at hearings, depositions and trials, and;
- Be available to assist and consult with the Attorney General's Office, with case preparation.

**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 City 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%, 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.

## **FUNCTION CODE 160(165) – ROADWAY DESIGN**

### **Traffic Management Systems (Permanent)**

Not Applicable

## **FUNCTION CODE 160(170) – ROADWAY DESIGN**

## BRIDGE DESIGN

**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*.

All bridge structures shall be designed for HL 93 loading. The project includes the following two structures:

1. Clear Creek Bridge. This proposed structure shall be approximately 2800' long and 77'-5" wide. Bridge shall consist of Twenty-Six spans and shall utilize steel and pre-stressed TX girders. 3 spans continuous steel I shaped plate girders approximately 720' long will be provided over the main creek. Substructures will be skewed to accommodate flow of Clear Creek.
2. Bridge Over Tributary of Clear Creek. This proposed structure shall be approximately 100' long 77'-5" wide. Bridge shall consist of single span and shall utilize pre-stressed TX girders.

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 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 to determine elevations of bridge substructure and super structure elements.
- Perform calculations for bridge TX Girder and 3 spans continuous steel I shaped plate girders.
- 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.

### **FUNCTION CODE 309(309) – DESIGN VERIF/CHANGES/ALTER**

#### **CONSTRUCTION PHASE SERVICES**

The Engineer shall provide Construction Phase Services at the written request of the City'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 the following information at each submittal:

1. 30% Plans Submittal

- 1.1. Eight sets of 11" x 17" plan sheets for the State District Review.
  - 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.
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.
  - 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. For Division Hydraulic Review of existing Bridge Class Culverts, five sets of 11" x 17" Bridge Class Culvert Plan and Profile sheets and Hydrology & Hydraulics sheets, include project title sheet and project layout sheet.
  - 2.7. 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.
3. 60% Plans Submittal:
- 3.1. Eight sets of 11" x 17" plan sets for the State District review.
  - 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. 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.
4. State Bridge Review
- 4.1. Seven sets of Bridge Layouts  
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.
- 5.2. Estimate of construction cost.
- 5.3. Marked up general notes
- 5.4. Construction schedule.
- 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
- 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"
- 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).



BASIS OF COMPENSATION

WSP USA

Proposal for Professional Engineering Services (Task 2)

Engineering services required for approximately 1.7 miles of Landing Boulevard

Approximately miles from FM 518 to IH 45

**A. BASIC SERVICES**

Roadway Design / Preliminary Schematic	\$	186,324.06
Drainage Study	\$	115,045.85
Drainage Design	\$	137,525.18
Bridge Design	\$	1,032,824.42
Illumination	\$	31,671.21
Signalization	\$	61,842.82
Signing and Pavement Markings	\$	33,801.34
Utility Coordination	\$	39,637.50
Traffic Control Layouts	\$	17,055.58
Miscellaneous	\$	28,858.28
Project Management	\$	57,206.88
Direct Expenses	\$	3,427.15

<b>TOTAL BASIC SERVICES ( PER TASKS )</b>	<b>\$</b>	<b>1,745,220.28</b>
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**B. ADDITIONAL SERVICES**

Condemnation Support	\$ 5,520.52
Construction Phase Services	\$ 74,882.36
Sub-Total WSP	\$ 80,402.89
RODS Surveying	
Design Survey	\$ 58,930.00
R.O.W. / Parcel Mapping	\$ 78,207.00
Terracon Consultants, Inc.	\$ 225,800.00
Terracon Land Clearing 3 sites 2 days @ \$3,000/day	\$ 18,000.00
Terracon TCP @ FM 518 2 days @ \$2,000	\$ 4,000.00
CVS Land Use Analysis	\$ 12,500.00
CVS Special Commissioner's Hearing (If Needed)	\$ 5,850.00
CVS Deposition and Trial (If Needed)	\$ 8,775.00
Sanoma Corp Land Use Analysis	\$ 12,500.00
Sanoma Corp Special Commissioner's Hearing (If Needed)	\$ 5,850.00
Sanoma Corp Deposition and Trial (If Needed)	\$ 8,775.00
U-Haul Land Use Analysis	\$ 14,500.00
U-Haul Special Commissioner's Hearing (If Needed)	\$ 5,850.00
U-Haul Deposition and Trial (If Needed)	\$ 8,775.00
Parsons Brinckerhoff (SubCoordination) (5%)	\$ 23,415.60
Sub-Total Sub-Consultants	\$491,727.60

**TOTAL ADDITIONAL SERVICES ( PER TASKS )** **\$ 572,130.49**

**TOTAL BASIC & ADDITIONAL SERVICES** **\$ 2,317,350.77**

The compensation for any additional services which the City desires to be added to the work scope of the project shall be negotiated. Subconsultant invoices will be subject to a 5% administration charge. Services will be charged according to those personnel directly involved in providing the services, and will be rounded to the nearest half hour.

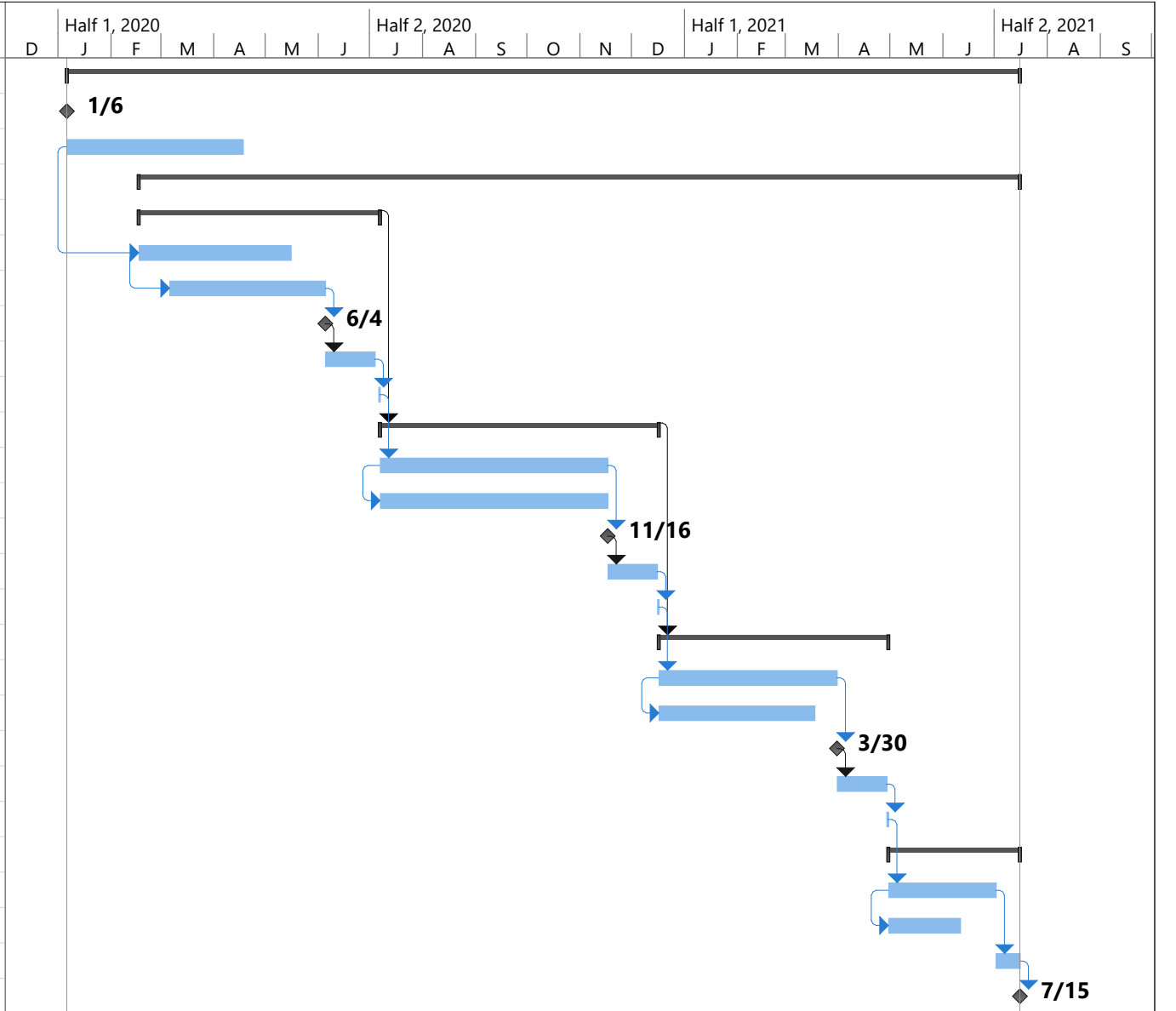


**SCHEDULE**  
League City, Texas

The professional shall complete the following activities and deliverables identified in the scope of work in accordance with the schedule as follows:

<b><u>Deliverables</u></b>		<b><u>Cost (combined)</u></b>	<b><u>Completion Date</u></b>
Survey	(Time Critical)	\$137,137.00	30 Days
Geotechnical Investigation	(Time Critical)	\$247,800.00	130 Days
Preliminary Design (30%)	(Time Critical)	\$523,566.08	62 Days
Revised Design (60%)	(Time Critical)	\$523,566.08	111 Days
Final Design (90%)	(Time Critical)	\$523,566.08	96 Days
Signed and Sealed (100%)	(Time Critical)	\$174,522.03	55 Days
Condemnation Support		\$5,520.52	Post Design Phase
Construction Phase Services		\$74,882.36	During Construction

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Half 1, 2020							Half 2, 2020				Half 1, 2021					Half 2, 2021				
							D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
1		<b>Landing Blvd</b>	<b>399 days?</b>	<b>Mon 1/6/20</b>	<b>Thu 7/15/21</b>																						
2		Begin Work	0 days	Mon 1/6/20	Mon 1/6/20																						
3		Survey (Critical Item)	75 days	Mon 1/6/20	Fri 4/17/20																						
4		<b>Design</b>	<b>369 days?</b>	<b>Mon 2/17/20</b>	<b>Thu 7/15/21</b>																						
5		<b>30% Design Development</b>	<b>101 days</b>	<b>Mon 2/17/20</b>	<b>Mon 7/6/20</b>																						
6		30% Design	65 days	Mon 2/17/20	Fri 5/15/20	3SS+30 days																					
7		30% Bridge Design (Critical Item)	65 days	Fri 3/6/20	Thu 6/4/20	6SS+14 days																					
8		30% Milestone	0 days	Thu 6/4/20	Thu 6/4/20	7																					
9		TxDOT/City Review	21 days	Fri 6/5/20	Fri 7/3/20	8																					
10		Review/Comment Resolution Meeting	1 day	Mon 7/6/20	Mon 7/6/20	9																					
11		<b>60% Design Development</b>	<b>117 days</b>	<b>Tue 7/7/20</b>	<b>Wed 12/16/20</b>	<b>5</b>																					
12		60% Design	95 days	Tue 7/7/20	Mon 11/16/20	10																					
13		60% Bridge Design (Critical Item)	95 days	Tue 7/7/20	Mon 11/16/20	12SS																					
14		60% Milestone	0 days	Mon 11/16/20	Mon 11/16/20	12																					
15		TxDOT/City Review	21 days	Tue 11/17/20	Tue 12/15/20	14																					
16		Review/Comment Resolution Meeting	1 day	Wed 12/16/20	Wed 12/16/20	15																					
17		<b>90% Design Development</b>	<b>96 days?</b>	<b>Thu 12/17/20</b>	<b>Thu 4/29/21</b>	<b>11</b>																					
18		90% Design	74 days	Thu 12/17/20	Tue 3/30/21	16																					
19		90% Bridge Design	65 days?	Thu 12/17/20	Wed 3/17/21	18SS																					
20		90% Milestone	0 days	Tue 3/30/21	Tue 3/30/21	18																					
21		TxDOT/City Review	21 days	Wed 3/31/21	Wed 4/28/21	20																					
22		Review/Comment Resolution Meeting	1 day	Thu 4/29/21	Thu 4/29/21	21																					
23		<b>100% Design Development</b>	<b>55 days</b>	<b>Fri 4/30/21</b>	<b>Thu 7/15/21</b>																						
24		100% Design	45 days	Fri 4/30/21	Thu 7/1/21	22																					
25		100% Bridge Design	30 days	Fri 4/30/21	Thu 6/10/21	24SS																					
26		100% - Ready for Letting Final Details	10 days	Fri 7/2/21	Thu 7/15/21	24																					
27		TxDOT Acceptance - Ready to Let	0 days	Thu 7/15/21	Thu 7/15/21	26																					



Project: Final Critical Schedule  
Date: Tue 11/12/19

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