

EXHIBIT A

City of Georgetown
SE Inner Loop
FM 1460 to SH 29

SCOPE OF SERVICES

The Project will reconstruct SE Inner Loop from FM 1460 to SH 29 in Georgetown. This scope of work consists of preparing the preliminary schematics, environmental reports, Plans, Specifications and Estimates (PS&E) and construction phase services for a single alignment. The project length along the anticipated alignment is approximately 2.8 miles.

Design services for this project will be performed in accordance with the latest available City of Georgetown manuals, guidelines and standards. Where City standards do not exist, appropriate TxDOT and/or AASHTO guidelines may be followed. The project shall consist of a two main typical sections: a 5 lane two-way-left turn lane from FM 1460 to Sam Houston, and a 4-lane divided arterial with a raised median from Sam Houston to SH 29. Additional project elements include, curb and gutter, sidewalks, drainage facilities, water quality, street lighting, traffic signal planning with interim appurtenances and public water / wastewater utility adjustments, and ROW document. The Engineer shall provide the necessary engineering and technical services for the completion of public involvement, permitting including TCEQ, surveying and mapping, identification of utility conflicts, coordination with utility companies, preparation of PS&E, bid phase services and construction phase services.

Agency abbreviations are as follows:

City of Georgetown (City), Williamson County (County), Texas Department of Transportation (TxDOT), Texas Department of Transportation Environmental Division (TxDOT-ENV), Federal Highway Administration (FHWA), Capital Area Metropolitan Planning Organization (CAMPO), Transportation Improvement Plan (TIP), Statewide Transportation Improvement Program (STIP), Environmental Protection Agency (EPA), Texas Historical Commission (THC), National Register of Historical Places (NRHP), Federal Emergency Management Agency (FEMA), Texas Commission on Environmental Quality (TCEQ).

The tasks and products are more fully described in the following TASK OUTLINE.

TASK OUTLINE

I. PROJECT MANAGEMENT

A. PROJECT MANAGEMENT

1. Create and submit monthly invoices suitable for payment by the City.
2. Prepare monthly progress reports for submission with the monthly invoices to provide a written account of the progress made to date on the project.
3. Meet formally at once a month with the City to review project progress.
4. Prepare project meeting summaries for applicable meetings during the project development process.
5. Meet with property owners, stakeholders, the City, County and TxDOT staff as required through the project development process.

6. The Engineer will have internal meetings with the consultant design team every two weeks for the length of the project. It is assumed that these meetings will include key personnel from each discipline and will be required to discuss and resolve project issues.
7. The Engineer shall prepare and execute contracts with sub-consultants, monitor sub-consultants activities (staff and schedule), complete monthly reports and review and recommend approval of sub-consultant invoices.
8. The Engineer will review and coordinate work of sub-consultants to ensure quality products are delivered to the County. The Engineer will also be responsible for the consistency and coordination between plans developed by each sub-consultant on the design team.
9. The Engineer shall formally close out the project and perform a documented archive process.

II. SURVEYING SERVICES

A. PROJECT CONTROL SERVICES

1. The Surveyor will attempt to recover and utilize City of Georgetown NAD-83/93 (HARN) NAVD 88 datum, Texas State Plane Coordinate System, Texas Central Zone primary control monuments for this project unless requested to use another source of datum. In the case that the control has been destroyed the Client will be notified immediately. This scope and fee do not include effort to re-establish destroyed control. A Global Positioning System (GPS) and conventional land surveying methods will be used to establish additional project control if needed. These methods will also be used to perform the various tasks of this project.

B. DESIGN SERVICES

1. The Surveyor shall generate, recover, and/or verify existing horizontal and vertical project primary control at the site, if any, and reconcile the control to known existing intersecting projects.
2. The Surveyor shall establish or densify additional secondary control as needed for the project to collect data along the length of the project.
3. The Surveyor shall, at their discretion, use 5/8" iron rods with distinguishing caps, cotton spindles (paved areas) or other durable entities for the project control as applicable.
4. The Surveyor shall perform differential leveling through the project control (primary and secondary) to establish or extend vertical control for the project.
5. The project limits for surveying shall be along the expected path of SE Inner Loop from FM 1460 TO SH 29. The survey shall also include:
 - (a) 1/4-mile east and west along SH 29 in both east and west directions, 20ft wider than existing ROW
 - (b) past SH 29 along SE Inner Loop.
 - (c) intersection with FM 1460 will also be surveyed past each radius curb return
 - (d) Maple Street from SE Inner Loop south, past Sam Houston and another 1500 ft
 - (e) Sam Houston from the split with SE Inner Loop, past Maple street and another 1500 ft
 - (f) All other cross streets and driveways along the corridor
6. The Surveyor shall perform a topographic/design survey within the project limits. The topographic/design survey includes, but is not necessarily limited to: roadway, ditches, major grade breaks, culverts, culvert types and sizes, metal beam guard fence, fences, driveways, mailboxes, traffic and other signs, mailbox turnouts, striping, and visible above ground utilities.

7. The Surveyor shall survey drainage structures within the limits defined above. There is an adjacent swale, west of the alignment from Churchill Farms to SH 29. These limits will be surveyed, including the outlet structures necessary to recreate hydraulic models.
8. The Surveyor shall survey side streets within the project limits to a distance of 100' from the proposed alignment or far enough to establish drainage.
9. The Surveyor shall survey driveways within the project limits to a distance of 20' from the proposed alignment or far enough to establish drainage.
10. The Surveyor shall provide digital photograph of each end of each cross road drainage structure located within the project limits.
11. The Surveyor shall process the collected information into a 1 foot contour DTM file utilizing Geopak V8i.
12. The Surveyor shall locate right-of-way monumentation and other evidence to reestablish the existing right-of-way lines and parcel boundaries within the limits of survey. This is not to be construed as boundary surveying at this time nor is it considered taxable for the purposes intended at this time.
13. The Surveyor shall set project control (N, E, Elev.) in such manner to reasonably assure the control will survive construction.

C. TREE SERVICES

1. The Surveyor shall locate trees that 6 inches in diameter and larger, and note the size, species and canopy area.

D. GEOTECHNICAL INVESTIGATIONS

1. Soil Borings – Geotechnical Engineering
 - (a) Perform fifteen (15) borings spaced at approximately 1,000 feet apart to a maximum depth of fifteen (15) feet along the final alignment to perform a final pavement design. Borings are planned to be terminated shallower than 15 feet if limestone is encountered.
 - (b) If expansive soils are encountered (PVR > 2") and a lime stabilized subgrade option is desired, additional borings may be needed to comply with pavement design requirements. Drill these borings to a minimum depth of ten (10) feet to map geology and collect PI information if soils are expansive for PVR calculation.
 - (c) Perform twenty-four (24) borings spaced at approximately 200 feet apart and to a maximum depth of thirty (30) feet for the six (6) proposed MSE retaining walls along the alignment. Borings are planned to be terminated shallower if 10 feet of competent limestone is encountered.
 - (d) No bridge borings are anticipated to be needed at this time but can be performed under a supplemental agreement upon request. The borings will be used to investigate subsurface stratigraphy and to obtain samples for laboratory testing.
 - (e) Some of the borings appear to be within dense tree foliage areas that may require limited pathway clearing for drilling rig access. One (1) day of clearing has been included in our budget.
2. Laboratory testing will be performed to determine the soil's plasticity and strength characteristics, including:
 - (a) NRCS Soil Classification
 - (b) Atterberg Limits Tests
 - (c) Sieve Analysis

- (d) Soluble Sulfate Content
 - (e) Moisture Content
 - (f) Unconfined Compressive Strength
 - (g) Eades and Grim (ASTM D6276) pH/lime series
3. The Engineer will coordinate with locator service to determine existing utility locations. No private utility locates are anticipated or planned in the scope of services.
 4. MSE Retaining wall Design Memo
 - (a) A geotechnical design memo consisting of location of borings performed and boring logs along with a memo report with analyses for global and external stability results will be provided.
 5. The Engineer will prepare a pavement design report that will present recommendations for the design of the roadway pavement sections. The pavement design will follow the criteria and guidelines in TxDOT's *Pavement Design Guide* and AASHTO's *Guide for the Design of Pavement Structures*. The pavement design report will include:
 - (a) Site vicinity and geology map.
 - (b) Generalized subsurface conditions, as well as groundwater conditions encountered during drilling operations.
 - (c) Pavement thickness design for the proposed roadway. Flexible pavement design will be analyzed using the FPS program. Rigid pavement design is not anticipated.
 - (d) Traffic data required by FPS 21 (existing and future ADT, ESAL's, and percent trucks) will be provided by the City.

E. GEOTECHNICAL LOCATIONS

1. The Surveyor will stake prior to boring and locate after boring up to thirty-nine (39) geotechnical locations. The Engineer is to provide the locations for the borings.

F. ROW, EASEMENT EXHIBITS & LEGALS

1. The Surveyor shall prepare and provide up to twenty (20) parcel right-of-way acquisition documents.
2. City of Georgetown to provide the Title Commitments for the Parcel Acquisitions.

G. DELIVERABLES

1. The Surveyor shall provide:
 - (a) 2D MicroStation V8i planimetric file.
 - (b) 3D MicroStation V8i DTM file including break-lines and 1 foot contours.
 - (c) Geopak V8i DTM (tin) file.
 - (d) ASCII point file.
 - (e) Two CD-ROM containing the specified files.
 - (f) PDF file of each Surveyor's project field book.
 - (g) Spreadsheet of landowners for right-of-entry letters

H. ASSUMPTIONS

1. The Surveyor shall notify the client prior to performing the work if:
 - (a) Sufficient right-of-way monumentation cannot be found to re-establish the existing alignments and associated right-of-way lines along the project corridor.

- (b) Traffic Control cannot be managed by the Surveyor's personnel.
- (c) The work is delayed due to weather or other circumstances beyond the Surveyor's direct control.
- (d) Existing Project Control cannot be recovered or verified.

I. UTILITIES

1. Subsurface Utility Engineering (SUE)

- (a) The project limits are approximately 2.8 miles along a new alignment.
- (b) The project consists of providing Quality Level (QL)-B on the existing underground utilities. QL-D and QL-C services are inclusive with the QL-B product.
- (c) Provide QL-B services for the various utilities noted on the site visit for preparing this scope of services with associated fees. The various utilities noted are water, sanitary sewer, natural gas, telephone communications (cable and fiber optic) and electrical. This scope of services is based upon the effort to provide SUE services for these utility systems.
- (d) Utility services from the main utility to the right-of-way to service a lot or structure are not included within this scope of service nor the estimated utility linear footage previously shown.
- (e) Identify and map the existing utility facilities located on existing utility poles within the project limits. The facilities company name and contact information will be provided as part of the deliverables.
- (f) Definitions:
 - (i) Quality Service Level D (QL-D) – This level of service is inclusive of QL-B and consists of collecting existing utility record information (as-built) from utility purveyors, municipalities, counties and other agency suppliers within the area of investigation. Contact the TxDOT Permit Office to obtain available records of any utility crossing IH 35 within the project limits.
 - (ii) Quality Service Level C (QL-C) – This level of service is inclusive of QL-B and consists of surveying and obtaining accurate horizontal position of visible utility surface features associated with the project area to be designated by the Engineer.
 - (iii) Quality Service Level B (QL-B Designating Services) – Designate is to indicate, by marking with paint, the presence and approximate horizontal location of subsurface utilities using geophysical prospecting techniques, including, without limitations, electromagnetic, sonic, and acoustical techniques.
 - (iv) Quality Service Level A (QL-A Locating (Test Hole) Services) – Locating services is to locate the accurate horizontal and vertical location of subsurface utilities by excavating a test hole using vacuum excavation techniques and equipment that is non-destructive to utilities.

III. ROUTE AND DESIGN STUDIES

A. DATA COLLECTION

1. Perform field investigations of the project. These investigations will include site visits to the project site and adjacent area to gather pertinent information relating to the corridor. Field investigations will also be performed to review individual property locations and the impacts of the alignment to that property.
2. Develop a photo inventory of the project site for reference in project meetings, discussions with stakeholders and discussions with developers, etc. during the project development.

3. Gather and review information from the City including existing as-builts project files, existing geometric conditions, existing typical sections, existing drainage facilities, culvert data and traffic data. Gather and review related existing and draft studies from the City, including feasibility, route, traffic signal, corridor, MIS/Environmental and Value Engineering studies in the project vicinity. Gather and review information from various planning documents such as the CAMPO 2040 plan, Texas Transportation Plan, Transportation Improvement Plan and the City master street/road plans impacting the project.
4. Gather and review information from the Developers including existing plans, project files, existing geometric conditions, existing typical sections, existing drainage facilities, existing bridge and culvert data and traffic data.
5. Collect County parcel data.

B. ALIGNMENT STUDY

1. Develop the roadway design criteria established in the route alternative stage for the project to be discussed, revised and approved by the City. This set of criteria will then be compiled and documented into a design criteria spreadsheet.
2. Develop two (2) alternative geometric configurations for SE Inner Loop within the project limits to satisfy the project goals of the City.
3. Develop two (2) alternative geometric configurations for SE Inner Loop / Maple Street / Sam Houston intersection to satisfy the project goals of the City.
 - (a) Coordinate with the County on intersections
4. Develop initial existing and proposed typical sections.
5. Develop Engineer's opinion of probable cost for the two (2) project configurations. A cost estimate will be developed for one (1) alternative to determine a cost per mile basis to apply to the other alternative.
6. Produce two (2) exhibits depicting the above geometric configurations to a detail level sufficient for City review.
7. Conduct three (3) meetings with the City to coordinate the desired and/or required improvements and obtain concurrence for the project location and final design configuration of the project.
8. Traffic Analysis
 - (a) The Engineer shall perform an operational analysis with VISSIM for the build year (2045) for two proposed intersection configuration designs at SE Inner Loop and Sam Houston/Maple to compare options using existing VISSIM simulation models. Existing calibration to counts and forecasted volumes at the intersection will be used in the operational analysis.
 - (b) The Engineer shall develop a technical memorandum to summarize all analysis performed. Measures of Effectiveness shall include network delay, network average travel time, vehicle miles traveled, and number of vehicles arriving in the network.
 - (i) Deliverables:
 - a) Technical Memorandum summarizing analysis and findings at the intersection of SE Inner Loop with Sam Houston Avenue

9.

C. SCHEMATIC LAYOUT DEVELOPMENT

1. Prepare calculated horizontal geometrics for the project roadways.
2. Prepare calculated vertical geometrics for the project roadways.
3. Develop existing and proposed typical sections for inclusion on project schematics.
4. Develop preliminary cross sections at 100' intervals. These cross sections will be for estimation of cut and fill quantities, as well as determining retaining wall locations and heights.
5. Determine retaining wall limits for the project roadways.
6. Finalize Engineer's opinion of probable cost for the selected configuration
7. Develop preliminary TCP layout and typical sections to include in cost estimates.
8. Prepare project schematic plots for the project corridor. Plots will include required elements suitable for submission to the City. The roll plot will not exceed 10' in length with a 1"=100' horizontal scale and 1"=10' vertical scale. Depict the following on the schematic plot:
 - (a) The horizontal alignments will show bearings in the tangent sections and curve data including delta angles, PI stations, tangent lengths, length of curve, and radii. The plan views will show the centerline, edge of pavement, striping, lane widths, shoulder widths, cross slopes, superelevations with transitions, direction of traffic flow, and layouts for speed change lanes.
 - (b) The vertical alignment will show existing and proposed elevations at 100-foot intervals, vertical curve VPI stations, curve lengths, superelevation rates and transitions, design speeds, and "K" values.
 - (c) The existing apparent ROW limits and proposed ROW limits for selected configuration.
 - (d) Anticipated retaining wall locations (if any).
 - (e) Proposed striping and lane numbers. Small signs will not be developed at the schematic phase.
 - (f) Current and projected traffic volumes as developed by the traffic data collection and analysis task.
 - (g) Existing utility locations in plan emphasizing those which are in conflict with the proposed construction. Proposed utilities will not be shown.
 - (h) Significant drainage structures (existing and proposed) as determined by Hydrologic and Hydraulic report.
9. Final Deliverable items
 - (a) Two (2) paper copy of schematic plot for selected alignment
 - (b) PDF version of schematic plots in electronic format (CD/DVD)
 - (c) Probable cost of construction estimate
 - (d) All (*.dgn) files – Mapping, utilities, design files, cross sections, schematic plot,
 - (e) Geopak files - (*.dat), (*.gpk), (*.tin), (*.prj) files, etc.
 - (f) Hydraulic models – files used from any software used for analysis and design for the storm sewer, water quality and detention design, such as HY8, Geopak Drainage, HEC-RAS/HMS

D. TRAFFIC DATA COLLECTION

1. Collect 24-hour Turning Movement Volume Counts at the following locations:
 - (a) SE Inner Loop & Stonehedge Blvd.
 - (b) SE Inner Loop & Churchill Farms Dr.
 - (c) SE Inner Loop & Belmont Dr.
 - (d) SE Inner Loop & Wey Hill Dr.

- (e) SE Inner Loop & Southwestern Blvd.
- (f) SE Inner Loop & Sam Houston Ave./Maple St.
 - (i) Collect count data at SE Inner Loop & Sam Houston Ave., SE Inner Loop & Maple St., and Sam Houston Ave. & Maple St. for comprehensive warrant analysis.

- 2. Rockride Ln. signal warrant study is being conducted by others. Traffic data collection is not required at this location.
- 3. Conduct a field review to collect physical data relevant to traffic analysis and design.
- 4. Collect other available traffic data from the City, TxDOT STARS II, CAMPO, Williamson County, and other sources as necessary for traffic analysis and design.

E. UTILITY COORDINATION

- 1. The Engineer will develop a contact list of the affected utility owners in the project corridor.
- 2. The Engineer will contact each utility company and meet individually with them to review their assumed utility locations developed from the SUE process.
- 3. The Engineer will prepare scroll plots indicating researched utility locations to provide to utility companies / owners for their review and comment.
- 4. The Engineer (or his subconsultants) will not be responsible for any omission of utility information that is not obtainable via electromagnetic, sonic, or acoustical designating services. Non-metallic piping, inactive electric and/or communication lines may or may not be found by electromagnetic, sonic or acoustical designating practices. The Engineer (or his subconsultants) do not warrant and/or guarantee that all existing utilities will be found.

F. WATER/WASTEWATER DESIGN

Water and Wastewater alignment study and design is assumed to include the following:

- 4,300 LF of new 16-inch water line
- Relocation of 6,000 LF of 12-inch water line
- Relocation of 1,000 LF of 8-inch wastewater line
- Relocation of 100 LF of 16-inch reclaimed water line

1. DATA COLLECTION

- (a) Perform field investigations of the project. These investigations will include up to two (2) site visits to the project site and adjacent area to gather pertinent information relating to the corridor and proposed pipeline alignments. Right of Entry will be provided by others.
- (b) Review information from the City including existing as-builts, project files, existing roadway features, topography, existing typical sections, existing utilities, and existing drainage facilities. Gather and review related existing and draft studies from the City, including utility master plans.
- (c) Review information from the Developers including existing plans, project files, existing geometric conditions, existing typical sections, existing drainage facilities, existing bridge and culvert data and traffic data.

2. ALIGNMENT STUDY

- (a) Develop up to two (2) proposed alignment layouts for approx. 4,300 LF of new 16-inch water line.
- (b) Review proposed roadway alignment and establish conflicts with existing water, wastewater and reclaimed water lines.

- (c) Develop conceptual level Engineer's opinion of probable cost for the water/wastewater utilities.
- (d) Produce exhibits depicting the proposed 16-inch water line alignment, and identification of conflicts with existing water, wastewater and reclaimed water lines to a detail level sufficient for City review.
- (e) Conduct one (1) meeting with the City to coordinate the desired and/or required improvements and obtain concurrence for the project location and final design configuration of the project.

3. SCHEMATIC LAYOUT DEVELOPMENT

- (a) Following development of project roadway and drainage schematic development, develop alignments for proposed water, wastewater and reclaimed water and relocations. Plots will show horizontal utility alignments on the schematic plots developed for roadway improvements.
- (b) Develop schematic level Engineer's opinion of probable cost for the water/wastewater utilities.

G. Landscape Architecture

1. Concept Phase

- (a) Create inventory maps and diagrams to provide basis for analyzation of factors
- (b) Coordinate with civil engineer on road alignment identifying areas available for landscape planting/programming
- (c) Coordinate with civil engineer on sidewalk/sidepath alignment identifying areas available for landscape planting/programming
- (d) Program and identify different landscape zones, buffers, wayfinding opportunities, intersections, conflict points, and crosswalks
- (e) Create Plant Palette imagery boards in coordination with concepts and landscape zones
- (f) Create hardscape material palette for enhanced sitework zones
- (g) Create multiple concept plans of landscape integration in accordance with available ROW, grade, sight triangles, and roadway amenities
- (h) Create detailed, rendered planting and sitework plans of specialty areas
- (i) Create street section diagrams and 3d models illustrating landscape integration into roadway programming
- (j) Prepare a detailed Opinion of Probable Cost for final concept

IV. PUBLIC INVOLVEMENT

The Engineer shall plan for and conduct one (1) public meeting for the project. The Engineer shall follow TxDOT requirements for public meetings.

1. Plan and prepare for public meeting

- (a) Compile, maintain and update a mailing list of people, agencies and organizations interested in the project, including adjacent property owners.
- (b) Arrange the site of the public meeting, including coordination of materials and staffing needed from the venue. The Engineer will cover the cost of facility rental and hourly pay for janitorial and security staff, if needed.
- (c) Develop a public friendly plot of the project.
- (d) Prepare public meeting notice, sign-in sheets, comment forms, handouts, displays and exhibits. Coordinate with one (1) local newspaper to publish the public meeting notice at least 15 days prior to the meeting. The Engineer will cover the cost of newspaper publication.

- (e) Attend one (1) pre-meeting with the City to review all exhibits and other materials to be used prior to the public meeting.
2. Provide three (3) personal to set up the facility and staff the public meeting, to assist in discussing the project and answer questions from the public.
3. Develop and submit a written summary of the public meeting to include the meeting notice, photographs of displays and set-ups, handouts distributed at the meeting, attendance sheets, comment forms, and responses to comments.
4. Deliverables
 - (a) Draft and Final public meeting notice, sign-in sheet, comment form, handout, displays and exhibits
 - (b) Draft and Final Public Meeting Summary Report

V. ENVIRONMENTAL

A. ENVIRONMENTAL CONSTRAINTS ANALYSIS

The Engineer shall do the following in support of the conceptual project schematic:

1. Obtain publicly available information including but not limited to: locations of public buildings and facilities (schools, churches, parks, cemeteries, dams), aerial photography, National Wetlands Inventory Maps, County Soil Survey Maps, TCEQ & EPA Hazardous Materials Database Information, FEMA Floodplain Information, and Threatened & Endangered Species Information.
2. Conduct field reconnaissance to visually inspect the project area for additional risks and field verify any environmental risks identified by the desktop constraints mapping.
3. Coordinate with the design team on known constraints and environmental concerns, and assist in the evaluation of preliminary route concepts.
4. Deliverables:
5. Draft and Final Constraints Map

B. ENVIRONMENTAL DUE DILIGENCE INVESTIGATIONS

The Engineer shall do the following to provide environmental clearance on the portion of the project that does not connect to TxDOT on-system roadways:

1. Right-of-entry
 - (a) Prepare and mail right-of-entry letters to property owners adjacent to the project area.
2. Data Collection & Field Reconnaissance:
 - (a) Update publicly available information obtained for the constraints mapping, then conduct field reconnaissance within the project area. This field investigation will be conducted with right-if-entry to adjacent properties.
3. Endangered Species Act Compliance

- (a) Perform a federal Threatened and Endangered Species habitat assessment. The assessment will be specific to all species listed in the USFWS Threatened and Endangered Species List for Williamson County, will include a description of suitable habitat for all species listed, and will provide information pertaining to the habitat available in the Project area.
 - (b) Perform a preliminary data review of data from the USFWS, Texas Parks and Wildlife Department (TPWD) Natural Diversity Database (NDD), USGS topographic maps, NRCS soil data, aerial photos, and other additional resources that may indicate the potential presence of threatened and endangered species' habitat.
 - (c) It is assumed that the project would not require consultation with the USFWS. If determined necessary, those services would be conducted under an additional scope and fee.
4. Clean Water Act Compliance:
- (a) Obtain and review pertinent data to identify potential waters of the U.S within the project area. Sources include, but are not limited to, the following:
 - (i) Aerial photographs
 - (ii) Soil surveys
 - (iii) Local and national hydric soils lists
 - (iv) U.S Department of Agriculture plant species data
 - (v) U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps
 - (vi) U.S. Geological Survey (USGS) topographic maps,
 - (vii) Federal Emergency Management Agency (FEMA) map(s)
 - (b) Identify and delineate the boundaries of all potential waters of the U.S. Methodology and documentation will be consistent with the 1987 Corps of Engineers Wetland Delineation Manual and 2010 Regional Supplement for the Great Plains Region or the most recent USACE guidance, as applicable. During field activities, waters of the U.S. (including wetlands, ordinary high water marks, etc.), will be mapped using either sub-meter accurate GPS equipment (such as a Trimble GeoXT) or other method approved by the Owner. Complete soil stations and appropriate field data forms as necessary to ensure conformance with USACE guidance and industry best practices.
 - (c) It is assumed permitting would be avoided through design. If a Nationwide Permit 14 Preconstruction Notification to the USACE or an Individual Permit is determined to be required, then it would be carried out under an additional scope and fee.
5. Texas Antiquities Code (TAC) Compliance:
- (a) Apply for and obtain a Texas Antiquities Permit from the THC (required for any project that falls under the jurisdiction of the Antiquities Code of Texas). The application for a Texas Antiquities Permit requires the signature of the project sponsor and/or landowner, as appropriate, as well as the archeological Principal Investigator. The Texas Antiquities Permit must be issued by the THC prior to the initiation of any cultural resources field activities.
 - (b) Perform an intensive archeological survey, consisting of pedestrian walkover with surface inspection and systematic shovel testing, at a level of intensity sufficient to meet or exceed the Texas State Minimum Archeological Survey Standards (TSMASS) and guidelines established by the CTA unless field conditions warrant excavation of more or fewer shovel tests.
 - (c) Document any cultural resources encountered to a sufficient degree to make preliminary recommendations of the significance of the resources in terms of their eligibility for inclusion in the NRHP and/or for designation as SALs, as appropriate.

- (d) Inspect the locales of any previously recorded archeological sites within the project area, assess their current condition, and document the sites to a sufficient degree to make preliminary recommendations of the significance of the resources in terms of their eligibility for inclusion in the NRHP and/or for designation as SALs, as appropriate.
- (e) Complete and submit State of Texas Archeological Site Data Forms (for new archeological sites) or State of Texas Archeological Site Update Forms (for previously recorded archeological sites) to TARL. Permanent site trinomials will be obtained from TARL for any new archeological sites documented within the project area during the survey.
- (f) Assess the significance of any cultural resources within the project area in terms of their potential eligibility for inclusion in the NRHP and/or for designation as SALs, as appropriate.
- (g) Develop a draft technical report detailing the project background, environmental and cultural setting of the project area, research goals and survey methods, survey results, recommendations for any cultural resources documented during the survey, and a bibliography of references cited suitable for review by the THC and any other applicable regulatory agencies.
- (h) Submit a preliminary review copy of the archeological draft report describing the results of the survey in electronic (PDF) format to the client or review. Following approval of the draft report by the client, the Engineer shall submit an electronic copy of the report to the THC and any other applicable regulatory agencies for review and comment.

6. Environmental Due Diligence Summary Report

- (a) Prepare a summary report of the environmental due diligence investigations. The report will document methods, results, and conclusions of the investigations, along with recommendations for further surveys, agency coordination, and permitting requirements.

7. Phase I Environmental Site Assessment:

- (a) Conduct a regulatory records review to identify listed hazardous waste generators, treatment, storage and disposal facilities; solid waste landfills, unauthorized sites; documented spills; oil and gas exploration and production sites; and underground storage tank sites within the proposed site location. The review will also identify other environmental risks along the project corridor.
- (b) Prepare a Phase I Environmental Site Assessment (ESA) to ASTM standards, based on the data collection and field reconnaissance conducted and identify potential hazardous material sites that may be impacted by the proposed project.
- (c) If it is determined that Phase II or Phase III investigation is required, those services could be conducted under a supplemental scope and fee.

8. Deliverables:

- (a) Draft and Final Right-of-Entry Letters
- (b) Draft and Final Environmental Due Diligence Summary Report
- (c) Draft and Final Phase I Environmental Site Assessment

C. TXDOT DOCUMENTATION

For the proposed roadway connections with TxDOT on-system roadways (SH 29 and FM 1460), the Engineer shall complete Environmental Documentation (anticipated to be Categorical Exclusions [CEs]) as required to comply with the National Environmental Policy Act (NEPA) and other State requirements. The Engineer shall conduct the following tasks in support of a CE Determination:

- 1. Update TxDOT ECOS Work Plan Development Forms to determine required tasks and technical reports/forms needed to satisfy TxDOT environmental documentation requirements.

2. Technical Reports

- (a) The Engineer shall prepare the following technical reports anticipated to be required in support of the CE:
- (b) Hazardous Materials Initial Site Assessment Form
- (c) Historic Project Coordination Request Form
- (d) Archeological Background Study
- (e) Species Analysis Spreadsheet and Species Analysis Form

3. Deliverables

- (a) Draft and Final Work Plan Development Forms
- (b) Draft and Final Hazmat Initial Site Assessment Form
- (c) Draft and Final Historic Project Coordination Request Form
- (d) Draft and Final Archeological Background Study
- (e) Draft and Final Species Analysis Spreadsheet and Species Analysis Form

D. Archeological Survey

1. Task 1—Archeological Background Studies

For the TxDOT ABS, Horizon will:

- (a) Perform basic archival research at the THC, the General Land Office (GLO), the National Park Service's (NPS) online National Register Information System (NRIS), TxDOT Potential Archeological Liability Map (PALM), TxDOT's Historic Resources Aggregator online database, and/or other relevant archives for information on previous cultural resources investigations conducted in the vicinity of the project area and previously recorded archeological sites and historic properties within and in the vicinity of the project area. Desktop archival studies will examine a 1.0-mile radius surrounding the project area.
- (b) Review the abovementioned archives; historical, geological, topographic, and soil maps; and aerial photographs prior to initiating fieldwork to evaluate the potential for encountering significant cultural resources within the project area.
- (c) Define the Area of Potential Effect (APE) of the proposed project based on applicable federal and state agency guidelines, taking into account the horizontal extent of the construction footprint, the vertical depth of ground-disturbing impacts, and potential indirect (e.g., viewshed) effects beyond the construction footprint.
- (d) Prepare a single TxDOT ABS for the intersections of SE Inner Loop Road at FM 1460 and SH 29 according to TxDOT's Standards of Uniformity for Technical Reports—Review Standards for Archeological Background Studies. Note that the TxDOT ABS would address only the abovementioned highway intersections; they would not include the entire alignment of SE Inner Loop proposed for improvement as SE Inner Loop is a county road and not an on-system TxDOT roadway.

2. Task 2—Project Coordination Requests for Historical Resources

For the TxDOT PCR, Horizon will:

- (a) Perform basic archival research at the THC, the NPS's online National Register Information System (NRIS), TxDOT's Historic Resources Aggregator online database, and/or other relevant archives for information on previous cultural resources investigations conducted in the vicinity of the project area and previously recorded archeological sites and historic properties within and in the vicinity of the project area. Desktop archival studies will examine the proposed construction footprint and adjacent parcels within 150.0 feet of the project area.
 - (b) Evaluate the potential presence of additional unrecorded historic-age resources by analyzing historical maps and aerial photographs of the project area.
 - (c) Complete and submit a PCR per TxDOT Environmental Affairs Division (ENV) Historic Studies Department Standards dated August 2015 to determine the scope of any further historic resources studies required for the project.
 - (d) Prepare the TxDOT PCR form and supplemental information memorandum documenting the results of the review for previously recorded National Historic Landmarks (NHL), historic properties listed on the NRHP and/or designated as SALs, and Recorded Texas Historic Landmarks (RTHL).
3. Task 3—Archeological Survey Fieldwork

If an archeological survey is required, Horizon will:

- (a) Apply for and obtain a Texas Antiquities Permit from the THC (required for any project that falls under the jurisdiction of the Antiquities Code of Texas). The application for a Texas Antiquities Permit requires the signature of the project sponsor and/or landowner, as appropriate, as well as the archeological Principal Investigator. The Texas Antiquities Permit must be issued by the THC prior to the initiation of any cultural resources field activities.
 - (b) Perform an intensive archeological survey, consisting of pedestrian walkover with surface inspection and systematic shovel testing, at a level of intensity sufficient to meet or exceed the Texas State Minimum Archeological Survey Standards (TSMASS) and guidelines established by the CTA unless field conditions warrant excavation of more or fewer shovel tests.
 - (c) Document any cultural resources encountered to a sufficient degree to make preliminary recommendations of the significance of the resources in terms of their eligibility for inclusion in the NRHP and/or for designation as SALs, as appropriate.
 - (d) Inspect the locales of any previously recorded archeological sites within the project area, assess their current condition, and document the sites to a sufficient degree to make preliminary recommendations of the significance of the resources in terms of their eligibility for inclusion in the NRHP and/or for designation as SALs, as appropriate.
4. Task 4—Archeological Technical Report

Following the completion of the archeological field survey (if required), Horizon will:

- (a) Complete and submit State of Texas Archeological Site Data Forms (for new archeological sites) or
- (b) State of Texas Archeological Site Update Forms (for previously recorded archeological sites) to TARL.
- (c) Permanent site trinomials will be obtained from TARL for any new archeological sites documented within the project area during the survey.
- (d) Assess the significance of any cultural resources within the project area in terms of their potential eligibility for inclusion in the NRHP and/or for designation as SALs, as appropriate.
- (e) Develop a draft technical report detailing the project background, environmental and cultural setting of the project area, research goals and survey methods, survey results, recommendations for any cultural resources documented during the survey, and a bibliography of references cited suitable for review by the THC and any other applicable regulatory agencies.

- (f) Submit a preliminary review copy of the archeological draft report describing the results of the survey in electronic (PDF) format to the client or review. Following approval of the draft report by the client, Horizon will submit an electronic copy of the report to the THC and any other applicable regulatory agencies for review and comment. Horizon will coordinate review with the regulatory agencies unless the client would prefer to coordinate agency review directly.
- (g) Respond to any comments on the draft report offered by the THC and any other applicable regulatory agencies and produce a final report. Submit the final report to the client and the THC.

5. Task 5—Records Curation

Following approval of the archeological technical report by all applicable regulatory agencies, Horizon will:

- (a) Prepare project records for curation at TARL per the requirements of the Antiquities Code of Texas and TARL’s Stipulations and Procedures for the Preparation of Archeological Records and Photographs, Curation Supplies, and Sources and/or Stipulations and Procedures for the Preparation of Archeological Material Collections, as appropriate.

6. Exclusions

- (a) Prehistoric/Protohistoric Archeological Site Recorded
- (b) Historic-age Archeological Site Recorded

E. GEOLOGIC ASSESSEMENT AND KARST SURVEY

1. Task 1: Geologic Assessment

- (a) Horizon proposes to conduct a Geologic Assessment (GA) of the property that is sufficient to address Texas Commission on Environmental Quality (TCEQ) requirements. This includes:
- (b) Background Information Compilation. Published reports will be reviewed and the information used to describe the geological and groundwater conditions within approximately 0.5 miles of the property. Primary sources of information will be geological and groundwater reports published by the Texas Bureau of Economic Geology, Texas Water Development Board, and US Geological Survey (USGS). Relevant theses and dissertations, cave-related publications, fault and lineament maps, and digital topographic maps from the USGS will also be examined.
- (c) Aerial Photography Examination. Photography of the property and surrounding areas, available from the Texas Natural Resources Information System (TNRIS), will be examined for evidence of lineaments, sinkholes, lithologic contacts, bluffs, and other relevant geological features.
- (d) Field Survey. A walking survey will be conducted to locate and describe recharge, karst, and other critical environmental features that may require protection or mitigation. The survey will be conducted along transects with 50-foot spacing, unless site conditions require closer transects. Identified features will be staked and/or flagged and photographed, and their positions will be determined using a handheld GPS device. Horizon assumes that the survey will be conducted only within the boundaries of the property, and that access to the property will be made available by the project owner. If other areas need to be examined, a separate cost estimate will be submitted for the additional work.

- (e) Excavation of Features. An initial reconnaissance excavation and probing of non-cave karst features will be conducted to determine if a cave is present. Such excavations and probing will be done by hand only, and steps will be taken to return the features to their original states following excavation. For features that cannot be excavated and probed by hand, other signs (e.g., air flow, presence of cave crickets) will be used to assess whether a cave is present. At this time, Horizon would not propose to use any remote sensing technology (e.g., geophysics or video cameras) to investigate such features.
- (f) Report Preparation. A written report will be prepared that contains the information required by the TCEQ. The TCEQ GA reports should be submitted to the project owner's engineer to assist in the development of an Edwards Aquifer protection plan and the selection of pollution abatement measures for the property. The report will include, as appropriate:
 - (i) Narrative describing the location, topography, physiography, roads, drainages, and impervious cover of the property and adjacent area.
 - (ii) Narrative of the geology and adjacent area that addresses stratigraphy, geologic structure, lithologic contacts, fractures, faults, sinkholes, known caves, springs, USFWS karst zones, and soil units.
 - (iii) Narrative describing the field survey and methods.
 - (iv) Narrative describing each identified karst and recharge feature, including dimensions, type, trend, possible origin, entrance elevation, geologic characteristics, surface drainage area and conditions, results of excavation, and wildlife observations.
 - (v) USGS 7.5-minute topographic map or equivalent map delineating the property, karst faunal zones (as defined by USFWS), identified features in the surveyed area, and recommended protection areas (if applicable). The map will also show caves, sinkholes, fractures, faults, and water wells within 0.5 miles of the property discovered from literature, aerial photographs, or other sources.
 - (vi) Site geology map, soils map, and a stratigraphic column.

2. Task 2: Phase I Karst Survey

- (a) Horizon's personnel will provide a 100% pedestrian reconnaissance on the subject site to identify karst features located within areas that may potentially produce the caves and voids suitable for utilization by several federally listed threatened or endangered terrestrial karst invertebrates (TKI's). The karst survey will be conducted by a qualified karst geologist/biologist and be conducted in accordance with the USFWS Section 10(a)(1)(A) Scientific Permit Requirements for Conducting Presence/Absence Surveys for Endangered Karst Invertebrates in Central Texas. If karst features are identified during the survey, the locations of each feature will be mapped using a GPS unit capable of sub-meter accuracy.

VI. PLANS, SPECIFICATIONS & ESTIMATE

The engineer will develop and submit Plans, Specifications & Estimates (PS&E) plans at levels consistent with and required for City 60%, 90% and final 100% plans. The schematic phase, plots and submittals shall be the 30% submittal.

A. RIGHT-OF-WAY AND UTILITY COORDINATION

1. Right of Way

- (a) The Engineer will determine and provide the limits of the proposed ROW to the Surveyor for preparation of Right-of-Way plans.

2. Utility Adjustments

The Engineer will utilize subsurface utility data throughout the design process. A good faith effort will be made to accommodate existing utility locations. Utility conflicts will be identified during the design process to allow for relocation. The Engineer will coordinate with utility providers on necessary relocations. The Engineer shall include the existing utility information in the plans.

- (a) Identify utility conflicts. The Engineer will provide plan and profiles, culvert layouts, cross sections and other sheets as required to utility providers to assist them in any relocation efforts.

B. ROADWAY DESIGN CONTROLS

1. Miscellaneous Plans

- (a) A project title sheet will be prepared as required for the construction plans.
- (b) A detailed index of sheets will be prepared that shows each sheets location in the plan set, as well as its corresponding sheet number. This index will be updated throughout the submittal process to allow for easier reference during the review process.
- (c) Project layout sheets will be prepared at a scale of 1"=200' that clearly indicates the limits of the entire project.
- (d) Benchmark layout sheets will be completed at a scale of 1"=200' that clearly indicate the benchmark locations and associated control information. These sheets will later be sealed by a RPLS for submittal.

2. Roadway Plans & Geometry

- (a) All plan sheets shall be prepared in an 11" x 17" format; normal scale shall be 1"=50 ft. horizontal and 1"=4 ft. vertical, unless otherwise stated herein.
- (b) Existing typical sections will be completed depicting the existing conditions of the project roadway.
- (c) Proposed typical sections will be completed depicting the improvements to SE Inner Loop, SH 29, Sam Houston and other cross streets as needed. The proposed typical sections are intended to show the general cross-sectional configuration of the roadway in logical sections and will be prepared to the appropriate level of detail and limits to convey that general information.
- (d) A horizontal alignment data sheet will be prepared depicting the horizontal geometric information for the project roadways to be included in the construction plan set.
- (e) SE Inner Loop plan and profile sheets shall be completed depicting the proposed construction.
- (f) Supplemental grading sheets will be prepared at a scale of 1"=50' for areas of the project that require additional grading information for construction or review purposes.
- (g) The Engineer shall provide plan sheets of removals at a scale of 1"=100'. Removal sheets shall clearly identify the disposition of roadway appurtenances. Description of removal items, including material, shall be included.
- (h) Develop right and left turn lanes to all major intersections.

3. Grading and Details

- (a) Design cross sections will be completed at 50-foot stations and other locations as necessary for the determination of cut and fill quantities. These sections will also be used to further refine the design vertical geometry. Cut and fill quantities determined from the design cross sections will be shown on the plan/profile sheets. Cross sections will not be developed as a deliverable for phased TCP.

- (b) The Engineer shall complete intersection layouts for nine (9) intersections. The intersection layouts will include the design of the pavement and drainage layouts, as needed, as well as other pertinent details not discernable elsewhere in the plans. Intersection layouts shall be developed for the following locations:
 - (i) FM 1460, Sam Houston/Maple Street, Southwestern Blvd., Rock Ridge Lane, Wey Hill Dr, Belmont Dr, Churchill Farms, Stonehedge Blvd and SH 29
- (c) Driveway details will be prepared for each driveway along the project corridor. When possible these driveways will be defined in a tabular format. Non-typical driveways may require special details.
- (d) The Engineer will develop driveway profiles as required for the project. These profiles will be developed to show driveway tie-back slopes, as well as limits for the contractor's information.
- (e) Miscellaneous roadway detail sheets will be developed for the project. The sheets will depict details required that are not defined in standard detail sheets. City standards will be used for the project development. Up to two (2) will be developed.

C. DRAINAGE DESIGN

1. Data Collection

- (a) The Engineer will collect and review the existing hydrologic and hydraulic analyses including FEMA Flood insurance maps, existing models and corresponding studies relating to the project from FEMA and the City. The Engineer will conduct field investigations to observe existing channel characteristics and bridge/culvert structures. The Engineer will assess channel and overbank roughness values using field notes and photographs.

2. Culverts

(a) Hydrology and Exterior Drainage Area Maps

- (i) If existing hydrologic models cannot be found in the FEMA library or from City records, then the Engineer will define drainage area boundaries and characteristics and existing conditions hydrology for the cross-culvert. Peak runoff will be computed in accordance with the City of Georgetown's Drainage Criteria Manual.

(b) Hydraulics

- (i) The Engineer will summarize the relative impacts to computed water surface elevations between existing and proposed conditions. The Engineer will design the proposed improvements such that there will be no significant impacts to adjacent properties.
 - a) The Engineer will analyze existing and proposed conditions hydraulics within the project limits using HY-8 for approximately XX culverts at the following stations:
 - 72+50, 84+00, 88+00, 90+00, 128+00, 172+50, 187+50, 194+50, 198+00, 207+50
 - b) Driveway culverts will be analyzed with HY -8. There are an assumed 15 driveway culverts.
 - c) For more complex crossings, HEC-RAS will be utilized. This is assumed for 4 crossings at the following stations:
 - 91+50, 110+00, 143+00. 157+00
- (ii) Bridge modeling and analysis is not included in this scope.

(c) Scour Analyses

- (i) Perform a scour analysis at the bridge structures (3) mentioned above, before submittal of preliminary bridge layouts.
 - (ii) Provide the City the potential scour depths, envelope and any recommended countermeasures including bridge design modifications and/or revetment.
- (d) Hydraulic Data Sheets
- (i) The Engineer will prepare culvert hydraulic data sheets for culverts modeled in HEC-RAS.
- (e) Hydraulic Report
- (i) The Engineer will prepare preliminary and final hydraulic reports summarizing the methodology used in the hydrologic and hydraulic analyses. Results will be tabulated and presented.
 - (ii) Report will include a summary of detention and water quality.
- (f) Culvert layout sheets will be developed for the twelve (12) culverts not covered by storm sewer plan and profiles. These sheets will be developed at a scale of 1"=50' H and 1"=4' V.
- (g) Preparation of Conditional Letter of Map Revision (CLOMR) and/or Letter of Map Revision (LOMR) applications or submittals are not included in this work authorization.

3. Storm Sewer Design

- (a) Exterior drainage area maps will be finalized at a scale reasonable to fit drainage areas on an 11x17 plan sheet. These maps will depict drainage area boundaries and flow direction arrows. Each area will be identified with a unique number to be used to find run-off information from the calculation sheets.
- (b) Interior drainage area maps will be finalized at a scale of 1"=50'. These maps will depict drainage area boundaries and flow direction arrows. Each area will be identified and cross-referenced to the calculation sheets.
- (c) Run-off to each inlet and inlet hydraulic information will be calculated in accordance with City of Georgetown Drainage Criteria Manual and shown on the run-off and inlet computation sheets in an approved format.
- (d) Storm sewers will be analyzed and computations will be prepared for the storm sewer design using approved design software.
- (e) Drainage plan and profile sheets will be completed depicting locations of inlets, manholes, storm sewers, culverts, utilities, channel improvements and ditch locations and flowlines as required. These sheets will be prepared at a scale of 1"=50'. Storm sewer profiles will be prepared at a scale of 1"=50' H and 1"=4' V. Storm sewer profiles will show pipe size and type, slope, existing and proposed ground lines above the pipe, pertinent hydraulic information and locations and sizes of inlets and junctions.
- (f) Lateral profile sheets will be developed for the project storm sewer systems. These sheets will be developed at a scale of 1"=50' H and 1"=4' V.
- (g) The Engineer will prepare a tabular ditch layout schedule that depicts pertinent information about the roadside ditch geometry and design. This table will include station, offset, flow line elevation, ditch lining material, as well as ditch bottom width. The tables will be shown on the drainage plan sheets.
- (h) The Engineer shall provide drainage design details for "non-standard" drainage structures in instances where they are not covered by City standard details cannot be utilized. The Engineer shall use City standard details where practical.
- (i) The Engineer will identify areas within the construction of the storm sewer and culvert construction that will require trench protection or special shoring.

4. Water Quality and Detention

Approximately the first mile of the project from FM 1460 to the north is within the Edwards Aquifer Recharge Zone.

(a) Water Quality – TCEQ Water Pollution Abatement Plan (WPAP)

- (i) Obtain and review available data on the existing and proposed roadway design and site geology, including engineering plans. An initial field visit will be conducted in order to inspect the site and identify and evaluate potential locations for water quality Best Management Practices (BMPs). Pollutant Removal Calculations and Design of Water Quality BMPs. Coordinate with private developers for potential combined facilities.
- (ii) Engineer will calculate the required total suspended solids (TSS) pollutant load and recommend suitable permanent BMPs for water quality treatment. The use of non-structural, vegetative water quality BMPs, such as grassy swales, which can be utilized within the ROW will be evaluated as the preferred treatment approach. If non-structural BMP's prove to be inadequate, structural BMP's such as sand filters will be preliminarily evaluated and recommendations provided. Recommended Best Management Practices will be in accordance with the TCEQ's technical guidance manual Complying with the Edwards Aquifer Rules – Technical Guidance on Best Management Practices (RG-348, July 2005) and addenda.
- (iii) Preliminary Grading and Layout
 - a) Engineer will perform preliminary grading for structural BMP's such as sediment filtration ponds to determine proper geographic locations and overall footprint requirements for the purposes of ROW preservation. It is assumed two (2) locations may be identified. Detailed final design is not included under this work authorization.
 - b) The final deliverable will be a preliminary technical memorandum stating the water quality assumptions, BMP's analyzed and recommendations for water quality treatment needed related to the proposed roadway project.
 - c) For the purposes of this scope, it is assumed the proposed facilities will not serve regional or adjacent development treatment or detention and that extensive coordination efforts in this regard will be handled by supplemental agreement.
- (iv) Prepare WPAP Document and Coordination with TCEQ. This task includes the completion of the WPAP application forms for submittal to TCEQ
- (v) Conduct a pre-submittal consultation meeting with TCEQ.

(b) Storm Water Detention – 3 ponds assumed

- (i) The Engineer will calculate the increase in peak discharge and runoff volume associated with the proposed improvements in accordance with the City of Georgetown Drainage Criteria Manual.
- (ii) The Engineer will determine the incoming splitter box required dimensions for flow diversion between the sand filter and detention pond.
- (iii) The Engineer will determine the required outlet structure for the detention pond to regulate the storm water runoff so the proposed runoff does not exceed the existing runoff peak discharges.
- (iv) Plan Development

- a) Develop a Pond Layout at a scale suitable to show the entire facility on one (1) sheet. It is anticipated this sheet will be developed at a scale of 1"=50' H. The pond layout shall show the overall dimensions of the pond, grading details, location of hydraulic structures, section cut lines, access locations, hydrologic and hydraulic computations for the pond
- b) Develop appropriate Sand Filter Details. Details to include sand bed structure/profile, chamber divider details and cross section. This is assumed for 1 pond location only.
- c) Develop structural details for the incoming splitter box for 1 pond location only.
- d) Develop structural details for the single outlet structure for the 3 assumed ponds.

5. SW3P and Erosion Control

- (a) Erosion control plans will be prepared for the length of project. Temporary storm water management devices will be needed to minimize the sediment runoff during construction of this project. The anticipated design components to be utilized on this project are silt fence, sand bags, rock filter dams, sediment traps and construction exits. One temporary erosion control plan depicting the entire project will be developed with notes that indicate that the contractor is responsible for phasing the devices along with the construction sequencing. Permanent erosion control measures will be included on these sheets as well.
- (b) A Storm Water Pollution Prevention Plan (SW3P) will be prepared for this job in accordance with TCEQ regulations.
- (c) Erosion control details will be prepared for any related items that are not covered by City of Georgetown standard details.

D. SIGNING, MARKINGS AND SIGNALIZATION

1. Signing and Pavement Markings

- (a) Signing and Pavement marking layouts will be prepared at a scale of 1"=50'. Road signs and markings will be shown all on the same plan sheet. Any additional sheets for signing/pavement markings will be included in a future supplemental agreement. These layouts will depict striping and delineator type and location, as well as MBGF location, lengths and end treatments. Each sign will have a corresponding number for cross-reference to the sign summaries.
- (b) Pavement marking details will be prepared for non-standard conditions.
- (c) Detail sheets for small signs will be prepared for non-standard signs. This sheet is intended to show the overall dimensions of the signs by determining letter size and spacing. Details will not be to scale.

2. Traffic Signal Warrant Study

- (a) Traffic Signal Warrants will be evaluated at unsignalized intersections within the corridor. Warrant study will be conducted in accordance with Texas Manual on Uniform Traffic Control Devices (TMUTCD) Chapter 4C. For intersections not meeting warrants for the existing conditions, an estimated timeline for warrants to be met will be prepared based on assumed traffic volume growth. Warrant Study Summaries will be prepared for each of the study locations. Warrant Studies will be prepared for the following locations:

- (i) Stonehedge Blvd.
- (ii) Churchill Farms Dr.
- (iii) Belmont Dr.
- (iv) Wey Hill Dr.
- (v) Southwestern Blvd.
- (vi) Sam Houston Ave./Maple St.

(b) Warrant study at Rockride Ln. is to be conducted by others.

3. Traffic Signalization

(a) Traffic signal design and plans will be prepared for new proposed traffic signals or modifications to existing traffic signals to accommodate the proposed intersection configurations. Signal design and plans are assumed for the following locations:

(i) SH 29 – Remove existing signal and install new signal to accommodate proposed intersection configuration.

(ii) Stonehedge Dr., Churchill Farms Dr., Belmont Dr., Wey Hill Dr., Southwestern Blvd., Sam Houston Ave./Maple St. – Assume 4 of these locations either meet signal warrants under existing conditions or are expected to meet signal warrants within 5 years. Traffic signals will be designed at these locations.

(iii) FM 1460 – Signal modification to accommodate proposed 5-lane roadway section, specifically for westbound SE Inner loop.

(a) Traffic signal plans will be prepared at a scale of 1"=40' and will include Existing Conditions, Proposed Signal Layout, Signal Details and Schedules, Signal Elevations, Detection Layout, and standard details.

(b) Signal plans will indicate existing conditions, existing utilities, and proposed roadway improvements. Plans will include location of signal pole foundations, conduit, and ground boxes to be installed under this work authorization or for signals to be installed in the future when signal warrants are met.

(c) The Engineer will coordinate with the City in identifying future power source and conduit runs.

(d) In the event that additional signals are warranted by the City, the design and plan production for those facilities will be addressed through a supplemental agreement to this work authorization.

(e) Traffic signal design and plans at SE Inner Loop & Rockride Ln. are to be prepared by others.

4. Temporary Traffic Signalization

(a) Temporary traffic signal design and plans will be prepared at SE Inner Loop & FM 1460, SE Inner Loop & Rockride Ln., and SE Inner Loop & SH 29. Temporary traffic signals will be designed in coordination with the Traffic Control Plans to maintain traffic in all phases and steps of construction. Temporary signals are assumed to be timber pole span-wire style. But existing or proposed steel poles and mast arms may be used as determined during design development and as approved by the City.

(b) Temporary Signal Plans will be prepared at a scale of 1"=40' and will include Temporary Signal Layouts for each TCP phase and step, Temporary Signal Details and Schedules, and standard details.

(c) Temporary Signal Plans will indicate location of temporary signal poles, controller, electrical service, signal heads, conduits, span wires, and other temporary signal equipment. Existing and proposed utilities, existing topographic features, proposed phased construction, and traffic control devices and lane configuration will also be depicted.

(d) The Engineer will coordinate with the City in identifying temporary power source.

E. MISCELLANEOUS ROADWAY

1. Retaining Walls

(a) The Engineer will investigate each wall location and determine what the most suitable wall type is for each application. The anticipated wall type is MSE. It is assumed approximately 3,700LF of walls will be included.

- (b) The Engineer will provide a location plan of all walls at a scale of 1"=400'. The intent is to show the location of all walls in plan including the wall designation and beginning and ending stations.
- (c) The Engineer shall prepare retaining wall layouts at a max scale of 1"=50'. The layouts will show plan and profile views of the retaining wall. It is assumed that six (6) retaining walls will be necessary for the project.
- (d) Non-proprietary wall designs (i.e., Tie-back, soil nailed, drill shaft) are not included in this scope of work.

2. Traffic Control Plan

- (a) Traffic control typical sections will be prepared for each stage of the construction sequence to clearly delineate the position of the existing traffic with respect to the proposed construction. Temporary traffic barriers and pavement markings will also be shown and dimensioned, as needed.
- (b) The Engineer will prepare 1"=400' plan layouts of all advance warning signs along SE Inner Loop and cross streets.
- (c) A detailed narrative for the sequence of construction and traffic control general notes will be prepared and submitted to the City for review and incorporation into the plans. The narrative will include a phase-by-phase, step-by-step written account of the proposed activities throughout the construction process. This is intended to be a narrative account of the activities shown in the traffic control plan layouts.
- (d) Detailed traffic control plans will be prepared at a scale of 1"=50'. These plans will be developed based on the City's approval of the conceptual plans developed at the schematic design level. This plan will describe the maintenance of traffic and sequence of work for each phase of the proposed construction. Detour alignments, location of work areas, temporary paving, temporary shoring, signing, barricades and other details will be required to describe the traffic control plan. The Engineer will be required to ensure that proper drainage can be maintained during each phase of construction. It is assumed three phases will be needed to full reconstruct the roadway.
- (e) Traffic control details will be developed for items not covered by City of Georgetown standard details.
- (f) An Engineer's opinion of construction schedule will be computed in order to determine an approximate duration for each of the phases of construction. The schedule will be prepared using Microsoft Project.

3. Illumination

- (a) The Engineer will design continuous and safety lighting along the project corridor. The lighting will be shown on illumination layouts.
- (b) The Engineer shall provide electrical circuit plans and details for the roadway lighting systems within the project limits.
- (c) The Engineer will coordinate with the City in identifying power sources, conduit runs and will show them on the project plans. The Engineer shall identify potential overhead utility conflicts and coordinate with the State and the utility company to help resolve the conflicts.

4. TxDOT Coordination

- (a) Develop exhibits for submittal to TxDOT for Local On-System Agreement (LOSA) coordination for work along and tying into FM 1460 and SH 29.

5. Quantities

Quantities will be tabulated for each of the following and as necessary to bid this project:

- (a) Traffic Control (per each phase)
- (b) Earthwork
- (c) Roadway
- (d) Retaining Walls
- (e) Removal
- (f) Drainage/Water Quality
- (g) Culverts
- (h) Small / Large Signs
- (i) Pavement Markings
- (j) Signals
- (k) Illumination
- (l) Utilities
- (m) Erosion Control and SW3P

6. Summary Sheets

Quantities that are calculated will be tabulated on individual summary sheets for inclusion in the construction plan set:

- (a) Traffic Control (per each phase)
- (b) Earthwork
- (c) Roadway
- (d) Retaining Walls
- (e) Removal
- (f) Drainage/Water Quality
- (g) Culverts
- (h) Small / Large Signs
- (i) Pavement Markings
- (j) Signals
- (k) Illumination
- (l) Utilities

7. Standards, Specifications and Estimate

- (a) The Engineer shall utilize City standards for the project as appropriate. Standards that require modification will be corrected and sealed by the Engineer. All other standards will have their title blocks filled out with the applicable project data and printed for inclusion in the final plan set.
- (b) A tabulation of applicable specifications, special specifications and special provisions will be prepared for submission with the final PS&E package.
- (c) The Engineer will review general notes provided by the City for applicability to the project. The Engineer will mark-up a set and return it to the City for their inclusion in the final plan set. The Engineer will work with the City to complete the basis of estimate prior to beginning quantity calculations.
- (d) An opinion of probable construction cost will be prepared at the 30%, 90% and prior to final PS&E submittal and supplied to the City in Microsoft Excel format.

8. Bid Documents

- (a) The Engineer will prepare contract bid documents and proposals and make them available in electronic format (PDF) as well as hard copy for the City's use.

F. WATER/WASTEWATER UTILITIES

1. Prepare plan and profile sheets identifying right-of-way, easements, existing utilities and topographic features. Scall will be 1" = 40' horizontal and 1" = 4' vertical. Proposed water and wastewater lines are not anticipated to include service stubs. Plan sheets are expected to include the following, and additional relocations or new utility alignments will be included under a supplemental agreement:
 - (a) 4,300 LF of new 16-inch water line (9 sheets)
 - (b) Relocation of 6,000 LF of 12-inch water line (12 sheets)
 - (c) Relocation of 1,000 LF of 8-inch wastewater line (4 sheets)
 - (d) Relocation of 100 LF of 16-inch reclaimed water line. (1 sheet)
2. Develop Quantities and provide update at each submittal phase.
3. Develop Quantity Summary Sheets (2 Sheets)
4. Standards, Specifications and Estimate
 - (a) The Engineer shall utilize City standards for the project as appropriate. Standards that require modification will be corrected and sealed by the Engineer. All other standards will have their title blocks filled out with the applicable project data and printed for inclusion in the final plan set.
 - (b) A tabulation of applicable specifications, special specifications and special provisions will be prepared for submission with the final PS&E package.
 - (c) The Engineer will review general notes provided by the City for applicability to the project. The Engineer will mark-up a set and return it to the City for their inclusion in the final plan set. The Engineer will work with the City to complete the basis of estimate prior to beginning quantity calculations.
 - (d) An opinion of probable construction cost will be prepared at the 30%, 90% and prior to final PS&E submittal and supplied to the City in Microsoft Excel format.
5. Develop submittal package to TCEQ for sewage collection system (SCS) in the Edwards Aquifer Recharge Zone, and coordination with TCEQ for approval.
6. Bid Documents
 - (a) The Engineer will prepare contract bid documents and proposals and make them available in electronic format (PDF) as well as hard copy for the City's use.

G. Landscape Architecture

1. Implementation Phase/Construction Documents
 - (a) Continue detailed planting plan and hardscape elements in AutoCAD following selected roadway landscape option
 - (b) Prepare plan drawings and details showing the landscape and sitework design and intent to meet any of the City of Georgetown landscape requirements
 - (c) Prepare drawings and details for irrigation
 - (d) Prepare technical specifications for grading, planting, and irrigation
 - (e) Prepare a revised Opinion of Probable total project costs based on the final drawings and specifications
 - (f) Coordinate with civil engineer for overall document submission
2. Bidding Assistance

- (a) Bidding assistance: Prepare sitework, planting, and irrigation drawings, specifications and bid form for bidding to contractors
 - (b) Attend Pre-Bid meeting for bidding contractors
 - (c) Answer questions and provide addenda in a timely manner for clarifications
3. Construction Observation
- (a) Assistance with contractor construction coordination
 - (b) General consultation for landscape planting and irrigation
 - (c) Site visits and requested meetings as necessary or requested
 - (d) Preparation of Record drawings from the contractor's as-built mark-ups
 - (e) Substantial completion review for landscape planting and irrigation
 - (f) Final completion review for landscape planting and irrigation

VII. BID AND CONSTRUCTION PHASE SERVICES

A. BID PHASE SERVICES

1. The Engineer will coordinate with the City for the Bid Package including but not limited to answering prospective bidder questions and preparing addenda as necessary.
2. The Engineer will attend one pre-bid meeting.
3. The Engineer will assist the City at contract bid opening.
4. The Engineer will tabulate the bids, research low bidder and make a recommendation of award to the City.

B. CONSTRUCTION PHASE SERVICES

1. Create and submit monthly invoices suitable for payment by the City.
2. The Engineer shall attend the pre-construction meeting.
3. The Engineer shall attend up to twelve (12) construction meetings as requested by the City.
4. The Engineer shall provide Construction Support Services at the written request of the City project manager. The written request shall include a description of the work requested, a mutually agreed upon time limit, a mutually agreed upon level of effort, a defined deliverable and any special instructions for coordination and submittal. These services shall include, but are not limited to the following:
 - (a) Responding to requests for information (RFIs)
 - (b) Providing redesign as directed by the City for Change orders and documentation
 - (c) Other project related tasks in support of the City during construction

The Engineer shall provide minor redesign as requested by the City project manager. In the event that revisions are requested and the work is considered to be additional to that set forth on the original contract or scopes of work, the Engineer shall prepare a budget and a schedule for the additional work requested. The Engineer shall not commence work on a task prior to receiving written approval by the City.

5. Review the Application for Payment and supporting documentation submitted by the Contractor, recommended to the Owner the amount that the Contractor is to be paid on monthly estimates as required by the Construction Contract. An eighteen (18) month construction schedule is assumed.

Such recommendation for payment to the Contractor shall not be a representation that the Engineer:

- (a) has made exhaustive or continuous on-site observations to check the quality or quantity of the Contractor's work,
 - (b) has reviewed construction means, methods, techniques, sequences or procedures,
 - (c) has reviewed copies of invoices received from subcontractors, material suppliers or other data requested by the Owner to substantiate the Contractor's right to payment,
 - (d) has ascertained how or for what purpose the Contractor has used monies previously paid by the Owner or
 - (e) has determined that title to any of the Contractor's work has passed to the Owner free and clear of any liens, claims, security interests or encumbrances.
6. Upon notice from the Contractor that the Contractor's work is ready for its intended use, conduct, in company with the Owner's representative and the Contractor, an inspection to determine if the work is substantially complete. If the Owner and the Engineer consider the work substantially complete, issue a certificate of substantial completion containing a list of required tasks for the Contractor to complete prior to issuance of certificate of final completion. Conduct a final inspection together with the Owner and the Contractor to determine if the work has reached final completion so that the Engineer may recommend final payment to the Contractor. If appropriate, make recommendations to the Owner for final payment to the Contractor.
 7. Provide shop drawing review. The shop drawing submittals will be limited to those specifically called for in the construction contract documents (plans, standard specifications, special provisions to the standard specifications and special specifications). Such reviews will not extend to means, methods, techniques, sequences or procedures of construction or to safety precautions and programs incident thereto.
 8. An engineer's concurrence letter and 22"x34" record drawings (one Mylar copy and a digital copy on CD) will be submitted to the Public Works Department. The Engineer and Contractor shall verify that all final revisions and changes have been made to the Mylar and digital copy prior to City submittal. Record construction drawings shall be provided to the City in digital format as AutoCAD ". dwg" files, MicroStation ".dgn" files or ESRI ".shp" files as well as PDF ".pdf" on CD. The set of Record Drawings, which are stamped by the Engineer, shall be the sole documents relied upon by the Owner as a reflection of the condition of the project location after completion of the construction activities.