RM620 (SH45 to Deep Wood Dr.) schematic
(SH45 to IH 35) EA

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CONTRACT FOR ENGINEERING SERVICES
SUPPLEMENTAL AGREEMENT NO. 4
TO THE PROFESSIONAL SERVICES AGREEMENT

STATE OF TEXAS §
COUNTY OF WILLIAMSON §

THIS SUPPLEMENTAL AGREEMENT to contract for engineering services is by and between Williamson County, Texas, a political subdivision of the State of Texas, *(the "County")* and **Halff Associates, Inc.** *(the "Engineer")* and becomes effective when fully executed by both parties.

WHEREAS, the *County* and the *Engineer* executed a contract on **February 19, 2007**;

WHEREAS, the not-to-exceed fee in Exhibit 1, Section 1, Item the agreement to **$1,166,370.85**; and,

WHEREAS, the ***"Compensation Cap"*** in Exhibit 1, Section 4, Item 4.3 limits the maximum amount payable under the agreement to **$1,220,000.00**; and,

WHEREAS, the Hourly Rates in the original Exhibit II are still applicable; and,

WHEREAS, it has become necessary to amend the agreement.

AGREEMENT

NOW, THEREFORE, premises considered, the *County* and the *Engineer* agree that said contract is amended as follows:

I. The not-to-exceed fee in Exhibit 1, Section 1, Item 1. I is hereby increased from **$1,166,370.85** to **$1,330,925.85**.
II. The Compensation Cap in Exhibit 1, Section 4, Item 4.3 is hereby increased from **$1,220,000.00** to **$1,385,000.00**.
III. The hourly Rates in the Supplemental Agreement 3 to the PSA, Exhibit II are still applicable.

All other provisions are unchanged and remain in full force and effect.

IN WITNESS WHEREOF, the ***County*** and the ***Engineer*** have executed this supplemental agreement in duplicate,

ENGINEER:
By: Michael A Moya
Signature

Michael A. Moya
Printed Name

Vice President
Title

12/24/09
Date

COUNTY:
By:
Signature

Printed Name

Title

1-14 2010
Date

OK

EXHIBIT II

HOURLY RATES

1. Principle	$190
2. Project Manager	$168
3. Senior Professional Engineer	$135
4. Professional Engineer	$111
5. Engineer in Training	$88
6. PM Planner/Landscape Architect	$155
7. Senior Planner/Landscape Architect	$81
8. Junior Planner/Landscape Architect	$61
9. PM Environmental Scientist	$132
10. Senior Environmental Scientist	$86
11. Junior Environmental Scientist	$67
12. CADD/GIS/Visual Technology	$67
13. Survey Manager	$115
14. Survey Technician	$70
15. Survey/SUE Crew	$118
16. Clerical/Administrative	$42

ATTACHMENT A
SUPPLEMENTAL NO. 1 TO
WORK AUTHORIZATION NO. 4

This Work Authorization is made pursuant to the terms and conditions of the Agreement entered into by and between Williamson County, Texas, a political subdivision of the State of Texas, (*the "County"*) and Halff Associates, Inc. (*the "Engineer"*).

Part1. The ***Engineer*** will provide the following engineering services: Geophysical testing, pavement design services, hydrologic and hydraulic designs, ROW mapping and surveying, and project management.

Part 2. The maximum amount payable for services under this Work Authorization without modification is $164,555.00.

Part 3. Payment to the ***Engineer*** for the services established under this Work Authorization shall be made in accordance with the Agreement.

Part 4. This Work Authorization shall become effective on the date of final acceptance of the parties hereto and shall terminate on December 15, 2010, unless extended by a Supplemental Work Authorization.

Part 5. This Work Authorization does not waive the parties' responsibilities and obligations provided under the Agreement.

ATTACHMENT A (con't.)

Part 6. This Work Authorization is hereby accepted and acknowledged below.

ENGINEER:	COUNTY: Williamson County, Texas
By: _____ Signature	By: _____ Signature
Michael A. Moya Printed Name	Dan A. Gattis Printed Name
Vice President Title	County Judge Title
12/29/09 Date	1-14 2010 Date

LIST OF EXHIBITS

OK

Exhibit A - Services to be Provided by County

Exhibit B - Services to be Provided by Engineer

Exhibit C - Work Schedule

Exhibit D - Fee Schedule *(based on approved rates in PSA Exhibit II executed by Commissioners Court action)*

EXHIBIT A

SERVICES PROVIDED BY THE COUNTY

FOR

PRELIMINARY ENGINEERING / ENVIRONMENTAL

RM 620

IN WILLIAMSON COUNTY

FROM SH 45 TO IH 35

This engineering scope for this Supplemental Agreement includes the following major tasks:

- The Engineer shall provide Electrical Resistivity Logging testing from Cornerwood Drive to Wyoming Springs at the RM 620 eastbound edge of pavement to the anticipated proposed ROW line. Analyze data and develop a soil boring plan. Provide report detailing findings. Provide diagrams showing location of voids discovered along the corridor. (Tasks 1-2)
- The Engineer shall provide engineering and technical services to perform pavement evaluation, pavement rehabilitation design and new pavement design services. (Tasks 1 and 3)
- The Engineer shall provide engineering and technical services to develop detailed hydrologic and hydraulic models. (Task 4)
- The Engineer shall provide ROW mapping, parcel plat and field note development to support ROW acquisition associated with this project. (Task 5)

Services to be provided by the County or the Contract Manager

Request and Acquire Right-of-Entry for purposes of performing geotechnical testing

Informational Services by County

See Work Authorization 4 for Information Services by Williamson County

Coordination Services by County

See Work Authorization 4 for Coordination Services by Williamson County

EXHIBIT B

SERVICES PROVIDED BY ENGINEER

FOR

PRELIMINARY ENGINEERING / ENVIRONMENTAL

RM 620

IN WILLIAMSON COUNTY

FROM SH 45 TO IH 35

Scope of Services for this Supplemental Agreement provided by Halff Associates, herein referred to as "Engineer" for Williamson County, herein referred to as "County", and involves geotechnical testing associated with the RM 620 Highway in Williamson County, Texas from Cornerwood Drive to Wyoming Springs Drive.

The Engineer will provide geotechnical testing and engineering services to provide details of subsurface conditions for RM 620 from Cornerwood Drive to Wyoming Springs Drive. Additional work will include laboratory testing, data assimilation and analysis, report generation, contract generation, invoicing and coordination with sub consultants and the County. (Tasks 1-2)

The Engineer will provide geotechnical testing and engineering services to provide pavement evaluation, pavement rehabilitation strategies and pavement design strategies for the segment of RM 620 from Cornerwood Drive to Wyoming Springs Drive. Additional work will include laboratory testing, data assimilation and analysis, report generation, contract generation, invoicing and coordination with sub consultants and the County. (Tasks 1 and 3)

The Engineer will provide engineering and technical services to develop detailed hydrologic and hydraulic models in order to study RM 620's upstream drainage sheds. This work will include data acquisition, field surveying, engineering calculations and documentation. (Task 4)

The Engineer will provide ROW mapping and parcel plat and field note development to support ROW acquisition that is associated with this project. (Task 5)

TASK 1 - PROJECT MANAGEMENT AND COORDINATION (FC190)

Engineer, in association with the Williamson County Road Bond Manager, herein referred to as "Contract Manager", will be responsible for directing/coordinating activities associated with Limited Geotechnical Study of RM 620 from Cornerwood Drive to Wyoming Springs.

For this Supplemental Agreement, the Engineer will perform a limited geotechnical study consisting of a geophysical survey and 10 soil borings along the southern side of RM 620 from just west of Cornerwood Drive to just east of Wyoming Springs.

Additionally the Engineer will perform a geotechnical study of the existing pavement within the project limits and provide an existing pavement evaluation, a pavement rehabilitation strategy and a new pavement design.

1.1 - Monthly Progress Reports, Invoices, and Billings

For the work to be performed, Engineer will prepare Monthly Progress Reports and advise the Contract Manager of findings as a result of the Limited Geotechnical Study of RM 620 from Cornerwood Drive to Wyoming Springs. These Reports will include, but not be limited to:

A. TASKS completed during the reporting period.
B. TASKS/Objectives planned for upcoming periods.
C. Problems encountered and the actions to remedy them.
D. Overall Project status, including a tabulation of TASK percentage complete, management schedule indicating Project development progress, and supporting documentation.

Engineer and sub-consultant invoices will be submitted to the Contract Manager.

Deliverables
- Progress Report (1 copy per Invoice/Billing).
- Invoices (1 copy per Billing).

1.2 - Coordination/Administration

For the work to be performed, Engineer will oversee preparation of documents and manage Project activities:

A. Coordination. Correspondence and coordination will be handled through, and with the concurrence of, the Contract Manager.
B. Lines of Communication. Communications between the Engineer and the County is via the Contract Manager unless otherwise directed by the Contract Manager or County. Engineer shall designate one Texas Registered Professional Engineer as the Project (Services) Manager responsible for Project management and all Contract Manager Communications.
C. Administration. Engineer will manage Project activities (including scheduled/unscheduled meetings), direct Engineer's team/staff correspondence with County, and assist the County in preparing responses to Project-related internal/external inquiries.
D. Project Meetings. For the work to be performed 2 meetings involving Engineer are forecasted with geotechnical subconsultant and the Contract Manager:

Project data collected will not be released to any non-County office and/or the public at-large without Contract Manager approval. Engineer will document all Project-related meetings

attended by the Engineer and will forward meeting minutes to the Contract Manager unless meeting minutes are provided by another party. Engineer will maintain an ongoing, functional Catalogue of attendee names, dates, locations, names/telephone numbers/addresses, and all matters discussed.

E. Correspondence. For the work to be performed, copies of all outgoing correspondence and all incoming correspondence will properly filed and documented. All document processing will be prepared using Microsoft Word, version 2003 or compatible Microsoft Word format. Any computer discs/diskettes utilized will be IBM compatible.

F. Agency Communication. Project communication with other agencies will be processed by the County, unless otherwise instructed by Contract Manager in order to ensure all parties are internally aware of any Project decisions/conclusions.

G. Release of Information. Release of Project-related information to non-County offices must be approved by Contract Manager. Any information released or distributed must be marked "Preliminary – Subject to Change Without Notice" or "DRAFT" or similar disclaimer.

H. Document Printing and Distribution. For the work to be performed, the Engineer will be responsible for all draft and final documents, reports, etc. produced for the Project unless otherwise defined by a specific Task described herein. Copies may be double-sided as agreed to by Contract Manager. The Engineer will provide documents to the County for posting on the County's internet database management system, as requested.

Deliverables
- All incoming correspondence (1copy).
- All outgoing correspondence (1 copy).
- Original (Project) files (1copy).

1.3 - Control/Scheduling

For the work to be performed, the Engineer will prepare an internal geotechnical testing schedule. The duration of the Limited Geotechnical Study of RM 620 will be 2 months from the date Right of Entry is granted to all properties.

Deliverables
- Project Schedule.

1.4 - Subconsultant Management

For the work to be performed, the Engineer, as necessary, will engage subconsultant(s) via contact(s) monitor and manage subconsultant activities (staff and schedule), and review and recommend payment of subconsultant invoices/billings. Subconsultant Progress Reports, invoices, and billings will be incorporated into Subtask 1.1.

Deliverables
- Subconsultant Contracts (2 copies with related attachments).
- Subconsultant Progress Reports (1 copy per invoice).
- Subconsultant Invoices (1 copy).

1.5 - Quality Assurance/Quality Control

For the work to be performed, the Engineer is expected to conduct internal and comprehensive quality assurance/quality control reviews throughout Project development in order to appraise design, technical and business performance and provide real-time direction and objective solutions.

TASK 2 – GEOTECHNICAL TESTING (FC 110)

PROJECT OVERVIEW: Williamson County is considering adding additional lanes to the existing Ranch Road 620 in Round Rock, Williamson County, Texas. We understand that approximately 10,900 ft of the proposed roadway construction (located between the intersections of Wyoming Springs, to a location 1000 ft south of Cornerwood Drive) will require some form of excavation. As the site is known to be underlain by the Edwards Limestone formation, there are concerns regarding the possible presence of karst features underlying the site, which may hinder the proposed widening of the roadway.

The aim of the geophysical survey is to seek to determine subsurface anomalies that may be indicative of possible karst features along the corridor adjacent to the existing roadway. This corridor of interest is up to 60 ft in width, and covers both the existing right of way and partially adjacent private property. Upon completion of the geophysical survey, the Engineer will use conventional borings to determine if the geophysical anomalies are indicative of voids or caves.

PROPOSED GEOPHYSICAL TESTING: For this survey, Williamson County representatives have requested that the principal geophysical technique we employ is Electrical Resistivity Tomography (ERT). In addition to this technique Ground Penetrating Radar (GPR) will be used to both complement the findings of the ERT survey and increase the coverage of the investigation. Further details regarding these techniques are presented below.

It is worth noting that as with all geophysical techniques, there are limitations with regards to the resolution, depth penetration and interpretation of the proposed techniques.

The following section of this document outlines the theory and proposed survey method of the above geophysical technique. Further information, including equipment specifications, detailed procedures and job safety and environmental assessments can be provided upon request.

ELECTRICAL RESISTIVITY TOMOGRAPHY: With the electrical resistivity technique, the apparent electrical resistivity of the subsurface is measured using an array of four electrodes. By injecting a dc or very low frequency ac current (I) between a pair of electrodes and measuring the resulting potential difference (ΔV) with a second pair of electrodes, it is possible to calculate the apparent resistivity using a derivation of Ohms law ($R=\Delta V/I$). The approximate depth of this measurement is related to the spacing between the electrodes, and therefore, by increasing the separation of the electrodes, readings can be recorded from greater depths.

For ERT surveys, multi-channel acquisition systems and arrays of numerous electrodes are employed. The system automatically selects various different combinations and permutations of electrodes, eventually creating a two-dimensional vertical cross-section of apparent resistivity values for the subsurface beneath the electrode array.

It should be appreciated that the data recorded are 'apparent' resistivity values, and not the 'true' subsurface resistivity values. This is because the recorded values are a function of all parts of the subsurface that the current has traveled through between electrodes. Conversion of the 'apparent' resistivity values to 'true' resistivity values is performed via an inversion process, which generates a model with a similar theoretical 'apparent' resistivity distribution to that of the field data. It must be noted that this process is none-unique; a given apparent resistivity data set might be

accounted for by many different models. Therefore, inversion process is constrained using available intrusive site investigation data, so as to produce the most realistic geological model.

For this investigation, the Engineer will employ an AGI Supersting, 8-channel resistivity meter, with an array of 84 to 122 electrodes. Using a unit electrode spacing of 10 ft and the dipole-dipole configuration, data will be collected down to a maximum depth of approximately 75 ft. It should be appreciated that the resolution of the resulting model will decrease slightly with depth, from approximately 2.5 ft at the surface to 7.5 ft at depth. Through correlation with intrusive data, the resulting models will be presented as a single, continuous interpreted geological cross-section along the length of the corridor.

In order for this technique to be successful the following is required:

- As the technique requires electrodes to be inserted into the ground, it will not be possible to survey over areas of asphalt or concrete surfacing. It has been noted that the survey corridor crosses private driveways, a highway intersection and a concrete drainage structure – we have assumed that these (and other similar) areas will be omitted from the survey;

- In areas of dry, resistive ground, it may be necessary to water the electrodes with a saline solution to ensure a good electrical contact is made and good quality data is recorded;

- The presence of metallic objects in the subsurface (such as utilities, culverts, reinforced concrete) within 50 ft of the ERT profile will perturb the quality recorded data and may possibly hinder the detection of the anomalies being sought;

- Similarly, the presence of any cathodic protection systems on any near by pipelines will affect the recorded data and may possibly hinder the detection of the anomalies being sought.

GROUND PENETRATING RADAR: The GPR technique involves a short duration, high frequency electromagnetic impulse being transmitted into the subsurface. Whenever a contrast in dielectric properties of the subsurface is encountered, some of the transmitted impulse is reflected back to the surface. The strength of the reflected signal is proportional to the magnitude of the contrast in dielectric properties. The propagation (and reflection) of the radar impulse depends heavily on the properties of the groundmass being investigated. Generally, the presence of saturated or clay-rich materials, and the presence of reinforced concrete will effectively decrease both the depth penetration and the resolution in the data. An increase in depth penetration and resolution is generally expected within dry, electrically resistive ground.

The other factor that influences the depth penetration and resolution of the data is the frequency of the impulse. Low frequency radar impulses are generally attenuated less by the electrical properties, and therefore penetrate to greater depths. However, with this increase in depth penetration comes a decrease in resolution. For example, a 400MHz antenna may sample to a depth of 4 – 6 ft (depending upon ground conditions) with a resolution suitable for detecting services, utilities (etc), but a 1500MHz antenna will only sample to 1 – 2 ft, with a resolution suitable for detecting small diameter reinforcement.

For this survey, the employment of a 200 MHz antenna, which typically samples to approximately 15 ft depth under ideal ground conditions, will be used. Data would be collected with a GSSI SIR 3000 radar system, with the antenna being pulled by hand, or towed behind an ATV at

walking speed. The Engineer will collect a series of traverses along the length of the corridor, where access permits.

In order for the GPR technique to be successful, we draw your attention to the following;

- The survey surface needs to be free of all moveable obstructions in order to maximize survey coverage;

- The presence of subsurface features, such as multiple utilities, areas of saturated ground conditions, obstructions etc, will also manifest in the GPR data, and may possibly hinder the detection of the anomalies being sought.

GEOPHYSICAL SURVEY APPROACH: It should be appreciated that as the ERT technique samples a hemisphere (radius approximately equal to the depth of investigation), it will only sample the shallow subsurface immediately beneath the centerline of the profile. Therefore, it is possible that small, shallow, isolated features offset from the profile may go undetected. For this reason, we have proposed the GPR technique to supplement the ERT.

The Engineer will conduct an ERT profile within the existing right of way, and offset approximately 15 – 20 ft from the existing edge of pavement. In order to extend survey coverage and identify any shallow subsurface features offset from this profile, a series of parallel GPR traverses will be conducted both within the right of way and within the adjacent private property. This approach will provide the most cost-effective solution to covering the entire survey corridor. It has been noted that sections of the proposed corridor are heavily vegetated (for example, section to the south of Cornerwood Drive, and areas of the corridor to the south of Great Oaks Drive). Such site conditions are unfavorable for the GPR technique as it will not be possible to deploy the antenna. It is estimated that 20 – 30% of the corridor located on private property may be omitted from the survey.

Scope of Geophysical Work

The following outlines the scope of works covered by this proposal; -

- Mobilize survey team and equipment to site;
- Lay out cones and signs along the edge of pavement to delimit work area;
- Perform ERT survey;
- Perform GPR survey;
- Provide a qualitative interpretation of the data on site;
- Demobilize and return all data to our office for detailed processing and analysis;
- Issue final report.

CONVENTIONAL BORINGS: In addition to the geophysical testing (ERT and GPR) to determine possible anomalies that might be indicative of karst features, we are proposing drillings and sampling a total of 10 borings to a depth of 20 ft. These borings will be drilled after results of the ERT and GPR studies have been completed and analyzed. Borings will be drilled in anomalous areas which could be indicative of karst features. Results of borings and geophysical study will be compiled in a single data report indicating areas of greatest probability of karst features such as caves or voids.

SITE ACCESS AND PROPERTY REQUIREMENTS:

Confirmation of access arrangements to the private properties located within the survey corridor is required prior to commencing work.

Contact details are required for land owners in order to arrange access.

Details of any site-specific training and/or personnel requirements that are needed for access to the survey area, along with typical working conditions are required prior to commencing work.

It is assumed that the site can be access from 9 AM until 3:30 PM at a minimum of seven days per week and that will be within TXDOT Right of Way or adjacent private property.

Deliverable

- Preliminary and Final Limited Geotechnical Study of RM 620 (four copies each)

TASK 3 – PAVEMENT TESTING, PAVEMENT REHABILITATION, AND PAVEMENT DESIGN (FC 110)

PROJECT OVERVIEW: Williamson County is planning to add additional lanes to the existing Ranch Road 620 in Round Rock, Williamson County, Texas. We understand that approximately 10,900 ft of the existing pavement structure (located between the intersections of Wyoming Springs, to a location 1000 ft south of Cornerwood Drive) will require pavement structural evaluation to determine pavement rehabilitation options. Additionally, as the existing roadway will be widened to accommodate a center turn lane, shoulders and turn lanes at intersections, new pavement designs will be required. As the site is known to be underlain by the Edwards Limestone formation, there are concerns regarding the possible presence of karst features underlying the site, which may hinder the proposed widening of the roadway.

The aim of the pavement structural evaluation is to determine the layer strengths of the different pavement layers so that these may be used in the pavement rehabilitation/overlay designs. Deflection testing using a Falling Weight Deflectometer (FWD) and shallow pavement borings will be used to evaluate the existing pavement thickness and structure. The pavement borings will be extended 7 ft into the subgrade to determine subgrade properties. The new pavement designs will be based on the soil information obtained through the borings on the existing pavement structure and back calculated subgrade modulus determined through FWD testing.

3.1 PROJECT LEVEL DEFLECTION TESTING: The purpose of the deflection test program is to determine the structural response characteristics of the pavement structure to wheel loads as well as the variability of the structural properties along the pavement sections. The deflection-testing program will be performed with a Dynatest 8082 FWD.

The existing pavement layout at the project site on RM 620 consists of a 4-lane, undivided roadway, with turn lanes at intersections. It is believed that this roadway was initially a two-lane road that has been widened and improved over time. As such, there is uncertainty in the subsurface layer structure. Our evaluation seeks to determine support characteristics to determine appropriate rehabilitation recommendations. In order to capture the transverse and the longitudinal variability in pavement structure and pavement response, we propose to conduct deflection testing in the outer wheel paths of the two outer lanes in each direction, and also in the inner wheel path of the inside lane in one direction. ASTM test standard D 4695 recommends a test spacing of 100 to 500 ft for a level-2 program for a routine analysis of overlay and rehabilitation design. We propose to adopt a test spacing of 250 ft such that a total of approximately 132 test points are obtained. One night of deflection testing is anticipated. Testing will be performed at load levels of 9,000 pounds and 16,000 pounds. After a seating drop has been performed, two drops will be performed and recorded at each of the load levels. The geophones that are used to measure the surface deflections will be spaced at 0, 12, 24, 36, 48, 60, and 72 inches from the center of the load plate.

Traffic control will be required for FWD testing. The costs associated with traffic control have been included in the cost estimate.

3.2 MATERIAL SAMPLING: Pavement thickness information obtained from associated borings will be required to conduct back calculation of deflection data to obtain layer moduli. Based on the findings of the FWD testing, a material sampling effort will be performed to determine the thickness of the different pavement layers. The sampling locations will be selected based on deflections measured. The use of these deflection tests helps to assure that the different areas (weak and strong) are sampled to recover materials for laboratory testing and characterization. This is a significant advantage of deflection testing (i.e., to minimize the amount and location of destructive sampling and testing).

Borings will be drilled to a depth of 7 ft from the surface of the existing pavement structure. We anticipate that a maximum of 21 borings will be required to determine the existing layer structure (based on an approximate spacing of about 500 ft between borings). The actual number of borings necessary to analyze the deflection data will be determined from the deflection response of the pavement structure. If the deflection profiles from the 3 lanes indicate a uniform pavement structure, the actual number of borings necessary may be lower than the maximum number of 21 borings proposed. The HMAC surface will be cored with a rotary core barrel and the core preserved. The flexible base and subgrade will be augered with a solid stem auger to obtain "disturbed" samples for testing. Bore holes will be backfilled by tamping like material back into the holes and placement of a "cold mix asphalt concrete" at the surface.

Traffic control will be required for borings. The costs associated with traffic control have been included in the cost estimate. Since a maximum of 21 pavement borings are anticipated, Fugro will subcontract for traffic control and coordinate lane closures with Halff Associates and TXDOT Austin District to disrupt traffic as little as possible

3.3 LABORATORY TESTING: Laboratory tests (natural water contents, Atterberg limits, and partial gradation analyses) will be performed to classify soil strata, evaluate plasticity, and check for presence of lime. In addition, soluble sulfate tests will be performed on soil samples to indicate if the phenomenon of sulfate induced heave will be a potential problem if lime stabilized subgrade is to be considered in the pavement design.

3.4 DATA ANALYSIS AND REPORTING: Engineering analyses of the results of the field and laboratory data will be made to provide pavement design parameters and to assist in developing pavement thickness designs for the proposed roadways. Our final report will include the following:

1. General subsurface conditions, discussion of site geology, boring logs with descriptions of strata and laboratory test results, and water levels obtained at the time of drilling;
2. Boring location plan;
3. Results of pavement layer stiffness based on back calculation of FWD data using TXDOT "modulus" software;
4. Results of Flexible Pavement Analysis using TXDOT's FPS 19 for
   a. Rehab/overlay strategies for existing pavements
   b. New design for new alignment
5. Mechanistic checks for pavement designs for rutting and fatigue

SITE ACCESS: It is assumed that site access is available 8 pm – 5 am, at a minimum, 7 days per week and all work will be within TXDOT Right of Way; and that Halff Associates will provide the traffic data necessary for the pavement designs.

Deliverable
Preliminary and Final Pavement Design Report (4 copies each submittal)

TASK 4 – DEVELOP DETAILED HYDROLOGIC AND HYDRAULIC MODELS (FC 161)

OVERVIEW: The purpose of this proposed work is to develop detailed hydrologic and hydraulic models to analyze the capacity of existing culvert crossings and estimate the potential impacts of future improvements along RM 620 from Cornerwood to Wyoming Springs. This analysis includes five culvert crossings with contributing drainage basins ranging from about 34 acres to 673 acres.

4.1 DATA ANALYSIS AND REPORTING:

A. Obtain pertinent data-past studies; site visit
B. Conduct Field Survey

4.2 HYDROLOGIC MODEL:

A. Develop most current terrain model using current LIDAR and field survey

B. Perform hydrologic calculations: HEC-HMS for basin 2 and 5; rational method for basins 1, 3, 4. Confirm existing hydrologic conditions. Confirm land use. Determine soil types from NCRS Soil Survey for Williamson County. Compute hydrologic parameters (sub-watershed areas, times of concentration, lag times, loss rates, etc). Develop channel routing model. Develop reservoir storage and outflow parameters for five (5) in-line detention structures located upstream of culverts #2 and #5. Input depth/duration rainfall totals for the 2-, 5-, 10-, 25-, 50-, and 100-year flood frequencies for existing land use conditions. Compute and tabulate existing conditions flood frequency peak discharges

4.3 HYDRAULICS:

A. Develop limited detail (without channel and culvert field surveys) HEC-RAS hydraulic models of streams #2 and #5 for hydrograph routing purposes. Note, channel cross section data will be obtained from LiDAR

B. Prepare existing culvert analysis and determine approximate capacity for culverts #1 - #5. Analysis will be conducted utilizing the peak discharges computed for Task II for the 2-, 5-, 10-, 25-, 50-, and 100-year flood frequencies. Compute and tabulate existing conditions peak flood elevations at the upstream face of each culvert.

Deliverable
Prepare brief letter report of project purpose, procedures, and results.
Export electronic files (HEC-HMS, HEC-RAS, MSWord, GIS, and PDF) to CD for submittal to the county.

TASK 5 – DEVELOP ROW MAPS, PARCEL PLATS AND FIELD NOTES AND ESTABLISH EXISTING ROW (FC 130)

OVERVIEW: The purpose of this proposed work is to develop Parcel Plats and Field Notes in order to support the appraisal and acquisition of needed ROW along RM 620 from near Cornerwood Drive to near Wyoming Springs Drive. The Engineer will also perform field surveying to indemnify existing and proposed ROW in the field. Acquisition of Right-of Entry to perform field surveying is specifically omitted from this scope of work and will be responsibility of Williamson County officials or their representatives. The development of TXDOT style ROW strip maps is also not included in this scope of work.

5.1 PARCEL PLATS AND FIELD NOTES FOR TWENTY (20) PARCELS:

This fee proposal includes the cost of preparing the parcel plats and field notes, to acquire right-of-way from a total of twenty (20) parcels. These will be signed and sealed by a Texas Registered Professional Land Surveyor. 1/2-inch iron rods with plastic caps stamped "HALFF INC." will be set for all right-of-way Points of Intersection, Points of Curvature, Points of Tangency, and at property line intersections.

5.2 PARCEL PLATS AND FIELD NOTES FOR SIX (6) DRAINAGE EASEMENT PARCELS:

Surveyor will also prepare parcel plats and field notes to acquire six (6) permanent drainage easements on adjacent properties. These will be signed and sealed by a Texas Registered Professional Land Surveyor. Surveyor will also locate sufficient boundary information in order to meet minimum requirements per the Texas Board of Professional Land Surveying for easements.

Deliverable
Right-of-way Acquisition Metes and Bounds with field notes for twenty (20) parcels.
Easement Acquisition Parcel Metes and Bounds with field notes for six (6) drainage easement parcels.

The following items are excluded from the proposed scope of services offered under this proposal:

1. Attending Value Engineering sessions.
2. Preparing and submitting the notice of intent (NOI) for SW3P activities to the appropriate agencies.
3. Performing public involvement (beyond tasks identified above).
4. Exposing and tying existing underground utilities/facilities (beyond tasks identified above).
5. Developing alternate facilities designs (i.e. steel superstructure and concrete superstructure for bridges, etc.).
6. Performing traffic impact studies (beyond tasks identified above).
7. Designing landscaping and irrigation/sprinkler facilities.
8. Designing hardscape (enhanced flatwork) facilities.
9. Designing noise abatement facilities.
10. Developing wetland, tree, etc. mitigation plans/designs.
11. Designing pavement structure drainage systems.
12. Designing storm water pump stations.
13. Coordinating design with FEMA. Preparing LOMR/CLOMR.
14. Designing public and/or franchised utility adjustments or systems.
15. Preparing and submitting quantity calculation backup/records.
16. Confirming and resetting project control monumentation if disturbed by others (i.e. utility companies, mowing operations, etc.).
17. Providing right-of-way acquisition services (i.e. property valuations, damages assessments, condemnation assistance/services, negotiations, relocation assistance, property management, serving as right-of-way agent, etc.).
18. Design of improvements/modifications to private facilities (i.e. sprinkler systems, security systems, parking facilities, temporary perimeter fences, etc.) to accommodate the proposed improvements.
19. Developing additional alternatives than previous studies; developing, revising or completing schematics for "build" alternatives east of Deep Wood Drive (beyond tasks identified above).
20. Iterating design tasks, or portions thereof, after a design issue consensus has been reached or due to receipt of instructions or information contrary to previous directives and information or due to revisions in design criteria.
21. Additional public involvement which could be required by section 6(f) consultation or mitigation.
22. Performing archeological surveys.
23. Production of Preliminary Bridge Layouts.
24. Production of Railroad Exhibits A or B.
25. Performing Railroad Coordination.

ANY ADDITIONAL SERVICES REQUIRED BEYOND THOSE SPECIFICALLY IDENTIFIED IN THIS PROPOSAL ARE BEYOND THE SCOPE OF SERVICES TO BE PROVIDED UNDER THIS PROPOSAL. ANY REQUIRED ADDITIONAL SERVICES WILL BE SEPARATELY IDENTIFIED AND NEGOTIATED AND SUCH ADDITIONAL SCOPE AND COMMENSURATE FEE WILL BE EXECUTED/AUTHORIZED UNDER A SUPPLEMENTAL AGREEMENT TO THIS PROPOSAL/CONTRACT.

Consultant/Engineer will provide equipment, material, labor and supplies (except as shown on EXHIBIT A) necessary to accomplish the Project Tasks.

The work will be performed in accordance with, but not limited to, the following manuals and standards:

1. Standard Specifications for Construction of Highways, Streets, and Bridges, 2004 - TXDOT.
2. Bridges and Structures Operation and Planning Manual - TXDOT.
3. Bridges and Structures Hydraulic Manual - TXDOT.
4. Bridges and Structures Design Examples - TXDOT.
5. Standard Specifications for Highway Bridges - AASHTO.
6. TXDOT Roadway Design Manual.
7. TXDOT Environmental Manual.
8. A Policy on Geometric Design of Highways and Streets, 2004 AASHTO.
9. Highway Capacity Manual Special Report 209 - Texas Research Board (TRB)
10. Technical Advisory T6640.8A - FHWA.
11. Noise Guidelines - TXDOT.
12. Air Quality Guidelines - TXDOT.
13. Texas Manual on Uniform Traffic Control Devices - TXDOT.
14. Standard Highway Sign Designs for Texas - TXDOT.
15. Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals - AASHTO.
16. Utility Accommodation Policy - TXDOT.
17. Utility Manual - TXDOT.
18. Code of Federal Regulations, Title 23 - "Highway" - Federal Register.
19. Administrative Order No. 5-89 - Signing, Sealing and Dating of Engineering Documents. - TXDOT.
20. Administrative Circular No. 26-91 - Minimum Signing, Sealing and Dating Procedures for Department Engineering Documents - TXDOT.
21. Guide for the Development of Bicycle Facilities, 2002 - AASHTO.
22. Guide for the Design of High Occupancy Vehicle Facilities, 2001 - AASHTO.
23. Code of Federal Regulations, Title 49 - "Transportation" - Federal Register.
24. Right-of-Way Manual - TXDOT.
25. U.S. Army Corps of Engineers Wetland Delineation Manual of 1987.
26. Williamson County Road Bond Program Design Criteria, latest edition.

NOTES: (1) All designs shall be in accordance with the above references, except where variances are permitted in writing by the State or FHWA.

(2) Engineer is responsible for purchasing all reference items/manuals required to complete Project TASKS/Subtasks.

WORK AUTHORIZATION #4
SUPPLEMENTAL AGREEMENT #1

Engineer/Consultant will perform the services to be provided under this agreement out of Engineer's/Consultant's office(s) as listed below:

Service	Office Location
Engineer	Halff Associates, Inc.

Work effort will be managed out of the Austin office located at:

4030 West Braker Lane, Suite 450
Austin, TX 78759

EXHIBIT C

SCHEDULE OF SERVICES PROVIDED BY ENGINEER

FOR

PRELIMINARY ENGINEERING / ENVIRONMENTAL

RM 620

IN WILLIAMSON COUNTY

FROM SH 45 TO IH 35

The following general work outline is anticipated for the progress of the work.*

SCHEDULE FOR GEOPHYSICAL TESTING

♦ Contract Execution/ Notice to Proceed	Jan. 15, 2010
♦ Right of Entry for all Properties Acquired	Feb. 15, 2010
♦ Mobilization (2 weeks)	Mar. 01, 2010
♦ Data Assembly/Collection-Field Work	Mar. 09, 2010
♦ Preliminary Report	Mar. 26, 2010
♦ Soil Boring (if necessary)	Apr. 08. 2010
♦ Final Report	Apr. 26 2009

* All dates are estimated and Subject to Change. Duration of reviews is outside the control of the Engineer and may exceed those estimated in this schedule. All work is contingent to access to adjacent properties. The Contract Manager is required to acquire Right of Entry for this work.

EXHIBIT C

SCHEDULE OF SERVICES PROVIDED BY ENGINEER

FOR

PRELIMINARY ENGINEERING / ENVIRONMENTAL

RM 620

IN WILLIAMSON COUNTY

FROM SH 45 TO IH 35

SCHEDULE FOR PAVEMENT TESTING, REHABILTATION AND DESIGN

♦ Contract Execution/ Notice to Proceed	Jan. 15, 2009
♦ Mobilization (2 weeks)	Feb. 01, 2010
♦ FWD Testing	Feb. 08, 2010
♦ Material Sampling	Feb. 22, 2010
♦ Preliminary Report	Mar. 05, 2010
♦ Final Report	Apr. 19, 2009

* All dates are estimated and Subject to Change. Duration of reviews is outside the control of the Engineer and may exceed those estimated in this schedule.

EXHIBIT C

SCHEDULE OF SERVICES PROVIDED BY ENGINEER

FOR

PRELIMINARY ENGINEERING / ENVIRONMENTAL

RM 620

IN WILLIAMSON COUNTY

FROM SH 45 TO IH 35

SCHEDULE FOR DEVELOPING DETAILED HYDROLOGIC AND HYDRAULIC MODELS

♦ Contract Execution/ Notice to Proceed	Jan. 15, 2009
♦ Data Acquisition/Survey	Feb. 01, 2010
♦ Hydrologic and Hydraulic Modeling	Apr. 08, 2010
♦ Prepare Preliminary Report	Apr. 22, 2010
♦ Coordinate with Wilco	Mar. 05, 2010
♦ Final Report	Mar. 19, 2009

* All dates are estimated and Subject to Change. Duration of reviews is outside the control of the Engineer and may exceed those estimated in this schedule.

EXHIBIT C

SCHEDULE OF SERVICES PROVIDED BY ENGINEER

FOR

PRELIMINARY ENGINEERING / ENVIRONMENTAL

RM 620

IN WILLIAMSON COUNTY

FROM SH 45 TO IH 35

SCHEDULE FOR DEVELOPING ROW MAPS, PARCEL PLATS AND FIELD NOTES

- Contract Execution/ Notice to Proceed — Jan. 15, 2009
- No work to begin on this task until written permission is received from the Contract Manager or its designated representative.

EXHIBIT D
RM 620 PRELIMINARY ENGINEERING / ENVIRONMENTAL

AVO 28671

TXDOT FUNC. CODE	TASK/DESCRIPTION	PRINCIPAL	STUDY MNGR	SR. ENG ENV. / PLANNER	PE	E.I.T.	RPLS	SURVEY TECH	CADD / GIS / VIS/TECH	SURVEY CREW	CLERICAL / ADMIN	TOTAL MAN-HOURS	LABOR CHARGES (DIRECT)	PRINTING, PLOTTING	DELIV, TRAVEL & MISC	SUB CONSULT'S	TOTAL COST FOR TASK (INCL MULT'S)
100	TASK 1 - PROJECT MANAGEMENT AND COORDINATION																
100	1.1 PROGRESS REPORTS, INVOICES & BILLINGS (6 ADDITIONAL MONTHS)		4								4	8	$840	$20		$220	$1,080
100	1.2 COORDINATION/ADMINISTRATION		24	9					3			36	$5,448	$20	$20	$4,360	$9,848
	MEETING PREP (assume 3 meetings)		6	3					3			12	$1,614			$2,180	$3,794
	MEETING (assume 3 meetings)		12	4								16	$2,556	$20	$20	$2,180	$4,776
	MINUTES		6	2								8	$1,278				$1,278
100	1.3 CONTROL/SCHEDULING			1								1	$135				$135
	REVISE PROJECT DEVELOPMENT SCHEDULE			1													
100	1.4 SUBCONSULTANT MANAGEMENT		10									10	$1,680				$1,680
100	1.5 QA / QC		4	4								8	$1,212				$1,212
	SUBTOTAL HOURS/COSTS		42	14					3		4	63	$9,315	$40	$20	$4,580	$13,955
110	TASK 2 -GEOTECHNICAL TESTING																
110	GEOPHYSICAL SURVEY-MOBILIZATION/DEMOBILIZATION															$3,780	$3,780
	GEOPHYSICAL SURVEY-MOBILIZATION/DEMOBILIZATION															$2,320	$2,320
	SUNCONSULTANT TRAVEL AND TRAFFIC CONTROL															$1,460	$1,460
110	GEOPHYSICAL SURVEY-SITE WORK															$19,150	$19,150
	FIELD STAFF															$12,300	$12,300
	GPR/GPRVEHICLE EQUIPTMENT															$5,600	$5,600
	TRAVEL EXPENSES															$1,250	$1,250
110	GEOPHYSICAL SURVEY-DATA PROCESSING & REPORTING															$4,115	$4,115
	STAFF OFFICE WORK															$3,400	$3,400
	CADD DRAFTING															$335	$335
	QC/QA															$380	$380
110	SOIL BORINGS															$8,400	$8,400
	MOBILIZATION															$400	$400
	TRAFFIC CONTROL															$400	$400
	DRILLING, CORING, PLUG HOLE @ 10 EACH AT 20 FT/ EA															$5,600	$5,600
	DATA REPORT															$2,000	$2,000
	SUBTOTAL HOURS/COSTS															$35,445	$35,445

EXHIBIT D
RM 620 PRELIMINARY ENGINEERING / ENVIRONMENTAL

AVO 29671

TXDOT FUNC. CODE	TASK/DESCRIPTION	PRINCIPAL	STUDY MNGR	SR. ENG ENV. / PLANNER	PE	E.I.T.	RPLS	SURVEY TECH	CADD / GIS / VIS/TECH	SURVEY CREW	CLERICAL / ADMIN	TOTAL MAN-HOURS	LABOR CHARGES (DIRECT)	PRINTING, PLOTTING	DELIV, TRAVEL & MISC	SUB CONSULT'S	TOTAL COST FOR TASK (INCL MULT'S)
115	TASK 3 - PAVEMENT DESIGN																
110	3.1 DEFLECTION TESTING															$4,170	$4,170
	FWD TESTING (NIGHT TIME)															$2,200	$2,200
	MOBILIZATION															$70	$70
	COORDINATION (PM 2 HOURS)															$320	$320
	COORDINATION-(STAFF ENGINEER-2 HOURS)															$200	$200
	TRAFFIC CONTROL ($1380 /day)															$1,380	$1,380
	3.2 MATERIAL SAMPLING															$10,785	$10,785
	MOBILIZATION															$400	$400
	TRAFFIC CONTROL ($1380 /day)															$2,760	$2,760
	CORING/DRILLING (21 CORES)															$6,825	$6,825
	COORDINATION (PM 2 HOURS)															$320	$320
	COORDINATION (STAFF ENGINEER 2 HOURS)															$200	$200
	COORDINATION (TECHNICAIN 4 HOURS)															$280	$280
110	3.3 LABORATORY TESTING															$3,450	$3,450
	NATUAL WATER CONTENT - 21 TESTS @ $15/TEST															$315	$315
	ATTERBERG LIMITS (21 TESTS @$55/TEST)															$1,155	$1,155
	SIEVE ANALYSIS (No. 4, 40 and 200 SIEVES (20 EA)															$1,155	$1,155
	SOLUBLE SULFATES (15 TESTS)															$825	$825
110	3.4 DATA ANALYSIS AND REPORTING															$8,340	$8,340
	PROJECT MANAGER (8 HRS)															$1,280	$1,280
	STAFF ENGINEER (68 HOURS)															$6,800	$6,800
	ADMINISTATIVE ASSISTANT (4 HOURS)															$260	$260
	SUBTOTAL HOURS/COSTS															$26,745	$26,745
120	TASK 4 - DEVELOP DETAILED HYDROLOGIC/HYDRAULIC MODELS																
120	4.1 DATA COLLECTION			4	8					20		32	$3,788		$20		$3,808
	A. SITE VISITS			4	4							8	$984		$20		$1,004
	B. FIELD SURVEY				4					20		24	$2,804				$2,804
120	4.2 HYDROLOGIC MODELING	2	4	8	20	48						82	$8,576				$8,576
	A. DEVELOP TERRAIN MODEL		2	6	16	36						60	$6,090				$6,090
	B. RUNOFF CALCULATIONS	2	2	2	4	12						22	$2,486				$2,486
120	4.3 HYDRAULICS	2	4	10	17	30			8		5	76	$7,675	$20			$7,695
	A. CULVERT MODELING		2	5	12	20						39	$4,103				$4,103
	B. BACKWATER MAPPING	2	2	5	5	10			8		5	37	$3,572	$20			$3,592
	SUBTOTAL HOURS/COSTS	4	8	22	45	78			8	20	5	190	$20,039	$20	$20		$20,079

EXHIBIT D
RM 620 PRELIMINARY ENGINEERING / ENVIRONMENTAL

AVO 28471

TXDOT FUNC. CODE	TASK/DESCRIPTION	PRINCIPAL	STUDY MNGR	SR. ENG ENV. / PLANNER	PE	E.I.T.	RPLS	SURVEY TECH	CADD / GIS / VIS/TECH	SURVEY CREW	CLERICAL / ADMIN	TOTAL MAN-HOURS	LABOR CHARGES (DIRECT)	PRINTING, PLOTTING	DELIV, TRAVEL & MISC	SUB CONSULT'S	TOTAL COST FOR TASK (INCL MULT'S)
110	TASK 5 - ROW MAPS, PARCEL PLATS, & FIELDS NOTES																
110	5.1 PARCEL PLATS AND FIELD NOTES FOR 29 PARCELS		5				100	350		160		615	$55,720		$100		$55,820
110	5.2 PARCEL PLATS & FIELD NOTES FOR 6 DRAIN EASEMENTS		2				35	65		30		132	$12,451	$40	$20		$12,511
	SUBTOTAL HOURS/COSTS		7				135	415		190		747	$68,171	$40	$120		$68,331
	FEE SUMMARY																
100	TASK 1 - PROJECT MANAGEMENT AND COORDINATION		42	14					3		4	63	$9,315	$40	$20	$4,580	$13,955
120	TASK 2 -GEOTECHNICAL TESTING															$35,445	$35,445
110	TASK 3 - PAVEMENT DESIGN															$26,745	$26,745
150	TASK 4 - DEVELOP DETAILED HYDROLOGIC/HYDRAULIC MODELS	4	8	22	45	78			8	20	5	190	$20,039	$20	$20		$20,079
110	TASK 5 - ROW MAPS, PARCEL PLATS &FIELD NOTES		7				135	415		190		747	$68,171	$40	$120		$68,331
	TOTAL HOURS	4	57	36	45	78	135	415	11	210	9	1000					
	BASE HOURLY RATES ($)	$190.00	$168.00	$135.00	$111.00	$88.00	$115.00	$70.00	$67.00	$118.00	$42.00						$164,555
	BASE SALARIES & RDWB'S TOTAL	$760	$9,576	$4,860	$4,995	$6,864	$15,525	$29,050	$737	$24,780	$378		$97,525	$100	$160	$66,770	$164,555
	TOTAL BY CATEGORY	1%	10%	5%	5%	7%	16%	30%	1%	25%	0%		$97,525	$100	$160	$66,770	$164,555
	TOTAL FEE												$97,525	$100	$160	$66,770	$164,555

HALFF FEE SUMMARY		%
TASK 1 - PROJECT MANAGEMENT AND COORDINATION		8.48%
TASK 2 - GEOTECHNICAL TESTING		21.54%
TASK 3 - PAVEMENT DESIGN		16.25%
TASK 4 - DEVELOP DETAILED HYDROLOGIC/HYDRAULIC MODELS		12.20%
TASK 5- ROW MAPS, PARCEL PLATS & FIELD NOTES		41.52%
	HALFF % OF TOTAL	100.00%

LABOR CATEGORY	% (Hours)
PRINCIPAL	0.40%
STUDY MANAGER	5.70%
DEP. STUDY MANAGER	
SR. ENGINEER / ENV	3.60%
PE	4.50%
E.I.T.	7.80%
RPLS	13.50%
SURVEY TECH	41.50%
CADD	1.10%
SURVEY	21.00%
CLERICAL	0.90%
	100.00%