

PAPE-DAWSON

August 22, 2025

Andrew Zagars, P.E.
City of Killeen
3201-A S.W.S. Young Drive
City of Killeen, Texas 76542

Re: City of Killeen - Mohawk Drive

Dear Mr. Zagars:

We are pleased to present this proposal for providing civil engineering and surveying services in connection with the above referenced project. Our proposed scope of services and associated fees are as follows:

Project Limits

The project limits are from Bunny Trail to Castle Gap Drive for approximately 0.65 miles.

Proposed Facility

The proposed roadway is a 3-lane roadway with design accounting for widening to 5 lanes in the future as needed. The road will include curb and gutter, turn lanes, 6' sidewalk, bike lanes, underground drainage, landscaping including street trees, and a bridge crossing the tributary to Reese Creek.

Design Criteria

The proposed design criteria for the project will be developed from the City of Killeen, Bell County, and TxDOT design criteria. It is anticipated that in most cases, the most stringent of the Design Criteria will be applied.

I. MANAGING CONTRACTED/DONATED PE (FC 110) \$156,010.00

Project Management and Administration

- **Communication:**

- Designate one Licensed Professional Engineer (Texas) to be responsible for the project management, and all communications with the City and its representatives.

- **Monthly Progress Report, Invoices, and Billings (10 months assumed):**

- Submit monthly progress status reports to the City. Progress reports will include deliverable table, tasks completed, tasks/objectives that are planned for the upcoming periods, lists or descriptions of items or decisions needed from the City and its representatives. Subconsultant progress will be incorporated into the monthly progress report. A copy of the monthly progress report will be submitted to the City.

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- Prepare correspondence, invoices, and progress reports on a monthly basis in accordance with current City requirements.
- **Quality Assurance and Quality Control (QA/QC) Plan:**
 - For each deliverable submittal, provide evidence of their internal review and mark-up of that deliverable as preparation for submittal and in accordance with submitted project specific QA/QC plan.
 - Provide continuous QA/QC throughout the duration of the scheduled services included herein to appraise both technical and business performance and provide direction for project activities.
- **Project Coordination & Administration:**
 - Prepare and maintain routine project record keeping including records of meetings and minutes.
 - Correspondence and coordination will be handled through & with the concurrence of the CITY.
 - Manage project activities (including documenting emails, phone and conference calls, maintain project files for the length of the project, meeting agendas, meeting minutes, and schedule meetings), direct Engineer's team/staff, coordinate and review sub-consultant work, correspond with the City and its representatives, and assist the City and its representatives in preparing responses to project-related inquiries.
- **Progress/Coordination Meetings (3 external meetings assumed):**
 - Attend a kickoff meeting and coordination/progress meeting with the City and its representatives and stakeholders, as necessary to communicate development of the project and design issues.
 - Prepare agenda and sign-in sheets for external coordination/progress meetings.
 - Prepare meeting minutes for review via email within three (3) business days of the external coordination/progress meeting.
 - Conduct internal coordination meetings as required to advance the development of the project.
- **Project Schedule:**
 - Maintain a project schedule indicating tasks, subtasks, critical dates, milestones, and deliverables. Submit to City as requested.

Deliverables:

- Monthly Invoices and Progress Reports including Deliverable Table
- Project Specific QA/QC Plan
- Meeting Minutes, Sign-In Sheets, and Agendas
- Project Schedule and Updates
- Project Files
- QA/QC Documentation with Deliverable

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Bidding Phase Services

- **Bidding Phase Services:**

- Prepare all applicable construction documents for bidding. Attend the pre-bid meeting. Respond to bidder's questions during the bid period. Prepare project addenda up to three (3) during bid period. Analyze contractor bids, prepare bid tabulation, and make recommendation for award to the apparent low bidder via a letter. Attend the pre-construction conference.

Deliverables:

- Letter of Recommendation for Award, with Bid Tabulation.

II. ENVIRONMENTAL COMPLIANCE (FC 120)

\$29,540

Environmental Coordination

- **Environmental Project Management and Coordination**

This item represents an allowance for time not specifically required for deliverable preparation:

- Coordinate project team to meet schedule and deliverables.
- Environmental staff attendance at four (4) coordination meetings.

- **Endangered Species Act Compliance:**

- A US Fish and Wildlife Service (USFWS) permitted biologist familiar with the habitat requirements for species listed by the USFWS as having the potential to occur on the subject property will conduct a reconnaissance site visit. Based on the site visit and aerial photography, the likelihood of occurrence of species on the property is to be assessed.
- A report will be prepared describing endangered species assessment methodology and characteristics of the property that support the conclusions of habitat potential. The report will include a map delineating the area that may be suitable for the listed species.
- FEMA requires documentation of compliance with the minimum Endangered Species Act requirements before it will process a CLOMR.
 - An Endangered Species Act Compliance Letter / "Take" Assessment to be prepared describing endangered species assessment methodology and characteristics of the property that support the conclusions of habitat potential.
 - In collaboration with the civil engineering team, a US Fish and Wildlife (USFWS) permitted biologist familiar with the habitat requirements for the local endangered species to prepare the FEMA-required letter.

- **Section 404 Clean Water Act Compliance:**

- Conduct a jurisdictional waters delineation on the subject property, following guidelines from the US Army Corps of Engineers (USACE), including the 1987 Wetland Delineation Manual.
- Prepare a Jurisdictional Waters Delineation Report including a map of areas that would potentially be under the jurisdiction of the USACE according to the most recent guidance, data forms, soils, vegetation, and hydrology analysis. A summary of

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jurisdictional waters as defined in the Federal Wetland Regulations 33 Code of Federal Regulations (CFR) Part 328 and the Clean Water Act as was done prior to the 2015 rule and incorporating the Sackett Case Supreme Court decision is also to be provided.

- If it is suspected that a a Pre-Construction Notification (PCN)_is required to the USACE; a supplemental work authorization would be required. The Jurisdictional Waters Delineation Report and Nationwide Permit with PCN are subject to the U.S. Army Corps of Engineers Forth Worth District review and issuance of a permit.
- **Cultural Resources Regulatory Compliance:**
 - For projects located on land owned by a political subdivision or agency of the state, compliance with the Antiquities Code of Texas (Texas Natural Resource Code, Title 9, Chapter 191) and accompanying Rules of Practice and Procedure (Texas Administrative Code, Title 13, Chapter 26) as implemented by the Texas Historical Commission is required.
 - For projects anticipating federal funding, permitting, and/or licensing, compliance with Section 106 of the National Historic Preservation Act (16 United States Code 470) and its implementing regulations (36 Code of Federal Regulations [CFR] 800) as overseen by the THC and lead federal agency is required. This includes coordination with the State Historic Preservation Officer (SHPO) and any affiliated or consulting Tribal Nations as part of the federal agency's responsibilities.
 - In addition, projects with the potential to impact human remains and/or graves, must comply with the Texas Health and Safety Code (Chapters 711 to 715) and Texas Code of Criminal Procedure ([TCCP] Chapter 49 Subchapter A Article 49).

As the proposed project area is to be utilized as public ROW and may require permitting through the USACE, the following scope of work is intended to provide compliance with the ACT and Section 106 of the NHPA.

- Agency Consultation Letter
 - As part of the project planning process prior to project construction, Pape-Dawson cultural resources staff to prepare a consultation letter for the lead regulatory agency summarizing the existing conditions OR verifying the project meets the requirements of Antiquities Code of Texas (Subchapter A, Sec. 191.0525[d]) and to provide concurrence with recommendations that no cultural resources survey is needed.

Notes:

- i. Additional services that may be required for potential USACE PCN (including Archaeological Permit Acquisition, Cultural Resource Survey, and Indirect Effects Analysis) would be conducted under a supplemental work authorization.*

Deliverables:

- Endangered Species Habitat Assessment
- FEMA Endangered Species Act Compliance Letter / “Take” Assessment

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- Jurisdictional Waters Delineation Report
- Agency Consultation Letter

III. SUBSURFACE UTILITY ENGINEERING (FC 130) \$5,546.58

- See attached proposal in Exhibit A

IV. GEOTECHNICAL SERVICES (FC 140) \$11,500.00

- See attached proposal in Exhibit B

V. DESIGN SURVEY (FC 150) \$77,925.00

- **Design Surveying**
 - Pape-Dawson will establish 4 primary control points, 12 aerial targets and 25 ground truthing points, with coordinates labeled, in the MicroStation 2D file, based on the North American Datum of 1983, (NA2011), epoch 2010, from the Texas State Plane Coordinate System established for the Central Zone and the North American Vertical Datum of 1988 (GEOID 12B).
 - Locate existing visible and above ground utilities along designated route.
 - Acquire invert elevations of Storm Sewer, Wastewater Manholes and inlet boxes where accessible.
 - Detail culvert crossing at Bunny Trail and South Clear Creek Road.
 - Supplement LIDAR topographic information where needed.
 - Locate visible improvements and utilities including driveways, water wells, storage tanks, drainage structures (size, material, flowline elevations), edge of pavement/shoulder, physical centerline, guardrail, fences, signs, mailboxes, locate property boundaries sufficient to re-establish apparent ROW.
- **Right-of-Way Parcels (2 parcels assumed)**
 - From deed research and data from the field survey, Pape-Dawson will analyze the results of the survey and perform computations related to the analysis of existing Right-of-Way and property boundary sufficient to prepare Parcels for ROW acquisition purposes. Parcel plats will be submitted in two rounds (preliminary and final). Preliminary ROW documents shall be submitted based upon found monumentation within the existing ROW and proposed ROW. Final ROW documents shall be submitted at a later date once review comments have been received from the City.
 - The plats will be prepared on 8 1/2" x 11" pages at a scale dependent upon parcel size. A closure computation will be prepared for each of the plats.
 - Pape-Dawson will prepare a field note (metes and bounds) description for each of the 2 parcels. A closure computation will be prepared for each of the descriptions.
 - To assure the accuracy of the documents, Pape-Dawson will review the descriptions while all details are compared to ROW plans and parcel plats (bearings, distances, stations and offsets, deed references, etc.). Final mark-ups

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will be made and corrections completed.

- All of the above-described survey documents (plans, property descriptions parcel plats and closure computations) will be submitted to the City for a one time review. Upon the completion of review of all ROW survey documents, Pape-Dawson will make necessary corrections. The final ROW documents will then be delivered to the City.
- **LiDAR Surveying:**
 Complete a control, improvement, topographic, and utility survey within approximately 6.8 miles of Mohawk Drive from the Bunny Trail Road to Castle Gap Drive in Killeen, TX. Also, complete a control and topographic survey within a corridor crossing Mohawk Drive approximately 6.8 miles long starting approximately 0.3 miles south of S Clear Creek Rd and ending approximately 0.2 miles north of Alamositos Drive.
 - Targets for aerial LiDAR will be set at approximately 1,700' intervals within the project limits. They will consist of chevron targets with a PK nail set on the inside corner of the chevron.
 - Ground truthing shots will be collected throughout the project area over a diversity of land cover types.
 - The acquired LiDAR data will be calibrated to control targets set on the project.
 - The calibrated LiDAR will be checked against the ground truthing shots to ensure the calibration is holding to control. At this point the data will be approved for production.
 - A ground truthing and calibration report will be produced as evidence of the calibration accuracy showing the expected accuracy of the LiDAR data within the project limits.
 - Topographic data will be extracted from the LiDAR point cloud and a MicroStation 3D DTM drawing and associated LandXML tin file will be generated.
 - The final DTM will be checked against the ground truthing points to ensure the extracted data is accurately representing the calibrated LiDAR data.
 - Conventional survey will be supplemented where lidar data cannot be completed.
 - Existing improvements will only be collected from the project data along Mohawk Drive.

Deliverables:

- Right of Entry Letters, Follow Up Letters, and Executed Right of Entry Documents.
- Mapping in 2-D and 3-D MicroStation Files
- PDF of each Surveyor Project Notebook

VI. ROADWAY DESIGN – ROADWAY (FC 160)

\$301,400.00

Roadway Sheet Development

- **The Engineer shall develop the following roadway sheets:**
 - Title Sheet
 - Index Sheet
 - General Notes
 - Quantity Summaries

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- Typical Sections
- Plan and Profile Sheets
- Intersection Grading Details
- Misc. Roadway Details
- Construction Standards

Roadway Model Development

The Engineer shall use the current versions of Bentley Openroads Designer at the time the task order is executed. However, the Owner may approve the use of other versions.

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

- **The plan view must contain the following design elements:**
 - Calculated roadway centerlines for mainlanes, and cross streets. Horizontal control points must be shown. The alignments must be calculated using OpenRoads horizontal geometry tools.
 - Pavement edges for all improvements
 - Lane and pavement width dimensions.
 - The geometrics of ramps, auxiliary and managed lanes.
 - Proposed structure locations, lengths, and widths.
 - Direction of traffic flow on all roadways. Lane lines and arrows indicating the number of lanes must also be shown.
 - Drawing scale shall be 1"=100'
 - Control of access line, ROW lines, and easements.
 - Begin and end superelevation transitions and cross slope changes.
 - Limits of riprap, block sod, and seeding.
 - Existing utilities and structures.
 - Benchmark information.
 - Metal beam guard fence locations
 - Radii call outs, curb location, Concrete Traffic Barrier (CTB), crash safety items and American with Disabilities Act Accessibility Guidelines (ADAAG) compliance items.
- **The profile view must contain the following design elements:**
 - Calculated profile grade for proposed mainlanes (cite direction), cross streets, and frontage roads, if applicable. Vertical curve data, including "K" values must be shown. The profiles must be calculated using OpenRoads vertical geometry tools.
 - Existing and proposed profiles along the proposed centerline of the mainlanes, the outside shoulder line of ramps, and the outside gutter line of the designated (north, south, east, or west) bound frontage roads.
 - Drawing vertical scale to be 1"=10'.

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- The Engineer shall prepare typical sections for all proposed and existing roadways and structures. Typical sections must include width of travel lanes, shoulders, outer separations, border widths, curb offsets, managed lanes, and ROW. The typical section must also include Proposed Profile Grade Line (PGL), centerline, pavement design, longitudinal joints, side slopes, sodding or seeding limits, concrete traffic barriers and sidewalks, if required, station limits, common proposed and existing structures including retaining walls, existing pavement removal, riprap, limits of embankment and excavation, etc.
- The Engineer shall provide an intersection layout detailing the pavement design and drainage design at the intersection of each cross street. The layout must include the horizontal and vertical alignments, curb returns, geometrics, transition length, stationing, pavement, drainage details, and Americans with Disabilities Act Accessibility Guidelines (ADAAG) compliance items. The Engineer shall design for full pavement width to the ROW and provide a transition to the existing roadway.
- The Engineer shall develop an earthwork analysis to determine cut and fill quantities and provide final design cross sections at 100 feet intervals. Cross sections must be created from the 3D corridor model and must be delivered in the standard TxDOT format on 11"x17" sheets or roll plots and electronic files. The Engineer shall provide all templates and corridors used to generate the design cross sections. Cross sections and quantities must include existing pavement removals. Annotation shall include at a minimum existing and proposed ROW, side slopes (front & back), profiles, etc.

Deliverables:

- The Engineer shall submit electronic files for each submittal at the 60%, 90%, and final. The Engineer shall also submit the current OpenRoads generated 3D corridor model for each submittal.

Plans

- The Engineer shall provide the following information at the following submittals:
 - 60% Plans Submittal
 - Electronic submittal
 - Estimate of construction cost.
 - Engineer's internal QA and QC markup set.
 - Design Exceptions with existing and proposed typical sections, location map and design exception exhibits.
 - A Preliminary 3D corridor model, in the most current format, created using Bentley's OpenRoads tools, and with detail to verify the design of the 30% plan sheets.
 - Electronic set-Bridge Class Culvert Plan and Profile sheets and Hydrology & Hydraulics sheets, include project title sheet and project layout sheet.
 - A preliminary 3D corridor model, in the most current format, created using Bentley's OpenRoads tools, and with detail to verify the design of the Bridge and Retaining Wall layouts.
 - Review Submittal (90%)

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- Electronic set for review
- Estimate of construction cost.
- Marked up general notes
- Construction schedule.
- List of governing Specifications and Special Provisions in addition to those required.
- Triple Zero Special Provisions.
- Temporary road closure letters.
- Engineer's internal QA and QC marked-up set.
- Other supporting documents.
- A detailed 3D corridor model, in the most current format, created using Bentley's OpenRoads tools, and with detail to verify the design of the 60% plan sheets. The level of detail of the surface and subsurface features will be at the direction of the Owner.
- Final submittal (100%)
 - 1 paper set 11" x 17"
 - Revised supporting documents from 90% review comments.
 - A final 3D corridor model, in the most current format created using Bentley's OpenRoads tools. The level of detail of the surface and subsurface features will be at the direction of the Owner.
 - A final 3D earthwork model in either .XML or .ICM format (as directed by the Owner) created using Bentley's OpenRoads tools. The level of detail of the surface and subsurface features will be at the direction of the Owner.
- Electronic Copies
 - The Engineer shall furnish the Owner with a flash drive or USB hard drive of the final plans in the format of current CADD system used by the Owner, and shall also provide as a .pdf format and upload to the file management system.
 - The Engineer shall also provide a separate flash drive or USB hard drive containing cross section information (in dgn, XLR, & ASCII formats) for the contractor to use.
 - The Engineer shall provide an electronic copy of MS Project, Primavera, or the latest scheduling program used by the Owner for construction time estimate.
 - With the approval of the Owner, and in lieu of the above, the Engineer may maintain the project files in the Owner's file management system.

VII. ROADWAY DESIGN – Storm Drain (FC 161)

\$258,920.00

Data Collection

- The Engineer shall provide the following data collection services:
 - Conduct field inspections to observe current conditions and the outfall channels, the cross-drainage structures, drainage easements, the tributary channel, and land development projects that contribute flow to the tributary. Document field inspections with digital photos.
 - Collect available applicable data including GIS data and maps, site survey data, construction plans, previous reports and studies, and readily available rainfall

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history for the area. Sources of data collected must include, but are not limited to, the City, State, County, and Federal Emergency Management Agency (FEMA).

- Review survey data and coordinate any additional surveying needs with Owner.
- Present existing drainage structures in a 3D corridor MicroStation model.
- Submit a letter report to the Owner Project Manager detailing completion of data collection.

Storm Drain Sheet Development

- The Engineer shall provide the following services:
 - Prepare the PS&E package in accordance with the applicable requirements of the Owner's specifications, standards, and manuals, including the TxDOT PS&E Preparation Manual. Include the following sheets and documents, as appropriate:
 - Hydrologic Data Sheets
 - Hydraulic Data Sheets
 - Scour Data Sheets (if applicable)
 - Culvert Layout Sheets
 - Storm Drain Plan/Profile Sheets
 - Storm Drain Lateral Sheets at the 90% and Final Submittals
 - Detention Pond Layouts
 - Detention Pond Details
 - Roadway Plan & Profile Sheets if applicable.
 - Main Culvert Crossing Plan and Profile Sheet
 - All other relevant sheets
 - Prepare culvert cross sections and identify each cross-section's station location.
 - Identify areas requiring trench protection, excavation, shoring and de-watering.
 - Prepare drainage area maps.
 - If applicable, prepare plan and profile sheets for storm drain systems and outfall ditches.
 - Select any necessary standard details from the TxDOT or City of Killeen lists of standards for items such as inlets, manholes, junction boxes and end treatments.
 - Prepare details for non-standard inlets, manholes and junction boxes.
 - Prepare drainage details for outlet protection, outlet structures and utility accommodation structures.
 - Identify pipe strength requirements.
 - Prepare drainage facility quantity summaries.
 - Identify potential utility conflicts and, if feasible, design to mitigate or avoid those identified conflicts.
 - Consider pedestrian facilities, utility impacts, driveway grades, retaining wall and concrete traffic barrier drainage impacts.
 - Identify existing ground elevation profiles at the ROW lines on storm sewer plan and profile sheets.
 - Locate soil borings every 500 feet along the storm sewer alignment and take piezometric readings at 2000 feet intervals.

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- Prepare Hydraulic Data Sheets for any bridge or cross drainage structures at the outfall channel and indicate site location (e.g., station and name of creek or bayou), if applicable.
- Develop a 3D model of the proposed drainage structures using the SUDA capabilities of the GeoPak/OpenRoads Product.
- Develop layouts for the following:
 - Subsurface drainage at retaining walls.
 - Outfall channels within existing ROW.
 - Bridge deck drainage systems, including internal drainage piping within the bents where required on structures.
 - Detention ponds associated outlet structures, and details, if applicable. If information is not available at the time of initial scoping, this work shall be considered as additional work.

Storm Drain Modelling

- The Engineer shall provide the following services:
 - Design and analyze storm drains using software as approved by the Owner.
 - Size inlets, laterals, trunk line and outfall. Develop designs that minimize the interference with the passage of traffic or incur damage to the highway and local property in accordance with local drainage ordinances, the TxDOT Hydraulic Design Manual, and any specific guidance provided by the Owner. Storm drain design software shall be selected as directed by the task order.
 - Determine hydraulic grade line starting at the outfall channel for each storm drain design. Use the design water surface elevation of the outfall as the starting basis (tailwater) for the design of the proposed storm sewer system.
 - Calculate manhole head-losses. Compute manhole head losses as per FHWA's HEC-22.
 - Limit discharge into existing storm drains and existing outfalls to the capacity of the existing system, which will be determined by the Engineer. Evaluate alternate flow routes or detention, if necessary, to relieve system overload. Determine the amount of the total detention storage to control storm drain runoff for the design frequency based on hydrograph routing for the full range of frequencies (50%, 20% 10%, 4%, and 1%, and AEP), as well as a rough estimate of the available on-site volume. When oversized storm drains are used for detention, the Engineer shall evaluate the hydraulic grade-line throughout the whole system, within project limits, for the design frequency or frequencies. The Engineer shall coordinate with the Owner any proposed changes to the detention systems.
 - Identify areas requiring trench protection, excavation, shoring, and de-watering.

VIII. FUNCTION CODE 160(162) - ROADWAY DESIGN –

\$40,160.00

SIGNING, PAVEMENT MARKINGS AND SIGNALIZATION

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Signing and Pavement Marking Design

- The Engineer shall prepare drawings, specifications, and details for all signs. The Engineer shall coordinate with the Owner (and other Engineers as required) for overall temporary, interim and final signing strategies and placement of signs outside contract limits. The Engineer shall:
 - Prepare sign detail sheets for large guide signs showing dimensions, lettering, shields, borders, corner radii, etc., and shall provide a summary of large and small signs to be removed, relocated, or replaced.
 - Designate the shields to be attached to guide signs.
 - Illustrate and number the proposed signs on plan sheets.
 - Select each sign foundation from State Standards.
- The Engineer shall detail both permanent and temporary pavement markings and channelization devices on plan sheets. The Engineer shall coordinate with the Owner (and other Engineers as required) for overall temporary, interim, and final pavement marking strategies. The Engineer shall select Pavement markings from the latest City and Owner standards.
- The Engineer shall provide a 3D corridor model with the proposed pavement marking stenciled onto the model.
- The Engineer shall provide the following information on sign and pavement marking layouts:
 - Roadway layout.
 - Center line with station numbering.
 - Designation of arrow used on exit direction signs
 - Culverts and other structures that present a hazard to traffic.
 - Location of utilities.
 - Existing signs to remain, to be removed, to be relocated or replaced.
 - Proposed signs (illustrated, numbered and size).
 - Proposed overhead sign bridges to remain, to be revised, removed, relocated, or replaced.
 - Proposed overhead sign bridges, indicating location by plan.
 - Proposed markings (illustrated and quantified) which include pavement markings, object markings and delineation.
 - Quantities of existing pavement markings to be removed.
 - Proposed delineators, object markers, and mailboxes.
 - The location of interchanges, mainlanes, grade separations, frontage roads and ramps.
 - The number of lanes in each section of proposed highway and the location of changes in numbers of lanes.
 - Right-of-way limits.
 - Direction of traffic flow on all roadways.

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IX. ROADWAY DESIGN – MISCELLANEOUS ROADWAY (FC 163)

\$224,080.00

Traffic Control Plan

- The Engineer shall prepare Traffic Control Plans (TCP) including TCP typical sections, for the project. A detailed TCP must be developed in accordance with the latest edition of the TMUTCD. The Engineer shall implement the current Barricade and Construction (BC) standards and TCP standards as applicable. The Engineer shall interface and coordinate phases of work, including the TCP, with adjacent Engineers. The Engineer shall:
 - Provide a written narrative of the construction sequencing and work activities per phase and determine the existing and proposed traffic control devices (regulatory signs, warning signs, guide signs, route markers, construction pavement markings, barricades, flag personnel, temporary traffic signals, etc.) to be used to handle traffic during each construction sequence. The Engineer shall show proposed traffic control devices at grade intersections during each construction phase (stop signs, flag person, signals, etc.). The Engineer shall show temporary roadways, ramps, structures (including railroad shoo-fly) and detours required to maintain lane continuity throughout the construction phasing. If temporary shoring is required, prepare layouts, and show the limits on the applicable TCP.
 - Coordinate with the Owner in scheduling a Traffic Control Workshop and submittal of the TCP for approval by the Traffic Control Approval Team (TCAT). The Engineer shall assist the Owner in coordinating mitigation of impacts to adjacent schools, emergency vehicles, pedestrians, bicyclists, and neighborhoods.
 - Develop each TCP to provide continuous, safe access to each adjacent property during all phases of construction and to preserve existing access. The Engineer shall notify the Owner in the event existing access must be eliminated and must receive approval from the Owner prior to any elimination of existing access.
 - Design temporary drainage to replace existing drainage disturbed by construction activities or to drain detour pavement. The Engineer shall show horizontal and vertical location of culverts and required cross sectional area of culverts.
 - Prepare each TCP in coordination with the Owner. The TCP must include interim signing for every phase of construction. Interim signing must include regulatory, warning, construction, route, and guide signs. The Engineer shall interface and coordinate phases of work, including the TCP, with adjacent Engineers, which are responsible for the preparation of the PS&E for adjacent projects.
 - Maintain continuous access to abutting properties during all phases of the TCP. The Engineer shall develop a list of each abutting property along its alignment. The Engineer shall prepare exhibits for and attend meetings with the public, as requested by the Owner.
 - Make every effort to prevent detours and utility relocations from extending beyond the proposed Right-of-way lines. If it is necessary to obtain additional permanent or temporary easements and Right-of- Entry, the Engineer shall notify the Owner in writing of the need and justification for such action. The Engineer shall identify and coordinate with all utility companies for relocations required.
 - Describe the type of work to be performed for each phase of sequence of construction and any special instructions (e.g., storm drain, culverts, bridges, railing,

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illumination, signals, retaining walls, signing, paving surface sequencing or concrete placement, ROW restrictions, utilities, etc.) that the contractor should be made aware to include limits of construction, obliteration, and shifting or detouring of traffic prior to the proceeding phase.

- Include the work limits, the location of channelizing devices, positive barrier, location and direction of traffic, work area, stations, pavement markings, and other information deemed necessary for each phase of construction.
- Identify and delineate any outstanding ROW parcels.
- Delineate areas of wetlands on traffic control plans.
- Design the TCP phasing by creating a phased 3D corridor model.
- Road closures should be avoided. If a road closure is determined to be necessary a Detour Layout and estimated closure duration shall be provided to the Owner for approval.

Illumination

- The Engineer shall refer to TxDOT's Highway Illumination Manual and other deemed necessary Owner approved manuals for design of continuous lighting and safety lighting for all conventional, high-mast, and underpass lighting. The Engineer shall include safety lighting as part of each design on each flashing beacon and traffic signal. The Engineer shall provide a preliminary layout for initial review and approval by the Owner. The Engineer shall prepare circuit wiring diagrams showing the number of luminaries on each circuit, electrical conductors, length of runs, service pole assemblies. Underpass lighting must be used on all structures within each project. The Engineer shall integrate existing illumination within the project limits into the proposed design. The Engineer shall coordinate with the Owner to determine the location of proposed high-mast, conventional, and underpass lighting.
- Routes selected by Owner will install City approved, Dark Sky-compliant lighting with aesthetically pleasing poles per City code.

Storm Water Pollution Prevention Plans (SWP3)

- The Engineer shall develop SWP3, on separate sheets from (but in conformance with) the TCP, to minimize potential impact to receiving waterways. The SWP3 must include text describing the plan, quantities, type, phase and locations of erosion control devices and any required permanent erosion control. The SW3P sheets must also include blanks to indicate placement and removal dates of all BMPs within the plan.

Specifications and General Notes

- The Engineer shall identify necessary standard specifications, special specifications, special provisions, and the appropriate reference items. The Engineer shall prepare General Notes from the TxDOT Waco District's Master List of General Notes, Special Specifications and Special Provisions for inclusion in the plans and bidding documents. In addition, the Engineer shall include applicable Owner general notes. The Engineer shall provide General Notes, Special Specifications and Special Provisions in the required format.

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Constructability Review

- The Engineer shall provide Independent Quality Review of the constructability of the PS&E sets.
- The Engineer shall perform constructability reviews at major project design milestones (e.g. 60%, 90%, and final plan) to identify potential constructability issues and options that would provide substantial time savings during construction. The constructability review must be performed for all roadway and structural elements such as Sequence of Work and Traffic Control, Drainage (Temporary and Permanent), Storm Water Pollution Prevention Plan (SWP3), Environmental Permits, Issues and Commitments (EPIC) addressed, identify Utility conflicts; ensuring accuracy and appropriate use of Items, Quantities, General Notes, Standard and Special Specifications, Special Provisions, Contract Time/Schedule, Standards; and providing detailed comments in an approved format. Reviews must be captured in a Constructability Log identifying areas of concern and potential conflict. The Engineer shall provide the results of all Constructability reviews and recommendations to the Owner at major project design milestone submittals.

Deliverables:

- 60%, 90%, & Final Plansheet Submittals including applicable Williamson County Submittal Checklists.
- Engineer's Opinion of Probable Construction Cost
- Design Summary Form
- MicroStation OpenRoads Designer final design files
- Cross Sections
- Final Surface DTM
- Estimated Construction Schedule

X. DRAINAGE STUDY (FC 170) \$140,910.00

Bridge Hydrologic & Hydraulic (H&H) Modeling – Flood Study

- **Data Collection and Coordination:**
 - Perform one (1) site visit to observe field conditions.
 - Coordinate with City of Killeen floodplain administrator on drainage analysis solution
 - Review and collect data related to drainage issues at 2 locations (approx. 300' east of Flanigan Drive and Stagecoach at Tyler Drive)
 - Collect latest FEMA model, Flood Insurance Rate Map (FIRM), Flood Insurance Study (FIS) data, Atlas 14 precipitation data, pertinent land use and soils data, publicly available topographic data, and other best available models.
- **Hydrologic and Hydraulic Analysis:**
 - Obtain and run best available hydrologic model using the latest applicable version of HEC-HMS. Update model with Atlas 14 precipitation data and latest existing and future land use data. Rerun HMS model to analyze proposed bridge or bridge class culvert (BCC).

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- Obtain and run best available hydraulic model using the latest applicable version of HEC-RAS. Update model with latest topographic data beginning just upstream of the Alamocitos Creek Drive crossing and continuing approximately 4000 LF of channel downstream of Alamocitos Creek Drive. Incorporate update hydrologic model data, and run the RAS model to establish an existing and future conditions hydraulic model.
- Use HEC-RAS to analyze and design the proposed Mohawk Drive floodplain crossing (likely a Bridge Class Culvert, or BCC) to convey the 100-year storm event. Assumes maximum 2 options.
- Perform no-rise analysis including assessment of compensatory storage requirements for the 100-year storm event.
- Perform scour analysis or energy dissipation calculations for the preferred crossing alternative.
- Prepare a H&H/drainage summary report, including exhibits, calculations, and narratives.
- Submit report and models to the City and reviews based on review comments.
- **Conditional Letter of Map Revision (CLOMR)**
 - **CLOMR Modeling and Documentation:**
 - Use the effective FEMA model for NRC Trib 1 and develop duplicate effective, corrective effective, and proposed conditions models using HEC-HMS and HEC-RAS.
 - Prepare hydrologic information concerning storm water runoff rates in NRC Trib 1 in this area for the 2/5/10/25/50/100/500-year storm events.
 - Use HEC-RAS to perform hydraulic calculations for the various runoff rates for existing and proposed conditions.
 - Prepare forms required by FEMA.
 - Prepare the documents consisting of calculations, forms, and drawings, and submit to City of Killeen and FEMA for review.
 - Provide official notification of proposed floodplain changes in local newspaper or through individual notification letter.
 - FEMA CLOMR submittal fees and newspaper publication fees will be billed as a direct expense to the City.
- **CLOMR Review Coordination:**
 - Monitor the CLOMR review by the City and FEMA, including response to comments.
 - Assumes two (2) comment letters for each of the City and FEMA.
- **Plans, Specifications, & Estimates (PS&E)**
 - **Bridge Class Culvert (BCC) H&H Plans**
 - Prepare hydraulic data sheet (1 sheet, Bridge/BCC only)
 -
 - Prepare BCC plan and profile sheet. Develop energy dissipator detail sheet (1 sheet)
 - Prepare channel grading sheets (1-2 sheets).

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- Prepare grading/channel non-standard detail sheet (1 sheet)
- Develop ORD model for channel grading.
- Includes 60/90/100% submittal preparation and QA/QC of bridge/BCC design.

Deliverables:

- H&H/drainage summary report (Flood Study).
- Conditional Letter of Map Revision (CLOMR)
- Bridge/BCC Hydraulic Plans, Specifications, & Estimates (PS&E)
- Applicable GIS, Hydrologic and Hydraulic Models or CAD files referenced in the drainage study.

Exclusions:

- A LOMR is not included in the scope for this project. This is anticipated to be required after construction is completed, and this can be provided with an additional service request (ASR).

XI. UTILITY DESIGN (FC 180) \$119,810.00

The proposed project improvements and detailed design consist of:

- The design of approximately 3,400 linear feet of 12” waterline. Preparation of engineering drawings and specifications for the improvements to submit for public bid as part of the overall roadway design.
- Collect and review existing data and record drawings for existing waterlines on Bunny Trail, Castle Gap Drive, Angle Drive, Brushy Creek Drive, and Guadalupe Drive for connection of the proposed waterline to the existing infrastructure.
- Design under the floodway to be installed via bore.
- Proposed 12” waterline to include fire hydrants spaced approximately 1,000 feet apart.
- Design to include coordination with City Staff to identify proposed locations for connection to future development.
- Preparations of quantity estimates and engineer’s cost estimation.
- Permitting with the Texas Commission on Environmental Quality (TCEQ) and the City of Killeen.

XII. TRAFFIC STUDY (FC 190) \$26,540.00

Traffic Study

- **Traffic Operational Analysis and Report:**
 - Conduct traffic study for the proposed Mohawk Drive roadway between Bunny Trail and Castle Gap Drive. Traffic counts will be collected as documented below:
 - 24-hour tube counts will be collected at the following locations to determine the daily volumes:
 - a. Bunny Trail between Privet Dr and Rockwall Dr
 - b. Bunny Creek Drive, north of Monague County Drive

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- 12-hour turning movement volumes will be gathered (7:00 AM – 7:00 PM) at the following intersections:
 - a. Bunny Trail at Breeder Ln/Alamocitos Creek Dr
 - b. Bunny Trail at Privet Drive
 - c. Bunny Trail at Rockwall Drive

Notes:

- i. The collection of the traffic data will be subcontracted and will be billed as a Direct Expense, and as such, is not included in the fee. An estimated budget amount of \$3,800.00 is anticipated for the traffic data collection listed above.*
- Traffic Operational Analysis will be performed for existing and future build conditions. Traffic volumes for existing conditions will be based on collected traffic counts and traffic volume projections will be developed for future conditions based on expected growth rate and future developments (if any).
- The traffic study analysis, findings and recommendations and the traffic counts and field data, along with our recommendations, will be summarized in a study report. If desired, a draft report will be submitted to the client for review and comment. Upon receipt of client comments, the report will be revised as appropriate and submitted to TxDOT and the City of Killeen. One (1) meeting with the City of Killeen is included in this scope to discuss our findings and to potentially speed the review process.

Notes:

- i. Traffic data collection to be billed as a direct expense, estimated at \$3,800*
- ii. Traffic data will be gathered at the discretion of the engineer.*
- iii. Traffic design services, or detailed pre-design analysis services, if needed, will be provided at an additional cost.*
- iv. It is presumed that no revisions to the study due to comments received by the client and/or reviewing agency will require additional data collection or analysis. If such is the case, an Additional Services Request (ASR) will be prepared outlining the additional tasks and associated fee.*
- v. The scope of work assumes one (1) 2-hour meeting with the City. If additional meetings are required, then that time will be billed on a time and materials basis.*

Deliverables:

- Traffic Operational Analysis Report

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THIS PROPOSAL ASSUMES AND/OR EXCLUDES THE FOLLOWING:

- ◆ *Any professional opinions or recommendations related to our scope of work shall be provided in written format on Pape-Dawson letterhead and not solely expressed verbally in meetings or as part of any demonstrative presentation or email discussions.*
- ◆ *Proposal assumes creek crossing requires multiple box culverts and not a bridge. An ASR for structural services will be required if H&H studies indicate that a bridge is required.*

SUMMARY OF SCOPE AND FEES

I.	Managing Contracted/Donated PE	FC 110 (110)	\$156,010.00
II.	Environmental Compliance	FC 120 (120)	\$29,540.00
III.	Subsurface Utility Engineering	FC 130 (130)	\$5,546.58
IV.	Geotechnical Services	FC 140 (140)	\$11,500.00
V.	Design Survey	FC 150 (150)	\$77,925.00
VI.	Roadway Design - Roadway	FC 160 (160)	\$301,400.00
VII.	Roadway Design – Storm Drain	FC 160 (161)	\$258,920.00
VIII.	Roadway Design – Signing, Pavement Markings and Signalization	FC 160 (162)	\$40,160.00
IX.	Roadway Design – Miscellaneous (Roadway)	FC 160 (163)	\$224,080.00
X.	Drainage Study	FC 170 (170)	\$140,910.00
XI.	Utility Design	FC 180 (180)	\$119,810.00
XII.	Traffic Study	FC 190 (190)	\$ 26,540.00
XIII.	Direct Expenses and Unit Cost Expenses		\$25,300.00
Total:			\$1,417,641.58

BASIS OF COMPENSATION

Pape-Dawson's compensation for the above services shown as hourly, allowance or Time and Materials (T&M) will be a charge on an as needed basis for personnel services plus an hourly charge for specialized equipment. Pape-Dawson's compensation for the other above services will be a lump sum fee. A budget of **\$1,417,641.58** is the estimated cost of Pape-Dawson's current understanding of the services identified above. This budget figure does include any Direct Expenses (defined below) or applicable sales tax on services. If this budget figure is exceeded, PapeDawson may request modification of this Agreement.

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AGREEMENT

The attached Terms and Conditions set out as Attachment A are incorporated into this Proposal by reference and become part of the agreement between the Client and Engineer by execution of this document. If the terms of this Proposal are acceptable, please acknowledge such by signing below and returning the executed document to us via e-mail or US Mail for our records. Receipt of the executed Proposal serves as authorization for us to proceed with the work.

The costs, fees, budget, and scope of work set out herein are valid for ninety (90) days from the date of this Proposal. If Pape-Dawson does not receive an executed Proposal from the Client within ninety (90) days from the date of this Proposal, the costs, fees, budget, and scope of work are subject to revision at Pape-Dawson's sole discretion. Pape-Dawson to provide a revised Proposal with the modified costs, budget, and scope of work should revisions be made.

We appreciate the opportunity to work with you on this project.

Sincerely,
Pape-Dawson Consulting Engineers, ILLC



Brian Allen, P.E., CFM
Associate Vice President



Kevin Young, P.E.
Managing Principal, Central Texas

CITY OF KILLEEN

Signature: _____

Name: _____

Title: _____

Date: _____

CITY OF KILLEEN ACCOUNTS PAYABLE CONTACT INFO

Name: _____

Address: _____

Phone: _____

Email: _____

Attachments:

- Attachment A
- Attachment B
- Attachment C
- Attachment D

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