Ref. NEX-2300173.07

October 31, 2023

Mr. Marc J. Tisdelle, P.E., Town Engineer
Stoughton Town Hall
Engineering Department, 2nd floor
10 Pearl Street
Stoughton, MA 02072

SUBJECT: Turnpike Street and Central Street at Turnpike Street intersection
Design Services for TIP Construction

Dear Mr. Tisdelle:

As requested, ***Greenman-Pedersen, Inc. (GPI)*** is pleased to submit this original and one (1) copy of our Scope of Work to undertake the design services in accordance with MassDOT's Standards for developing construction documents for advertising under the state's TIP. The project has not yet received MassDOT PRC approval. In order to have the project programmed into the TIP, the town must first complete the PRC approval process and demonstrate the project is moving forward and have a preliminary design and construction estimate.

The project proposes to upgrade pedestrian and bicycle access along Turnpike Street and through the Central Street at Turnpike Street intersection. Since work will be undertaken at the Central at Turnpike Street intersection, it is likely and assumed for this contract that upgrades will also be required at that intersection. We initially estimate the construction fee for the project to be between $10,000,000-$15,000,000.

SECTION 1. – Scope of Services

The services to be provided for this Task Order are set forth in the attached MassDOT Standard Tasks - Scope of Services.

SECTION 2. – Schedule

The project is not yet programmed on the TIP. As a priority task, GPI will complete the field survey and base plan preparation (Task 303 and 304) in order to initiate the Project Development Phase. After the project has been programmed, GPI will develop a detailed design schedule for review by the Town and MassDOT.

SECTION 3. – Compensation

The hours and fee are outlined in detail on the attached Man Hour Estimate form. GPI has included efforts for an Environmental Notification Form (ENF) as well as a Design Exception Report (DER) should they be required as the design progresses. In addition, GPI will utilize sub-consultants for completion of the Construction Contract Time Determination (CTD) and geotechnical assistance.

The town shall pay the Consultant for the services outlined in the attached Scope of Services a fee not to exceed One Million Four Hundred One Thousand Four Hundred Forty-Four ($1,401,444) without authorization by Town. Payment shall be on a time and materials and expense basis at the standard billing rates of the applicable employee.

SECTION 4. – Acceptance

If this LOU meets with your approval, please sign, date and return one (1) copy to our office, to the attention of John Diaz

Very truly yours,

GREENMAN-PEDERSEN, INC.

By: _____

John W. Diaz, P.E.
Vice President/Director of Innovation

Date: 10/31/23

APPROVAL OF SCOPE OF SERVICES
TOWN OF STOUGHTON

By: _____

Marc J. Tisdelle, P.E.
Stoughton Town Engineer

Date: _____

By: _____

Procurement Officer

Date: _____

SCOPE OF SERVICES

This scope of services includes all phases of design including Project Development through Construction Engineering for the Intersection Improvements at Central Street at Turnpike Street and along Turnpike Street from Central Street to Campanelli Parkway in Stoughton, Massachusetts.

The project proposes to upgrade pedestrian and bicycle access along Turnpike Street and through the Central Street at Turnpike Street intersection. Since work will be undertaken at the Central at Turnpike Street intersection, it is likely and assumed for this contract that upgrades will also be required at that intersection.

The project will involve pavement milling & HMA overlay, full depth HMA construction, pedestrian and bicycle accommodations per MassDOT's Healthy Transportation Policy Directive, curbing, utility relocations, signage and pavement markings. With the installation of new sidewalks and curbing, the project will also require a substantial amount of work related to drainage and utility design within the limited project area.

The pavement rehabilitation will be based on subsurface investigation conducted by the Consultant and may be a combination of resurfacing and reconstruction as coordinated with the Pavement Design Section of MassDOT.

The project will attempt to comply with the Healthy Transportation Policy Directive (P-13-0001) to the fullest extent possible to allow all users access to safe and comfortable healthy transportation options in all the services provided. Sidewalks and wheelchair ramps shall be made compliant with ADA/AAB requirements. Improved pavement markings and traffic signs shall be evaluated as needed. The Consultant will work with MassDOT District 5 and Complete Streets Engineers to review alternatives for consideration.

In accordance with the Pre-25% Design Scoping Procedure, the following meetings and tasks are anticipated as part of this scope for Project Development (portions of text below are taken from the Controlling Criteria and Design Justification Process for MassDOT Highway Division Project Engineering Directive E-21-002):

1. Project Scoping Meeting with MassDOT and Town Officials to discuss the following:
    - Overview of existing conditions.
    - Review purpose and need and scope of work as approved by the Project Review Committee (PRC).
    - Identify any risks to pursuing scope as approved by PRC.
    - Obtain input for cross section(s) to accommodate all users, project limits and project scope; identify utility constraints, preliminary environmental permitting requirements, and design exceptions.
    - Determine data collection and conceptual analysis needs. Examples include draft design justification workbook, safety alternatives analysis, and typical section alternatives.

2. Data collection and development of conceptual designs:
   - Data will include crash data, traffic count data, UAS mapping.
   - Development of up to two (2) conceptual (10% level) designs with critical cross sections, roll plan and preliminary profile views. Concepts are assumed to include a roundabout as well as a traffic signal. Roundabout Measurement of Performance diagrams will be developed for the roundabout alternative which includes:
     - Fastest Path Analysis
     - Design Vehicle Turn Path Diagrams
     - Intersection Sight Distance Diagrams
   - Preparation of a draft Design Justification Workbook (DJW) for each ICE Stage two alternative to identify potential design exceptions.
   - Intersection Control Evaluation (ICE) will be conducted.
     - Assuming stage two will be needed.
   - Preparation of a preliminary project cost estimate for each alternative.
   - Preparation of a preliminary design schedule using the schedule template.
   - Preparation of a preliminary ROW impact summary for each alternative.

3. Two (2) Pre-25% Over the Shoulder (OTS) review/meetings to confirm the scope and cross section:
   - It is anticipated that two (2) OTS meetings will be required to evaluate the two different intersection concepts and provide input for design refinement. Upon completion of the second OTS meeting, resubmit concepts for final approval to proceed to Public Outreach #1.
   - OTS review of the project purpose and need and scope as approved by PRC.
   - OTS review of the conceptual designs and the analysis including all items on the Project Scoping Checklist.
   - Prepare meeting minutes.

4. Public Outreach #1:
   - Schedule an in-person meeting with Town officials to review the concepts and solicit feedback. A virtual meeting option will be offered if it is not safe to do in-person per State (and Town) guidelines.
   - Schedule up to two (2) key stakeholder meetings to introduce the project and review the concepts.
   - Schedule one (1) meeting with the general public to review the concepts and solicit feedback.
   - Color plans and typical sections will be developed for the purposes of these meetings.
   - Depending on the scope of the alternatives, traffic simulation may be necessary for this public outreach in order to convey the anticipated operations. If requested by the Town, an amendment may be required for the simulation effort.

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Concept Refinement:

- The Consultant will work with MassDOT and Town staff to identify a preferred alternative based on the safety, operations, impacts, costs and feedback from the public.

5. Public Outreach #2:
   - Up to two (2) follow-up meetings with key stakeholders will be held to present the preferred alternative.
   - Up to two (2) follow-up meetings will be held with the public to present the preferred alternative to solicit final comments before entering the design stage.

After the preferred alternative has been selected, the Town and MassDOT will review it for conformance with the PRC approved project and determine next steps before proceeding to 25% design.

ASSUMPTIONS

1. The project limits are expected to extend approximately 500 ft along each of the eastbound, southbound and westbound approaches of the Central Street at Turnpike Street intersection. Work along the northbound Turnpike Street will extend approximately one (1) mile to the intersection of Campanelli Parkway. The focus of the project is to provide updated pedestrian and bike accommodations along Turnpike Street and through the intersection of Central Street.

2. Geotechnical Design will be provided by a Subconsultant as a direct expense and will include pavement cores for the proposed pavement design and subsurface investigation (borings) at proposed mast arm locations as required and the development of a Geotechnical Report.

3. Subsurface utility exploration (SUE) will be provided and will include Quality Level B information as required by MassDOT Engineering Directive E-21-005.

4. It is anticipated that sidewalks will be proposed on both sides of the road along Turnpike Street.

5. Traffic data collection is included as part of this scope/fee. Data will be collected through a Subconsultant as a direct expense. The following traffic data collection is anticipated:

   - 48 Hour Automatic Traffic Recorder (ATR) along Turnpike Street at two (2) locations (volume/speed/class).
   - 12 Hour (7am-7pm, mid-week) Turning Movement Counts (TMC's) at the intersection of Central Street at Turnpike Street.

6. The following additional services will be required: Pavement cores and test pits, preparation of the Construction Contract Time Determination, and Police Details required for pavement testing and soil borings.

7. Highway street lighting design is not anticipated to be required and is not included. It is assumed that lighting will be provided via cobra heads on existing utility poles or integral as part of the proposed mast arm assemblies. This will be coordinated as the design develops with the utility company and the Town of Stoughton as necessary.

SECTION 100 PROJECT DEVELOPMENT ENGINEERING

101 Project Concept Preparation (Development of Purpose and Need)

Prepare a general description and definition of the project. Visit site and conduct preliminary surveys.

As part of this task, one (1) site visit is anticipated to become familiar with the project location.

102 Preliminary Project Area Analysis

Prepare an overview that evaluates the project area in light of the project's purpose and need, including landscape impacts, to determine any additional studies that are beyond the Scope of Services that may be required. Also, examine planning any applicable criteria, degree of citizen and agency involvement and other issues and factors that may influence the design of the project provided by the Engineer.

Development of alternatives will require a clear understanding of the constraints, opportunities, and potential concerns of abutters. The existing intersection and project area will be evaluated during this phase to understand use of adjacent lands, and possible project constraints.

The anticipated meetings with Town Officials, MassDOT, key stakeholders, and the public accounted for under this task are described above in the Pre-25% Design Scoping procedure.

Meeting minutes will be prepared for record keeping of these events

103 Reasonable Alternative(s) Identification

Evaluate endorsed alternatives that meet the project's purpose and need to determine, if they are feasible and reasonable.

Preliminary cross sections will be explored in coordination with the Town and MassDOT, to include up to two (2) alternatives for the improvements of the intersection and/or corridor. Alternatives will consider geometry and operational improvements, impacts to abutting properties,

and healthy transportation opportunities. This task includes the development of these concepts to include conceptual plans and typical sections. It is anticipated that one signalized configuration will be explored in addition to a roundabout configuration. The preliminary concepts will be submitted to the Town and MassDOT for review and input prior to the first Pre-25% OTS review meeting.

104 Alternatives Analysis and Report Preparation

Select engineering and environmental solutions to accomplish the project's purpose and need and prepare a report that presents all findings. The written evaluation of alternatives shall include a description of the alternatives, a comparison of the advantages and disadvantages of each alternative, and supporting data for the conclusions. Those alternatives that are eliminated from further study shall be graphically illustrated and should be accompanied by descriptions of the locations with statements as to why further consideration is not warranted.

The deliverable will be developed by GPI and provided to the Town and MassDOT for review and comment prior to finalizing. The deliverable is anticipated to include the following:

- *Conceptual Plan of the preferred alternative. Measurement of performance diagrams will be provided if a roundabout alternative is advanced.*
- *Intersection Control Evaluation (ICE) report with supporting documents which includes:*
    - *Design Volume Diagrams*
    - *Concept Plans for the other alternatives evaluated in ICE Stage 2*
    - *Traffic operation reports for Opening and Design year for ICE Stage 2 alternatives*
    - *Collison Diagram (if required)*
    - *Highway Safety Analysis, consistent with the procedures outlined in MassDOT Safety Analysis Guide, dated 7/24/20 for ICE Stage 2*
    - *Preliminary Construction Cost Estimate for ICE Stage 2*

Two (2) Pre-25% OTS meetings with the Town and MassDOT are expected to review the conceptual design and solicit feedback. The first OTS meeting is intended to procure feedback on the initial concepts and identify potential modifications or other alternatives to investigate. At the second OTS meeting, the revised concepts with the draft ICE stage two supporting documents will be evaluated. Those documents will be submitted to the Town and MassDOT for review and input before the second Pre-25% OTS.

One (1) public informational meeting to discuss the conceptual alternatives and to solicit feedback.

The following will also be evaluated for each alternative investigated in ICE Stage two.

- *Design Justification Workbook – Potential design waivers for each alternative reviewed will be presented. Since the design will be only at a 10% level, the list of potential design waivers may not be all-inclusive.*
- *Utility Relocations – Planning level assessment of utility relocations will be conducted to understand potential impacts.*
- *Preliminary Construction Cost – As part of the ICE Stage two assessment, a conceptual-level project estimate will be developed for each alternative. This will be a non-itemized estimate with appropriate contingencies.*
- *Right-of-Way – A preliminary summary of right-of-way impacts will be provided for each of the proposed alternatives.*

105 Project Design Schedule Development and Monthly Updates

Develop and submit for approval a project design schedule in accordance with the requirements of Division I, Section 4.01 as amended by the language included above.

SECTION 150 ENVIRONMENTAL

The Consultant shall meet all the requirements of both the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA) for the purpose of implementing the Proposed Project and produce any and all documents required for submittal under each/either act(s) (the "Environmental Document(s)"). The MassDOT Environmental Services Division should be consulted regarding NEPA and MEPA requirements.

151 Early Environmental Coordination Design Submission Checklist

Complete the 25% Design Submission Checklist Early Environmental Coordination for Design Projects. This involves ensuring that coordinating with local, regional, state, and federal resource agency staff has been completed. This effort provides project stakeholders with an opportunity to comment on the presence of environmental resources in the project area, their extent and potential significance. Documentation that an adequate level of consideration has been made to avoid and minimize impacts to identified environmental resources shall be presented; completion of the early coordination requirements ensures necessary deliverables (CE, WQDF, etc) have been prepared and design plans are adequate for environmental review. Written responses are required for each item, and supporting documentation must be included.

152 Historic/Archaeology – Federal Section 106 and State Chapter 254

Provide information in accordance with the requirements of Section 2.4.2.5, *Environmental Requirements for Preliminary (25 Percent) Design Submission* of the *Project Development & Design Guide* as itemized in the 25% Design Submission Checklist Early Environmental Coordination for Design Projects. Check the MassDOT Highway Division website for the most

recent version of the checklist, a template for the standard local historic commission/tribal historic preservation officer solicitation letter; and an updated contact/address list. Be available to meet with MassDOT's Cultural Resource Unit (CRU) staff, and with local and state historical commission representatives, as agreed upon between MassDOT and the Consultant.

153 Reserved

No effort is anticipated.

154 Hazardous Materials Research/Review

Provide information generated in accordance with the requirements of Section 2.4.2.5, *Environmental Requirements for Preliminary (25 Percent) Design Submission* of the *Project Development & Design Guide* to the MassDOT Hazardous Materials Unit during its review. Also include responses to comments from local and state agencies and attendance meetings, as agreed upon between MassDOT and the Consultant.

155 Project Development Meetings and Public Hearings

Prepare for and hold public meetings and public hearing(s) as agreed upon by MassDOT and the Consultant.

156 National Environmental Policy Act / Massachusetts Environmental Policy Act (NEPA/MEPA) Determination

Determine the appropriate level of documentation in the NEPA process (Categorical Exclusion, Environmental Assessment (EA) or Environmental Impact Statement (EIS)) and the MEPA process (Environmental Notification Form (ENF) or Environmental Impact Report (EIR)) by meeting and coordinating early with MassDOT, FHWA and other government agencies, local boards and commissions, and conducting public meetings, as agreed upon in the Scope of Services.

157 NEPA – Categorical Exclusion (CE)

Prepare a Categorical Exclusion (CE) Determination Checklist for Federal-Aid Actions in accordance with the *Programmatic Agreement For Approval Of Categorical Exclusions Between The Federal Highway Administration And The Massachusetts Highway Department*, dated May 17, 2005, and Federal Highway Administration Regulation 23 CFR § 771.117 (1987).

Typically, the NEPA and MEPA Environmental Documents for major projects are prepared jointly, that is, as either an EA/EIR or as an EIS/EIR. In some cases, the NEPA and MEPA documents are prepared and processed separately. The Consultant shall perform the tasks described in Sections 155 through 158 and 161 through 163, as agreed upon by MassDOT and the Consultant.

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158 NEPA – Environmental Assessment (EA)

Not anticipated

159 NEPA – Draft Environmental Impact Statement (EIS)

Not anticipated

160 NEPA – Final Environmental Impact Statement (EIS)

Not anticipated

161 NEPA Supplemental Environmental Impact Statement (EIS)

Not anticipated

162 NEPA Reevaluation

Not anticipated

163 MEPA – Environmental Notification Form (ENF)

The preparation of an ENF is not anticipated given the context of the project location. It should be noted that the Consultant is required to prepare an EECR, CE Checklist and Water Quality Data Form, as necessary. Wetland permitting is not included in this scope or fee.

164 MEPA – Draft Environmental Impact Report (DEIR)

Not anticipated

165 MEPA – Final Environmental Impact Report (FEIR)

Not anticipated

166 MEPA Notice of Project Change

Not anticipated

167 MEPA Supplemental Environmental Impact Report

Not anticipated

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168 Reserved

Not anticipated

169 Reserved

Not anticipated

170 USACE Section 404 General Permit (PGP)

Not anticipated

171 USACE Individual Section 404 Permit

Not anticipated

172 U.S. Coast Guard Bridge (USCG) Permit
Not anticipated

173 Programmatic Section 4(f) Evaluation

Not anticipated

174 Draft Individual Section 4(f) Evaluation

Not anticipated

175 Final Individual Section 4(f) Evaluation

Not anticipated

176 Wetland Resource Area Delineation

Not anticipated

177 WPA Abbreviated Notice of Resource Area Determination (ANRAD)

Not anticipated

178 WPA Request for Determination of Applicability (RDA)

Not anticipated

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179 WPA Notice of Intent (NOI)

Not anticipated

180 WPA Variance

Not anticipated

181 Chapter 91 License/Permit Application

Not anticipated

182 Water Quality Certification

Not anticipated

183 Coastal Zone Management Consistency Review

Not anticipated

184 Wildlife/Rare Species Assessment

Not anticipated

185 Essential Fish Habitat Assessment

Not anticipated

186 Reserved

Not anticipated

187 Impaired Waterbody Assessment and Water Quality Data Form

Determine if there are Impaired Waterbodies, as evaluated per the requirements of Section 303(d) of the Federal Clean Water Act, affected by highway runoff generated in the project area by completing the 25% Design portion of the Water Quality Data Form. Document the incorporation of Best Management Practices (BMPs) in the stormwater management system by completing the 75% Design portion of the Water Quality Data Form.

SECTION 200 FUNCTIONAL DESIGN REPORT

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A Functional Design Report documents the process for determining the preferred alternative and the parameters for design. Refer to the *Project Development Guide*, Section 2.2.1 for more information concerning Project Planning Reports. Also, refer to the Traffic and Safety Engineering 25% Design Submission Guidelines.

201 Establish Purpose and Need

Establish purpose and need statement of the project.

202 Public and Agency Outreach

Conduct public and agency outreach for the project to ensure that the project meets its intended purpose, benefits from the input and feedback from interested citizens, local and regional groups, and elected officials, and maintain strong support. General public outreach guidelines and tools are described in Section 2.9 of MassDOT *Project Development and Design Guide*.

203 Evaluate Existing Conditions / Context

Provide a narrative of the existing study area including lane configurations, key dimensions, design speed, posted speed, Speed Regulations, functional classification, environmental constraints, Roadway context, roadway users, etc. Include a project locus map.

204 Prepare Traffic Volumes

Coordinate the procurement of the appropriate traffic counts for the study area and provide an assessment of data to determine factors for background growth and seasonal adjustments. Prepare the future design volumes.

205 Conduct Safety Analysis

Collect, tabulate, and analyze the crash data and document trends and causes. Prepare crash rate work sheets, collision diagrams, collision mapping as required. Review safety with respect to the Safety Review Prompt List or conduct a Road Safety Audit based on HSIP eligibility.

206 Evaluate Signal Warrants

Collect, tabulate, and analyze traffic count data with respect to the MUTCD Traffic Control Signal Needs (Warrants) based on the existing geometric conditions to determine if signals are justified.

207 Operational Analysis for Existing Conditions

Determine Peak-Hour Factor, Truck Percentage, and applicability of pedestrian phasing. Determine, tabulate, and discuss Level of Service, volume-to-capacity ratio and vehicle delays in accordance with MassDOT's A Guide on Traffic Analysis Tools and average and 95th percentile Queue calculations. Analyze Existing Traffic Volumes (No Build). Perform Systems Analysis for closely spaced and/or coordinated systems. Perform operational analysis for the following roadway components:

Roundabout
Signalized Intersection

Present LOS results graphically.

208 Establishment of Basic Design Controls and Evaluation Criteria

Establish basic design controls such as:

Roadway Context
Roadway Users
Transportation Demand
Measure of Effectiveness
Design Speed
Sight Distance

Establish evaluation criteria for accessing each alternative.

209 Development of Alternatives

Provide a discussion of alternatives considered. Alternatives should be developed using the design guidance provided in the MassDOT *Project Development and Design Guide*. Develop alternatives to comparable levels and present in an evaluation matrix.

210 Operational Analysis for Future Conditions

Analyze Future Traffic Volumes (in both No-Build and Build). Where volume and geometric conditions allow, evaluate roundabout alternative in addition to traditional intersection design. Perform Systems Analysis for closely spaced and/or coordinated systems. Perform operational analysis for the following roadway components:

Signalized Intersections
Roundabout

Present LOS results graphically.

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211 Preferred Alternative

Provide a detail description and graphical presentation of the preferred alternative. Include a discussion how selections of the following were made.

Typical Sections
Horizontal and vertical alignment
Clear Zone
Bicycle / Pedestrian accommodation
ROW impacts / Mitigations
Environmental impacts / mitigations
Safety Improvements

212 Complete Streets

Document how the project addresses bicycle and pedestrian accommodation in accordance with Complete Streets policies and the principles of the *Project Development and Design Guide* and associated Engineering Directives. Address desirable accommodation parameters and the context and impacts associated with the selection of the project cross-section.

213 GreenDOT

Document how the project addresses the three primary goals of the GreenDOT Policy Directive, P-10-002.

214 Traffic Management

Prepare a Construction Management Outline providing a description of all major construction components of the project and how vehicle, pedestrian, and bicycle accommodations will be maintained.

215 Construction Cost

Provide an estimated construction cost.

216 Conclusion and Recommendation

Provide a conclusion and recommendation.

217 Report Preparation

Prepare a report detailing the various design alternatives with appropriate graphics, descriptive text and cost estimates justifying the recommendations presented.

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SECTION 220 DESIGN JUSTIFICATION WORKBOOK

The Federal Highway Administration (FHWA) has established 10 controlling criteria as defined in 23 CFR 625, which must be adhered to when designing a roadway improvement project. MassDOT has adopted this policy and applies the requirements of 23 CFR 625 to all projects regardless of funding source, and has added 4 additional controlling criteria. Chapter 2, Section 2.11 of the *Project Development and Design Guide* (Guidebook) and Engineering Directive E-20-001 describes the Design Justification Process in detail.

The Design Justification Workbook standardizes the preparation of Design Justifications and streamlines MassDOT's review process. The Design Justification Workbook should follow the workbook template available on mass.gov.

221 Evaluate the Controlling Criteria

Compare the recommended values of the controlling criteria of Chapter 2 of the Guidebook and E-20-001 to the proposed values. Revisit those features that do not meet the recommended values and work toward developing a design that is consistent with current recommended design standards.

222 Perform Incremental Evaluation

For each of the controlling criteria that do not meet the current recommended design criteria, prepare the additional documentation as noted in the workbook template. This documentation should include a discussion of alternatives evaluated and an incremental comparison of impacts and costs associated with each alternative.

223 Complete and Certify the Workbook

Complete the Design Justification Workbook by including a project description, executive summary, and all supplemental information as noted in the workbook template. Stamp and certify the Design Justification Workbook.

SECTION 230 INTERCHANGE JUSTIFICATION/ MODIFICATION REPORT (IJR/IMR)

Not anticipated

SECTION 300 25% HIGHWAY DESIGN SUBMISSION

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The survey and mapping limits for this intersection improvement project will extend 1000 feet in each direction along Central Street at the intersection with Turnpike Street. Turnpike Street limits will be from 1,000 ft north of Central Street to the intersection of Campanelli Parkway (Approximately 1 mile). The width of the survey shall extend approximately 25 feet beyond the right-of-way and include the face of all abutting buildings or up to the nearest physical obstruction (walls, fences, etc.).

All topographic information will be collected via Terrestrial LiDAR supplemented with conventional survey where needed. Overall, multiple methods of survey will be used to acquire the necessary existing conditions information in order to create the standardized MassDOT survey submittal. GPI will provide pairs of NAD 83 (2011-Epoch 2010.00) / NAVD 88 RTK-GPS control points to be used as primary control for the project and shall densify the project control by traverse and differential leveling as needed for the required remote sensing and ground survey services. All survey notes, including control point tie sketches, shall be kept in survey field notebooks which will be provided upon completion of the survey

301 Project Initiation and Data Compilation

Compile and review all available documents of existing features and planned projects in the vicinity of the proposed work. Included, as part of this task, is the investigation of utility installations, previous subsurface explorations, traffic data, and right of way research.

Invert Inventory

GPI will locate and document all drainage infrastructures within the project limits via the LiDAR data or traditional survey methods (where obscured by parked vehicles). All accessible drainage and sewer structures will have invert data, pipe size and material type collected. It is assumed that all structures are clean and free of sediment and/or debris. No employee of GPI will break the plane of any structures' rim, therefore confined space will not be required. If entry into a structure is required to gather pipe size, location and material an additional fee per structure will be added to this project with prior approval from the Client. This fee will include personnel, safety gear and additional survey equipment. All inaccessible structures will be located but no invert data will be collected. All information will be documented and transferred to the survey base plans.

302 Utility Coordination

Contact utility companies to verify locations of existing utilities and to assess impacts to those facilities. Ensure that the proposed design addresses impacts associated with accommodating both existing and proposed utilities. Provide a list of utility companies that may be affected by the proposed work, as part of the 25% submission.

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Contact and coordination with utility companies to compile record information within the project's limits and transfer record utility information to CAD base plans, on appropriate layers, for use in design. All fees charged by the utility companies for records will be passed on as a direct expense, which could be more than that allotted in the scope. GPI cannot control how responsive the utility companies are and will not be held accountable if there is a delay due to the utility companies.

Subsurface Utility Engineering (SUE) Level B will be performed in accordance with Engineering Directive E-21-005*. Subsurface geophysical methods that will be employed include ground penetrating radar (GPR) and electromagnetic precision underground locating equipment (PUL). Available access covers and manholes within the project limits will be opened and depth to outgoing/incoming pipes/ducts will be noted. GPR traverses and found utilities will be measured/surveyed from known reference points or control points to properly locate the subsurface utility information on the survey base plans.*

303 Survey Coordination and Controls

Survey Control and Boundary Retracement - *Pairs of horizontal and vertical control will be established by GPI at various locations throughout the project as previously noted. GPI will then establish the main line traverse from the primary control pairs and establish project control to check that there is adequate coverage for use in data acquisition, processing and boundary retracements. These traverse points will be set via traditional survey methods (double angles and digitally leveled) and will close upon the pairs of primary control. Any vertical MassDOT geodetic Control points throughout the project limits will be tied into the traverse and elevation network. Pairs of main line traverse points will be sketched and referenced to three (3) physical objects for future recovery. The survey point will be either a magnetic PK nail, drill hole or rebar and cap.*

Terrestrial LiDAR - *The acquired Terrestrial LiDAR data will be processed and transformed onto the project control points and validated. A quality report of the processing will be provided.*

Supplemental Survey - *GPI will supplement the Terrestrial LiDAR with conventional survey methods in all obscured areas.*

Point Cloud - *The processed scan data will create a complete 3D scene from which the mapping data will be manual extracted (survey within the 3D environment). The data extraction will be performed using a combination of software and ultimately brought into AutoCAD Civil 3D for creation of the survey base plans. The final point cloud will be available to the CLIENT upon request.*

304 Base Plans, Profiles and Typical Sections

Perform field review of base plan information. Verify the location of existing features, note legends on all warning, regulatory and route marker signs. Verify that the plans provide sufficient information regarding existing drainage and sewer systems. Verify that the cross sections include existing features such as walls, hydrants, poles, trees, sills, wells, ledge, layout lines, etc. Verify that profiles include station equations, cross culverts, bridge structures, sills, high-tension lines, benchmarks, etc.

Planimetric features, along with spot elevations will be collected in accordance with the MassDOT Field Survey Guidelines and Baseplan Requirements for Survey and Design Consultants. All permanent physical features at the time of data acquisition will be mapped. In the event that there is overlay or paving activities after the date of data acquisition, the mapping accuracies specified for this survey deliverable will no longer apply within those areas. Points and breaklines will be collected to adequately depict the true shape of the terrain.

305 Field Reconnaissance

Perform site investigations to observe the general site conditions, traffic patterns, traffic management, potential detour routes, wetland and cultural resources and other relevant features. Take photographs and/or video existing facility and surrounding environment.

GPI will perform up to four (4) site visits. These site visits include those required under the 2020 MassDOT ROW Guidelines to check for accuracy of the survey basemap.

306 Plot Existing Layout Lines

Plot and calculate all existing layout line geometry and note all property owners.

GPI will compile all Layout and Baseline information and all associated side street layouts within project limits. Research will be performed at the registry of deeds, city/town halls and MassDOT for record layout baseline and owner information. Calculate and plot all existing layout, record baseline, approximate property lines with record frontages and owner information to CAD.

307 Meetings and Liaison

Attend coordination meetings, as scoped with MassDOT, the community, utility-owners, local commissions and others. Prepare and distribute minutes of the meeting.

GPI will attend up to two (2) coordination meetings. A colorized roll plan will also be prepared.

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308 Determine Roadway Cross Section

Determine the proposed roadway cross section based on functional classification, traffic volumes, local environmental and cultural resources and the Guidebook. For Non-NHS bridge projects refer to Engineering Directive P-92-010.

309 Preliminary Horizontal Geometry

Develop horizontal geometry based on the proposed cross section, horizontal clearances, the proposed design speed and functional classification. Develop horizontal roadway geometry at intersections.

310 Preliminary Vertical Geometry

Develop vertical geometry based on the proposed design speed giving consideration to drainage, vertical clearances, construction cost and the interfacing with the proposed horizontal geometry.

311 Cross Section Studies

Conduct iterative horizontal and vertical geometry refinements for critical cross sections based on the interface with the proposed roadway cross-section and existing features.

312 Prepare Cross Sections

Prepare cross sections to determine the tops and bottoms of slope. Evaluate the impacts to resource areas, the need for retaining walls and determine the limits of work at driveways.

313 Plot Proposed Layout and Easements

Plot proposed alterations to existing layouts and proposed permanent or temporary easements and rights of entry, based on the limits of work determined by the cross sections.

314 Pavement Design

Prepare a pavement design in accordance with the Guidebook for review by MassDOT. Perform pavement cores, prepare pavement design checklist, determine DBR value, and assemble traffic data.

Pavement cores will be performed by a Subconsultant.

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315 Typical Sections

Prepare representative typical sections for mainline, ramps and secondary roadways. Label the location of roadway crown line; describe the method of banking, guardrail location, pavement structure and material types in accordance with Standard Nomenclature and Materials Specifications.

316 Construction Details

Provide details of key features not satisfactorily described in the *Construction and Traffic Standard Details*. Key details shall include the labeling of key materials in accordance with the Standard Nomenclature and Materials Specifications.

317 Hydrological Studies and Hydraulics Report

Not anticipated

318 Preliminary Drainage and Utility Studies

Investigate project impacts on existing surface and closed drainage systems. Evaluate hydraulics and structural adequacy of existing culverts. Establish preliminary limits of proposed open and closed drainage system improvements and outlet locations.

319 Lane Configurations

Assess travel lane configurations at intersections and at weaving and merging sections to establish traffic requirements/capacities.

320 Traffic Signals

Prepare signal plans depicting signal head type, quantity, and location. and include the sequence and timing chart and preferential phasing diagram. Additional guidance regarding the Traffic related details required for the 25% Design Submission is described in the Traffic and Safety Engineering 25% Design Submission Guidelines.

321 Signs and Pavement Markings

Prepare preliminary sign and pavement marking plan to document changes associated with conceptual design.

322 Traffic Management

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Develop a general methodology for constructing the proposed project to minimize the impact to all facility users and abutters, while at the same time addressing construction costs and constructability. Prepare preliminary temporary traffic control plans. The preparation of these plans should include a preliminary estimate that takes into account the use of police and/or flaggers to be used for traffic control.

It is assumed typical details will be sufficient for 25% traffic management.

323 Landscape Plan

Prepare an initial Landscape Plan identifying tree removals and tree protection and areas proposed to receive grass cover/lawn, plantings, and applicable details.

324 Constructability Review

Review the proposed project to ensure that the project does not present unusual matters that would unduly increase the cost the project or present potential scheduling delays during construction resulting in claims for extra work. Particular attention must be given to the proposed construction staging and available right of way.

325 Quality Control (QC) Review

Perform review of the quality and accuracy of the documents to ensure that key aspects of the information to be presented to MassDOT are prepared in accordance with the *Guidebook*, the *Standard Specifications for Highways and Bridges* and the most recent Supplemental Specifications, Standard Nomenclature and Engineering Directives. Particular attention is directed to Chapter 2 of Guidebook for the 25% submission requirements. The design should also be reviewed for conformity to design standards. Deviations from the controlling criteria defined in Chapter 2 of the Guidebook and in E-20-001 must be documented under Section 220, Design Justification Workbook.

326 Preliminary Construction Estimate

Prepare a preliminary cost estimate using MassDOT's Weighted Average Bid Application (WABA). The estimate should be prepared with a level of detail commensurate with a 25% submittal. Refer to Chapter 2 of the Guidebook for the 25% cost estimating requirements.

327 Submission Checklists

Prepare and submit the 25% Highway Design and Traffic Checklists.

328 Modifications and Revisions

Revise the plans accordingly, prior to scheduling the public hearing, in order to properly present the nature and extent of the project to the public at the hearing.

329 Value Engineering (VE)

Not anticipated

330 Construction Contract Time Determination

At the 25% design stage the designer must provide the project manager with the anticipated construction duration. This preliminary duration shall be determined based on the know scope of work, outcomes of early utility coordination, current proposed staging and anticipated traffic management plan. A full Construction Contract Time Determination (CCTD) performed by a Scheduler is not required until the 75% design and beyond.

331 Incentives/Disincentives

Not anticipated

SECTION 350 DESIGN PUBLIC HEARING

351 Hearing Preparation

Prepare the graphics and other visual aids per the negotiated scope of services to display at the public hearing. Prepare a public hearing handout.

GPI will prepare a colored rendered plan and perspective plans consisting of before and after images taken from approximately three (3) locations. GPI will work with MassDOT's public engagement group to prepare presentation slides, meeting scripts, conceptual renderings, and will participate in rehearsals in preparation for the design public hearing.

352 Design Public Hearing

Attend Design Public Hearing, present the project to the public and respond to questions. Assist MassDOT in preparing written responses to letters received from concerned individuals as a result of the hearing.

SECTION 400 75% HIGHWAY DESIGN SUBMISSION

401 Response to 25% Comments

Prepare a formal written response to all comments received regarding the 25% review and address revisions stemming from the Design Public Hearing that MassDOT and the Consultant deem necessary.

402 Field Reconnaissance

Conduct a field review of the proposed project interface with adjacent properties, streets, drives, drainage, utilities, wetlands, etc. Define additional survey needs, if needed.

403 Meetings Liaison and Coordination

Attend meetings and provide the liaison necessary to advance the design of a project. Coordinate and attend meetings with MassDOT's Boston and District Offices, community representatives, planning agencies, as determined in the project scoping process. Provide MassDOT with minutes of the meetings.

404 Utility Coordination

Contact utility companies affected by the proposed work. Discuss project impacts and note the locations of relocated utilities (poles, pipes, etc.) on the plans. Include estimate and special provisions for publicly owned utility work that is to be performed by the construction contractor.

405 Final Horizontal Design Geometrics

Adjust the horizontal geometry based on the 25% review comments and comments stemming from the Design Public Hearing. Plans must clearly show all aspects of the horizontal geometry, including curve components such as Point of Curvature (PC), Radius (R), DELTA, Length of Curve (L), Tangent (T) and Point of Tangency (PT) along with a description of roadway widths, station equations and horizontal offsets between survey baseline and design centerline.

406 Final Vertical Design Geometrics

Adjust vertical geometry based on 25% review comments and comments stemming from the Design Public Hearing. Plans must clearly show all pertinent aspects of the vertical geometry including Stopping Sight Distance (SSD), Passing Sight Distance (PSD), Grade 1 (G1), Grade 2 (G2), Length of Vertical Curve (L), K (factor), station and elevation of Point of Vertical Curvature (PVC), Point of Vertical Tangency (PVT) and Point of Vertical Intersection (PVI). Profiles are to be prepared in accordance with the Guidebook.

407 Pavement Design

Respond to Pavement Design Engineer's review comments and prepare a detailed pavement design with updated data sheets, per the Guidebook.

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408 Typical Cross Sections

Finalize the typical cross sections ensuring that materials and dimensions are clearly labeled in accordance with the proposed pavement structure approved by the Pavement Management Section.

409 Plot Cross Sections

Adjust cross sections to ensure that the slope limits and treatments of each cross section are crafted to suit the specific site locations. Individual cross sections should be evaluated regarding guardrail locations, gravel box detail, pay limits, and the need for subdrains and retaining walls.

410 Plot Proposed Layout and Easements

Adjust the plans based on the limits establish by the final cross sections to ensure that adequate right of way is available to perform the work. Existing layout lines, proposed alterations and any temporary or permanent easements must be clearly labeled.

411 Construction Plans

Prepare the Construction Plans in accordance with the Guidebook. Each item of work within the project limits must be clearly labeled. Drawings must be formatted as described in the Guidebook.

412 Grading and Tie Plans

Prepare grading and tie plans as applicable showing detailed information regarding proposed curve geometry and grades.

413 Drainage and Water Supply Details

Clearly show all existing and proposed drainage and water supply installations. The drainage and water supply design must address all work required to accommodate the proposed roadway improvements. During the Project's design development, the plan presentation of proposed drainage facilities will show rim and invert elevations. These will be included in a separate CADD layer, so that they can be frozen off in the PS&E documents. These elevations shall not be shown on the final plans.

414 Traffic Signs

Identify locations for all warning, regulatory and route marker signs. Indicate on the construction plans the status of existing sign structures.

415 Guide Sign Design and Overhead Directional (OD) Elevations

Indicate proposed locations of all ground mounted and overhead guide signs. Develop panel legends and calculate size. Prepare a Sign Summary Sheet. Design support foundations and include calculations. Draft guide sign details and overhead sign elevations.

416 Traffic Signals and Plan Preparation

Include designs for traffic signal installations, supports, and foundations. Develop traffic signal specifications. Finalize phasing details and prepare the traffic signal plans.

417 Pavement Markings and Plan Preparation

Design and layout the roadway pavement markings, stop lines, cross walks, gore markings, etc. Prepare pavement marking plans.

418 Traffic Management

Finalize the construction staging. Prepare the temporary traffic control construction plans in accordance with the MUTCD such that sufficient information is provided to demonstrate a feasible means of constructing the project. The level of detail shall recognize that the actual traffic management plan implemented by the contractor may vary from that shown on the plans. A more definitive estimate for the use of police/flaggers will be made based on the finalization of the traffic control plans/traffic management plans.

419 Highway Lighting Plans and Details

No effort is anticipated.

420 Landscaping and Plan Preparation

Finalize planting locations and species based on review comments. Develop planting schedules and tabulate relevant data.

421 Erosion Control

Detail the sequencing, material placement and measures to control the potential damage to adjacent properties, wetlands, bodies of water, etc. Include erosion control measures in the plans.

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422 Miscellaneous Contract Plans

Prepare miscellaneous full size drawings for presentation of the proposed project. These shall include the following miscellaneous contract plans, as required: Title Sheet, Index, Key Plan, Boring Plans, Boring Logs, Typical Sections, and Special Details.

423 Quantity & Cost Estimate (Weighted Average Bid Application)

Prepare a detailed estimate using MassDOT's Weighted Average Bid Application (WABA). Also prepare a calculation book based on the latest edition of the Standard Nomenclature. Check that every item of work shown on the plans has a pay item.

Provide tracking of significant changes (greater than 10%) since the 25% estimate.

424 Special Provisions

Prepare draft special provisions based on the latest edition of the Standard Specifications for Highways and Bridges and Supplemental Specifications, and verify that every item in the estimate that is listed in the Standard Nomenclature with an asterisk (*) has a special provision. Ensure that special provisions are drafted only when absolutely necessary to describe a specific or unique activity to be performed by the contractor.

425 Constructability and Quality Control (QC) Reviews

Perform an independent review of the project using an experienced engineer, who is not directly involved in the preparation of the contract documents. The review shall focus on the practicality of constructing the project based on access to site, equipment needs, material properties, etc. Also provide an overall review of the plans, specifications and estimate for conformity to the Guidebook, the Standard Specifications for Highways and Bridges, the latest Supplemental Specifications, the Bridge Manual, the Construction and Traffic Standard Details, and the latest Engineering and Policy Directives.

426 Submission Check List

Prepare and submit the 75% Design Check List.

427 Bottom Up Estimate and Reconciliation (if required)

No effort is anticipated.

428 Construction Contract Time Determination

The Consultant shall prepare the CCTD.

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This language applies to all Projects with Project Utility Coordination Form and/or Incentives/Disincentives.

The Consultant shall prepare a Construction Contract Time Determination (CCTD) Schedule which sets forth an estimate for a reasonable duration of the construction contract, utilizing the details of the estimate for all projects that involve a Project Utility Coordination Form or Incentives/Disincentives that MassDOT chooses to offer the Contractors.

The CCTD Schedules at the 75% (INITIAL), 100% (UPDATED) and PS&E (UPDATED) design stages provide MassDOT with a basis to determine whether the Construction Contract Duration represents a reasonable approach to constructing the Project, to allow constructability issues to be addressed prior to design completion, to assist the Consultant with the requirements to validate that the contract plans/documents support a constructible approach, and to assist MassDOT in the review of the Contractor's Baseline Schedule Submission.

The Consultant shall employ an experienced construction scheduler to prepare construction schedules at the 75%, 100% and PS&E design stages. The Scheduler must have a minimum of 5 years construction scheduling experience, and may be an employee of the Consultant.

a) Critical Path Method Scheduling

The CCTD Schedule shall use a Critical Path Method (CPM) and shall be developed and maintained using software approved by MassDOT (Primavera is preferred for consistency with MassDOT's construction specifications and master schedule). An evaluation of critical resources, shift differential, overtime, proposed methods, and all limitations of operations shall be included in the CCTD Schedule.

Based upon consultation with MassDOT the Consultant will be required to respond to any comments and update, explain or incorporate any MassDOT provided data, such as production factors, and/or revise the CCTD Schedule, as MassDOT determines necessary.

The Consultant shall submit a CCTD schedule following the 75%, 100% & PS&E submission of each construction cost estimate. The CCTD schedule submission will be due three (3) weeks after the construction cost estimates have been approved by MassDOT.

If required, the data from the bottoms up cost estimate for Lump Sum items (e.g., crews, equipment, production rates, quantities, construction sequence), must be used in the development of the CCTD Schedule. The Scheduler shall develop the logic (activity relationships) and activity durations using data from the estimate. Production rates and labor hours shall be used to develop reasonable crew hours based upon a reasonable crew composition. This evaluation shall also consider the intended construction sequence, construction seasons, and other construction time

related aspects, such as any requirements to relocate utilities and Incentive/Disincentive provisions.

b) Milestones and Access Restraints

The Consultant shall develop Contract Milestones and Access Restraints (to the Project site) including those identified to support the utility coordination developed as part of the Project Utilities Coordination Form and those needed to support the implementation of Incentives and Disincentives that should be included in the construction contract provisions, and shall include them in the CCTD schedule.

c) Limitations of Operations – Construction Constraints

The Consultant shall identify significant implications of construction constraints as may be determinable, and reflect them in the cost estimate and schedule, including, but not limited to restrictions from temperature, noise, vibration, permitting, approved materials, emergency response and community events, as part of the Project Utility Coordination form. The Consultant shall include all of the resulting PUC form information in their CCTD and shall provide MassDOT a furnished PUC form in the Contract Documents. This effort also includes the development of access restraints (restrictions that clearly define when the contractor can start work in a specific area allowing for the third-party Utility to complete their work) into the Contract Documents. The Consultant shall identify any early utility work, permitting or Right of Way activities that must be performed prior to the Contractor N.T.P. These early coordination activities shall be identified and included in the CCTD updates. If some construction activities are to be performed during the winter months (grouting of precast units; placing of closure pour slabs; etc.) make sure those tasks are identified and appropriate language is added to Subsections 8.03 and 8.10.

d) Elements

The Consultant shall include the following time (contract duration) related elements are included in the CCTD Schedule:

1) Preparation of a work plan and mobilization prior to starting physical work;
2) Preparation of critical submittals;
3) Review of critical submittals by the Consultant (MassDOT will provide standard submittal review durations to be used in the CCTD schedules);
4) Procurement/ordering of materials;
5) Fabrication and delivery of long-lead items;
6) Time necessary to complete each activity, as itemized in the Construction cost estimate;
7) Testing;
8) Commissioning (moveable drawbridges only);
9) Winter restrictions;
10) Environmental permitting or landowner restrictions;

11) Agency/utility/city restrictions;
12) Sequencing/logic required to complete the work;
13) Utility restraints and utility relocation milestones; and
14) Early/Critical coordination activities
    A. Early Utilities
    B. Remaining Right of Way
    C. Permits that the Contractor must obtain

e) Quality Control Procedures

The Consultant shall submit its Quality Control (QC) procedures for the performance of CCTD to MassDOT for review and approval prior to commencing work on the Project. As a minimum requirement, the Consultant shall detail the roles of each individual performing the planning schedule (utilization of estimating information, logic, durations, constructability, means-and-methods), and provide a description of how the schedule will be developed, monitored and approved by the Consultant.

429 Incentives/Disincentives with Road User Calculation

No effort is anticipated.

SECTION 450 100% HIGHWAY DESIGN SUBMISSION

451 Respond to 75% Comments

Prepare a formal written response to all comments received regarding the 75% review. Resolve any further review comments.

452 Finalize Plans

Prepare a set of plans addressing all comments received from the 75% review. Ensure that the plans are clear and are prepared in accordance with Chapter 2 of the Guidebook.

453 Finalize Special Provisions

Review the special provisions to ensure that the special provisions do not duplicate those with respect to Division I of the Standard Specifications. Review the Method of Measurement and Basis of Payment for every item in order to ensure that the special provisions are clearly defined and not ambiguous.

454 Finalize Quantity and Cost Estimate (W.A.B.A. & Calculation Book)

Prepare Detail Sheets, Quantity Sheets, and a Cost Summary Sheet. Finalize calculation book in accordance with Chapter 18 of the Guidebook. Prepare calculations for all items of work that have a pay item. Identify any non-participating work. The estimate submitted shall be prepared using MassDOT's Weighted Average Bid Application (WABA).

Provide tracking of significant changes (greater than 10%) since the 75% estimate.

455 Quality Control (QC) Review

Perform an independent review of the project using an experienced engineer, who is not directly involved in the preparation of the contract documents to perform an independent review of the project. Refer to the MassDOT web site for the latest edition of all reference documents, Engineering Directives and Policy Directives. Verify that the plans, specifications and estimate are prepared in accordance with these documents.

456 Submission Check List

Prepare and submit the 100% Highway Design Check List.

457 Bottom Up Estimate and Reconciliation (if required)

No effort is anticipated.

458 Construction Contract Time Determination

The Consultant will prepare the CCTD. Refer to Standard Task Description 428 (Construction Contract Time Determination) which details the effort involved in this task for the 75%, 100%, and PS&E Submissions.

459 Incentives/Disincentives

No effort is anticipated.

SECTION 500 RIGHT OF WAY

The Consultant shall prepare right of way plans as specified in the Guidebook and the Plan Preparation Guidelines for Consultants Preparing Right of Way Plans (dated February 2020), and as noted in applicable FHWA policies and regulations. Preliminary right-of-way plans shall be submitted prior to the 25 percent design approval and the public hearing.

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Right of way plans shall include all pertinent data affecting the costs of the right of way applicable for appraisal purposes, such as structures, access roads, improvements, landscaping, drainage, fences, cesspools, septic tanks, wells, property bounds, etc.

The size, form and arrangement of right of way plans shall conform to the general requirements for highway plans as specified in the Guidebook. The three main components of the Right of Way process are:

Preliminary Right of Way plans shall be prepared prior to holding the 25% Design Public Hearing. Existing data, details and all proposed work shall be prepared in such a manner as to be readily discernable. These plans shall remain in the preliminary stage until after the layout has been duly filed in the Registry of Deeds.

Right of way acquisition data shall be itemized by the Consultant on the preliminary right of way plans, as soon as the data is obtained. The Consultant shall, as required, provide MassDOT and the municipality with copies of the preliminary right of way plans for coordination and informational purposes, particularly as this may relate to changes in parcel dimensions or title names.

Deeds and plans of the abutting property owners shall be used to verify the location of all the abutter's property lines. Electronic copies of the research materials and any updates shall be maintained throughout the right of way process. All research materials are to be made available to MassDOT during the preparation of the Preliminary Right of Way Plans.

Final Right of Way plans are no longer required by MassDOT.

Relative to **Layout and Taking Plans and Orders of Taking,** the Consultant shall prepare and submit to the Municipality, and their Counsel, all the instruments which are required to be recorded in the Registry of Deeds in connection with the acquisition of any interest in real estate made necessary by the work to be performed under this Contract. These instruments shall consist of plans, descriptions and orders of taking for advance takings, alterations, layouts and/or easements. The preparation of these instruments shall conform to standard MassDOT and municipality practices. Drawings shall be plotted on polyester film. The title sheet of all plans to be recorded shall be signed and stamped with the seal of a Land Surveyor registered in the Commonwealth, who shall be in charge of the work.

Abutter's property lines shall be verified with updated deeds and plans. The Professional Land Surveyor shall maintain and update electronic copies of the research materials throughout the taking document process. All research materials are to be made available to MassDOT Highway Division during preparation of the Layout Plans and written instruments.

The Municipality shall handle the recording and filing of these instruments as well as the appraisal and settlement of all land damages, including negotiations with property owners.

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501 Preliminary Right of Way Plans

Review the relationship between the limits of work necessary to satisfactorily construct the proposed improvements and the existing layout. Determine appropriate limits of alterations to existing layouts, takings, permanent easements, temporary easements, etc. Prepare Preliminary Right of Way Plans in accordance with Chapter 18 of the *Guidebook* and the Plan Preparation Guidelines for Consultants Preparing Right of Way Plans (dated February 2020). The Right of Way Plans include Title Sheet, Typical Sections, Parcel Summary Sheet, Location Maps and Property Plan Sheets.

501 Preliminary Right of Way Plans

Review the relationship between the limits of work necessary to satisfactorily construct the proposed improvements and the existing layout. Determine appropriate limits of alterations to existing layouts, railroad sidelines, takings, permanent easements, temporary easements, etc. Prepare Preliminary Right of Way Plans in accordance with Chapter 18 of the *Guidebook*, the current versions of the MassDOT CAD Standard and the Plan Preparation Guidelines for Consultants preparing Right of Way Plans. The Right of Way Plans include Title Sheet, Legend, Abbreviation and Project Description, Typical Sections, Parcel Summary Sheet, Location Maps and Property Plan Sheets.

502 Layout Plans and Order of Taking
503 Written Instrument

Not Included in Contract.

504 Quality Control (QC) Review

Perform a separate review of the quality and accuracy of the preliminary Right of Way plans to check that key aspects of the information to be presented to MassDOT are prepared in accordance with Chapter 18 of the *Guidebook*, the current versions of the MassDOT CAD Standard and the Plan Preparation Guidelines for Consultants preparing Right of Way Plans. Check that previous comments on the preliminary Right of Way plans are addressed satisfactorily for the next submission.

SECTION 600 GEOTECHNICAL DESIGN

601 Research Available Subsurface Data

To be completed by Subconsultant.

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602 Field Reconnaissance

To be completed by Subconsultant.

603 Subsurface Investigation Plan

Prepare a subsurface investigation plan (boring, probing, testing type, location, depth, etc.) in accordance with the Bridge Manual. Revise and resubmit after MassDOT review. Prepare the specifications and estimates if the boring contract is to be paid for with direct expenses.

Under this task GPI will also pre-mark the boring and pavement core locations for Dig Safe.

604 Subsurface Investigation Inspection

To be completed by Subconsultant

605 Office Studies, Analysis and Testing

To be completed by Subconsultant

606 Geotechnical Report

Prepare and edit the Geotechnical Report in accordance with the Bridge Manual and other guidelines. Correlate the contents of the report with the project construction plans.

GPI's Geotechnical Subconsultant will prepare the Geotechnical Report. This task includes hours for review and coordination efforts.

607 Meetings, Reviews and Liaisons

Coordinate and meet with MassDOT for reviews, revisions, and advancement of project submittals.

GPI will attend up to one (1) coordination meeting.

608 Plans, Specifications and Estimates

Prepare and finalize geotechnical related detail and items for the plans, special provisions, and estimates.

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SECTION 700 PROJECT DEVELOPMENT – STRUCTURAL

Not anticipated

SECTION 710 SKETCH PLANS

Not anticipated

SECTION 750 FINAL BRIDGE DESIGN

Not anticipated

SECTION 800 PS&E SUBMISSION

Upon approval of the plans submitted for the preliminary design submission, the Consultant shall proceed with the preparation of the contract plans and documents in accordance with the relevant guidelines set forth in the Guidebook, the Bridge Manual, the Standard Specifications for Highways and Bridges, and other related publications as listed in Division I.

801 Respond to 100% Comments

Prepare a formal written response to all comments received regarding the 100% review.

802 Finalize Plans, Specifications and Estimate

Ensure that all comments from 100% review are addressed and reflected in the contract documents.

803 Prepare Detail Sheets

Prepare Detail Sheets in accordance with Chapter 13 of the Guidebook. All items of work not adequately reflected on the plans are to be described in the Detail Sheets.

804 Combine Highway and Bridge

No effort is anticipated.

805 Quality Control (QC) Review

Have an experienced engineer who is not directly involved in the preparation of the contract documents perform an independent review of the project. Log on to the MassDOT website for the

latest reference documents such as Engineering Directives and Policy Directives, and verify that the Plans, Specifications and Estimate are prepared in accordance with these documents. Review all environmental permits and ensure that the contract documents provide a means of compensating the construction contractor for performing work described in the permits.

806 Finalize Bottom Up Estimate and Estimate Reconciliation (if required)

No effort is anticipated.

807 Finalize Construction Contract Time Determination

The Consultant shall prepare the CCTD.

Refer to Standard Task Description 428 (Construction Contract Time Determination) which details the effort involved in this task for the 75%, 100% and PS&E Submissions.

808 Finalize Incentives/Disincentives

No effort is anticipated.

SECTION 900 CONSTRUCTION ENGINEERING

901 Pre-Bid Services

Review and respond to inquiries from MassDOT related to the bid documents. Participate in Pre-Bid Conference. Provide written responses to contractor's questions.

902 Pre-Construction Conference

Attend the Pre-Construction Conference. Answer questions and prepare the minutes of the meeting.

903 Highway Shop Drawings and Signal Permit

Review lighting, traffic signals, and sign shop drawings, including foundations and supports; and perform an operational site inspection. Prepare a signal permit based on as-built conditions.

904 Bridge and Wall Shop Drawings

No effort is anticipated.

905 Bridge Construction Procedures

No effort is anticipated.

906 Furnishing Advice and Field Visits

Provide assistance to MassDOT in interpreting the contract documents. Conduct field visits to the project site during construction as requested by the Engineer to provide consultation on design intent, assistance in addressing unforeseen conditions and /or similar matters, as requested by the Engineer. Attend periodic status and coordination meetings as determined by complexity of the project.

907 Geotechnical Construction Evaluation

No effort is anticipated.

908 Bridge Rating and Photographs

No effort is anticipated.

909 Signal Inspection/Fine Tuning

Provide assistance with the final signal inspection and assistance in addressing unforeseen conditions, as requested by the Engineer. Attend periodic status and coordination meetings as determined by complexity of the project.

NOTE: The Engineer in attendance at the Signal Inspection shall have current Traffic Signal Electrician Level II and Traffic Signal Inspector certifications from the International Municipal Signal Association (IMSA).

GPI

Design Fee Estimate

Project: Central at Turnpike & Turnpike St
Location: Stoughton
Town, State: MA
Proj. #: TBD
Date: 10/31/2023
Prepared By: JWD

PHASES	Project Director	Project Manager	Project Engineer	Engineer	Designer	Assistant Designer	Task Budget
Hourly Rate for each employee x 3.0	**$ 240**	**$ 195**	**$ 165**	**$ 135**	**$ 115**	**$ 100**	
Task 1: Survey							
Field Survey	4			74		70	$17,950
Base Plan Preparation & Research	3	14	64	56	64	168	$45,730
Quality Control	4	8					$2,520
Subtotal Hours	*11*	*22*	*64*	*130*	*64*	*238*	$529
Subtotal Costs	$ 2,640	$ 4,290	$ 10,560	$ 17,550	$ 7,360	$ 23,800	**$66,200**
Task 2 - Project Initiation							
Step 1: Project Request							
MaPIT/PIF Part I Submission		2	8				$1,710
ICE Stage 1		2	4		8		$1,970
Meetings	2	6	6				$2,640
Step 2: Project Proposal							
PIF Parts II and III	2	8	16	8			$5,760
Step 3: Project Creation							
Misc. Coordination (20 Hours)	2	4	4	4	4	2	$3,120
Subtotal Hours	*6*	*22*	*38*	*12*	*12*	*2*	$92
Subtotal Costs	$ 1,440	$ 4,290	$ 6,270	$ 1,620	$ 1,380	$ 200	**$15,200**
Task 3 - Project Scoping Meeting							
Preparation of Materials	2	6	16	8			$5,370
Meeting	2	2	2				$1,200
Subtotal Hours	*4*	*8*	*18*	*8*			$38
Subtotal Costs	$ 960	$ 1,560	$ 2,970	$ 1,080	$ -	$ -	**$6,570**
Task 4 - Data Collection and Conceptual Design							
Traffic Data Collection	*By subconsultant, see below.*						
Crash Data Collection and Analysis			6	20		8	$4,490
Prepare Traffic Volumes			2	4	12		$2,250
Analyze Signal Warrants			1		6		$855
Traffic Operations Assessment			4	16	10		$3,970
Conceptual Designs (Up to 3)	2	4	60	20	10	8	$15,810
Roundabout Measurement of Performance Diagrams		1	10				$1,845
ICE Stage 2 Assessment	1	1	2	8			$1,845
Draft Design Justification Workbook (Up to 3)		4	16	16	4		$6,040
Preliminary Project Estimate (Up to 3)		2	8	10	12	8	$5,240
Preliminary Project Schedule	1	4	8				$2,340
Preliminary ROW Impact Summary (Up to 3)		2	4	8			$2,130
Quality Control	2	4	2	4			$2,130
Subtotal Hours	*6*	*22*	*123*	*106*	*54*	*24*	$335
Subtotal Costs	$ 1,440	$ 4,290	$ 20,295	$ 14,310	$ 6,210	$ 2,400	**$48,945**
Task 5 - Pre-25% Over the Shoulder (OTS) Review Meetings							
Prepare Pre-25% Scoping Checklist		2	2	8			$1,800
Meetings (2)	4	4	4				$2,400
Prepare Meeting Minutes		2					$390
Refine and Resubmit Design Concepts	2	6	8	12	8	4	$5,910
Subtotal Hours	*6*	*14*	*14*	*20*	*8*	*4*	$66
Subtotal Costs	$ 1,440	$ 2,730	$ 2,310	$ 2,700	$ 920	$ 400	**$10,500**
Task 6 - Public Outreach #1							
Prepare Meeting Materials		4	8	24		4	$5,740
Meeting with Town (1)	2	2	2				$1,200
Meeting with Stakeholders (1)		4	4				$1,440
Public Meeting (1)	4	4	4				$2,400
Subtotal Hours	*6*	*14*	*18*	*24*		*4*	$66
Subtotal Costs	$ 1,440	$ 2,730	$ 2,970	$ 3,240	$ -	$ 400	**$10,780**
Task 7 - Preferred Alternative							
Development of Preferred Alternative Concept Design	2	4	16	8	8	8	$6,700
Subtotal Hours	*2*	*4*	*16*	*8*	*8*	*8*	$46
Subtotal Costs	$ 480	$ 780	$ 2,640	$ 1,080	$ 920	$ 800	**$6,700**
Task 8 - Public Outreach #2							
Prepare Meeting Materials		2	4	16		4	$3,610
Public Meeting (1)	4	4	4				$2,400
Subtotal Hours	*4*	*6*	*8*	*16*		*4*	*$38*
Subtotal Costs	$ 960	$ 1,170	$ 1,320	$ 2,160	$ -	$ 400	**$6,010**
Task 9 - Environmental							
Prepare Meeting Materials		4	8	20		4	$5,200
Meeting (2)	8	8	8				$4,800
Subtotal Hours	*8*	*12*	*16*	*20*		*4*	*$60*
Subtotal Costs	$ 1,920	$ 2,340	$ 2,640	$ 2,700	$ -	$ 400	**$10,000**
Task 10 - FDR							
Prepare Meeting Materials	24	36	48	60		12	$30,000
Subtotal Hours	*24*	*36*	*48*	*60*		*12*	*$180*

GPI

Design Fee Estimate

Project: Central at Turnpike & Turnpike St
Location: Stoughton
Town, State: MA
Proj. #: TBD
Date: 10/31/2023
Prepared By: JWD

PHASES	Project Director	Project Manager	Project Engineer	Engineer	Designer	Assistant Designer	Task Budget
Hourly Rate for each employee x 3.0	**$ 240**	**$ 195**	**$ 165**	**$ 135**	**$ 115**	**$ 100**	
Subtotal Costs	$ 5,760	$ 7,020	$ 7,920	$ 8,100	$ -	$ 1,200	**$30,000**
Task 11 - DJW							
Prepare Meeting Materials	16	24	32	40		8	$20,000
Subtotal Hours	*16*	*24*	*32*	*40*		*8*	*$120*
Subtotal Costs	$ 3,840	$ 4,680	$ 5,280	$ 5,400	$ -	$ 800	**$20,000**
Task 12 - 25% Design							
Prepare Meeting Materials	40	240	340	280	360	34	$195,100
Subtotal Hours	*40*	*240*	*340*	*280*	*360*	*34*	*$1,294*
Subtotal Costs	$ 9,600	$ 46,800	$ 56,100	$ 37,800	$ 41,400	$ 3,400	**$195,100**
Task 13 - Design Public Hearing							
Prepare Meeting Materials	12	18	24	30		6	$15,000
Subtotal Hours	*12*	*18*	*24*	*30*		*6*	*$90*
Subtotal Costs	$ 2,880	$ 3,510	$ 3,960	$ 4,050	$ -	$ 600	**$15,000**
Task 14 - 75% Design							
Prepare Meeting Materials	60	320	320	300	400	88	$224,900
Subtotal Hours	*60*	*320*	*320*	*300*	*400*	*88*	*$1,488*
Subtotal Costs	$ 14,400	$ 62,400	$ 52,800	$ 40,500	$ 46,000	$ 8,800	**$224,900**
Task 15 - 100% Design							
Prepare Meeting Materials	32	240	320	240	316	40	$180,020
Subtotal Hours	*32*	*240*	*320*	*240*	*316*	*40*	*$1,188*
Subtotal Costs	$ 7,680	$ 46,800	$ 52,800	$ 32,400	$ 36,340	$ 4,000	**$180,020**
Task 16 - Right of Way							
Prepare Meeting Materials	4	80	110	80	108	20	$59,930
Subtotal Hours	*4*	*80*	*110*	*80*	*108*	*20*	*$402*
Subtotal Costs	$ 960	$ 15,600	$ 18,150	$ 10,800	$ 12,420	$ 2,000	**$59,930**
Task 17 - PS&E							
Prepare Meeting Materials	12	80	180	120	120	20	$80,180
Subtotal Hours	*12*	*80*	*180*	*120*	*120*	*20*	*$532*
Subtotal Costs	$ 2,880	$ 15,600	$ 29,700	$ 16,200	$ 13,800	$ 2,000	**$80,180**
Task 18 - Construction							
Prepare Meeting Materials	12	60	160	120	140	20	$75,280
Subtotal Hours	*12*	*60*	*160*	*120*	*140*	*20*	*$512*
Subtotal Costs	$ 2,880	$ 11,700	$ 26,400	$ 16,200	$ 16,100	$ 2,000	**$75,280**
Expenses and Subconsultant Services							
Traffic Counts (PDI)	$ 7,300						
Geotech	$ 65,000						
Survey Expenses and Mileage	$ 1,000						
Mileage, printing, and miscellaneous expenses	$ 1,500						
TOTAL HOURS	265	1222	1849	1614	1590	536	$7,076
TOTAL COST OF LABOR	$ 63,600	$ 238,290	$ 305,085	$ 217,890	$ 182,850	$ 53,600	**$1,061,315**
Expenses Subtotal	**$ 74,800**						**$74,800**
TOTAL PROJECT							**$1,136,115**
25% Design Contingency	$ 15,900	$ 59,573	$ 76,271	$ 54,473	$ 45,713	$ 13,400	**$265,329**
TOTAL FUNDING RECOMMENDED FOR DESIGN							**$1,401,444**