

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
10 Park Plaza, Boston, MA**

**STANDARDIZED  
SCOPE OF SERVICES  
AND  
WORK HOUR ESTIMATE FORMS  
FOR CONSULTANT SERVICES**

**FINAL DESIGN OF BRUCE FREEMAN RAIL TRAIL  
PHASES 2A AND 2C  
ACTON-CARLISLE-WESTFORD-CONCORD**

**May 26, 2010**

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**GENERAL**

The Bruce Freeman Rail Trail (BFRT) corridor extends approximately 25 miles along the Framingham and Lowell railroad corridor and is named in memory of former State Representative Bruce Freeman. Phase 2A of the BFRT is approximately 4.8 miles in length and begins at the Phase 1 terminus at Route 225 in Westford and continues southerly through Carlisle and Acton ending at Acton Indoor Sports along the former Penn Central/Old Colony Railroad right-of-way. Phase 2C of the BFRT approximately 2.5 miles in length and runs from the Sudbury Town line (north of Route 117) to a point southeast of Commonwealth Avenue in the Town of Concord. The section of the BFRT from Commonwealth Avenue to the Acton town line will be addressed as part of the Concord Rotary project.

This Scope of Work has been prepared based on the satisfactory review and approval of the 25% plans for Phase 2C submitted by the Town of Concord to MassDOT and the Design Public Hearing held on 6/25/2009. It is assumed that all previously completed plans, documents, studies, traffic counts, CADD files etc. will be provided to GPI.

**SECTION 150 ENVIRONMENTAL**

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

Phase 2A – No effort is anticipated.

Phase 2C - Historic review will be completed by MassDOT Cultural Resources Unit. GPI will be available for consultation with CRU staff.

**157 NEPA–Categorical Exclusion (CE)**

Phase 2A – No effort is anticipated.

Phase 2C - 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 C.F.R. § 771.117 (1987).

**163 MEPA–Environmental Notification Form (ENF)**

Prepare an ENF for Phase 2A and Phase 2C and associated correspondence to various agencies, as necessary, in accordance with the Massachusetts Environmental Policy Act and MEPA Regulations 301 CMR 11.00. Prepare associated filing attachments, such as a distribution list and public notice; responses to comments, as necessary; and attend one (1) public scoping session.

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**168 Massachusetts Endangered Species Act (MESA) and Notice of Intent (NOI) Streamlined Review**

Phase 2A – No effort is anticipated.

Phase 2C – No effort is anticipated. This project will require additional coordination with NHESP for being in habitat with a number of species. This additional coordination will be completed by MassDOT. Any information and/or required in the Contract will be provided by MassDOT to GPI.

**170 USACE Section 404 Programmatic General Permit (PGP)**

Phase 2A and 2C - No effort is anticipated. MassDOT will submit the NOI filing with a cover letter prepared by the Wetlands Unit.

**176 Wetland Resource Area Delineation**

Phase 2A and 2C - No effort is anticipated.

**177 WPA Abbreviated Notice of Resource Area Determination (ANRAD)**

No effort is anticipated.

**179 WPA Notice of Intent (NOI)**

Phase 2A - Prepare and submit an NOI to the Acton and Westford Conservation Commissions in accordance with the Massachusetts Wetlands Protection Act. Include the preparation of all associated forms and backup documentation; permit plans, coordination during review, a site walk, and attending four (4) conservation commission hearings, 2 per town.

Phase 2C - Prepare and submit an NOI to the Concord Conservation Commission in accordance with the Massachusetts Wetlands Protection Act. Include the preparation of all associated forms and backup documentation; permit plans, coordination during review, a site walk, and attending two (2) conservation commission hearings.

**182 Water Quality Certification**

Phase 2A and Phase 2C - No effort is anticipated. It is assumed that the Order of Conditions will serve as the Water Quality Certificate.

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**186 Coordination and Liaison**

Phase 2A - Include scheduling and participating in environmental two (2) meetings with MassDOT, assisting in expediting the permitting process, and compiling and maintaining environmental files and records.

Phase 2C - Include scheduling and participating in environmental two (2) meetings with MassDOT, assisting in expediting the permitting process, and compiling and maintaining environmental files and records.

**SECTION 220 DESIGN EXCEPTION REPORT**

A Design Exception Report is required for Phase 2C of the BFRT in Concord. No effort is anticipated for Phase 2A. The tasks below apply to Phase 2C only.

**221 Evaluate the 13 Controlling Criteria**

Compare the recommended values of the 13 controlling criteria of Chapter 2 of the Guidebook to the proposed values. Revisit those features requiring a design exception 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 a summary of impacts resulting from implementing the desirable, minimum and the proposed designs. Also include a summary of impacts of designs in the range between the minimum and the proposed designs. Include right of way impacts, impacts to trees, walls, wetland resource areas, constructions costs and other impacts which influence the selected design.

**223 Prepare Narrative/Report**

Prepare a Design Exception Report including a narrative, traffic analysis, typical sections, photographs, and summary of impacts.

**SECTION 350 DESIGN PUBLIC HEARING**

It is assumed that two separate public hearings will be held. The Phase 2A Public Hearing will be held in Acton and the Phase 2C Public Hearing will be held in Concord. Both hearings will require the same effort. The tasks below apply to both Phase 2A and Phase 2C.

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**352 Hearing Preparation**

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

**353 Design Public Hearing**

Attend a 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**

It is assumed that the Phase 2A and Phase 2C submissions will remain independent and will not be combined. The tasks below apply to both Phases 2A and 2C.

**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 four (4) meetings for Phase 2A and three (3) meetings for Phase 2C 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.

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**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.

**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.

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**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**

NOT REQUIRED

**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 at the following intersection:

- Acton Road (Route 27) at Carlisle Road (Route 225) – Phase 2A

Include design of Passive Signal control at the following trail crossing locations:

- Main Street (Route 27) – Phase 2A
- Main Street (Route 27) – Phase 2A
- Brook Street – Phase 2A
- Concord Road – Phase 2A
- Wetherbee Street – Phase 2A
- Old Marlboro Road – Phase 2C
- Williams Road – Phase 2C

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**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.

**419 Highway Lighting Plans and Details**

NOT REQUIRED

**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.

**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**

Prepare a detailed estimate based on the latest edition of the Standard Nomenclature. Check that every item of work shown on the plans has a pay item. Prepare the estimate in accordance with the Method of Measurement and Basis of Payment described in the Standard Specifications for Highways and Bridges including the latest supplements and the Standard Special Provisions.

**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.

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**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.

**SECTION 450 100% HIGHWAY DESIGN SUBMISSION**

It is assumed that the Phase 2A and Phase 2C submissions will remain independent and will not be combined. The tasks below apply to both Phases 2A and 2C.

**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 Estimate**

Prepare a 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.

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**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% Design Check List.

**SECTION 500 RIGHT OF WAY**

Right-of-way efforts will be required for both Phases 2A and 2C. .

**501 Preliminary Right of Way Plans**

No effort is anticipated. It is assumed that the Preliminary Right-of-Way Plans for Phase 2C were submitted and approved

**502 Layout Plans and Order of Taking**

Prepare Layout Plans based on the approved Preliminary Right of Way Plans. Show lengths and bearings of all lines and calculate areas. The Layout Plans shall be prepared in accordance with Chapter 18 of the Guidebook and shall include the proposed layout lines, property lines, corner markers, names of property owners, parcels to be taken, access and non-access points and the locations of all bounds. The preparation of a Decree Plan shall be included, if required.

**503 Written Instrument**

The Written Instrument for the Layout and Order of Taking shall be prepared in accordance with MassDOT Policy. The Written Instrument shall be carefully checked against the Layout Plan.

**504 Final Right of Way Plans**

After the FHWA has granted authority to the State and approved Federal participating funds to acquire the right of way takings and/or the Right of Way Bureau accepts the Preliminary Right of Way Plan, the Preliminary Right of Way Plan will become the Final Right of Way.

**505 Title Search**

GPI will assist the Towns with the Title Search process. GPI will provide project right-of-way plans, coordinate between MassDOT and the Towns and will attend two (2) meetings.

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**SECTION 600 GEOTECHNICAL DESIGN**

Geotechnical Design efforts will be required for both Phases 2A and 2C.

**606 Geotechnical Report**

Coordinate with the Geotechnical subconsultant on the preparation of the Geotechnical Report, as per Directive M15-1, Bridge Manual, Footprint Program and other guidelines. For this scope, it is assumed that the Geotechnical Report will be limited to the information regarding the grade separated crossing alternative of the bridge over Route 2A/119 (Phase 2A) Powder Mill Road (Phase 2C). The actual soil borings will be obtained by MassDOT through their open ended contracts with drillers.

**607 Meetings, Reviews and Liaisons**

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

**SECTION 700 PROJECT DEVELOPMENT – STRUCTURAL**

**General**

BFRT Phase 2A involves the modification of 6 existing simple span steel girder bridges over Nashoba Brook and Butter Brook. The condition of these bridges and reuse options were presented in the January 2007 Preliminary Structures Report. No comments were received on this report, however the following structures scope of work is based on the assumption that the conclusions of the report are valid. The intent is to reuse the 6 existing superstructures with no structural repairs.

A listing of the bridge is presented below:

Acton – Existing #1 - 40 foot simple span - Existing steel built up girders  
Acton – Existing #2 - 35 foot simple span - Existing steel built up girders  
Acton – Existing #3 - 48 foot simple span - Existing steel built up girders  
Acton – Existing #4 - 30 foot simple span - Existing steel built up girders  
Acton – Existing #5 - 21 foot simple span - Existing steel rolled section girders  
Acton – Existing #6 - 16 foot simple span - Existing steel built up girders

The one new bridge structure is anticipated to be a prefabricated truss carrying the rail trail over Route 2A. No preliminary engineering has been done on this structure other than some visual concepts provided for the Public Hearing and 25% Highway Design phase. The approaches are anticipated to be embankments constructed from mechanically stabilized earth (MSE) walls.

Acton – New#1 - Route 2A/119 - New structure at new location - Prefabricated truss over Route 2A - MSE embankments on approaches

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BFRT Phase 2C involves 3 bridge locations. A BRIDGE SUMMARY was completed by GPI on March 15, 2010 and does include additional clarifications to the Phase 2C scope. The three locations are:

- 1) Bridge No. C-19-032 – Abandon Line over Nashoba Brook – Mile Marker 14.81

This existing bridge is an approximately 70 foot long ballasted deck bridge. The bridge is comprised of 3 spans, with the 2 piers located in the river. The proposed solution at this location is to reuse the existing bridge and construct the trail on the bridge itself.

- 2) Bridge No. C-19-031 – Abandon Line over Assabet River – Mile Marker 15.16

The existing bridge superstructure has been removed at this location. The span between the remaining abutments is approximately 90 feet. The proposed solution at this location is to construct a prefabricated structure on the existing abutments.

- 3) Bridge No. C-19-015 – Powder Mill Road over Abandon Line

This existing structure in this location is a corrugated steel pipe arch that exists within the 20 foot embankment of Power Mill Road. The proposed solution at this location is to construct a tunnel along the same alignment as the corrugate steel pipe arch.

### **701 Field Investigation**

Phase 2A - Conduct a field inspection to review the Route 2A bridge site and adjacent conditions, and establish project parameters and constraints. Evaluate the ground and river survey to determine the parameters for bridge design.

Phase 2C - Conduct a field inspection to review the conditions at the three locations referenced above. Evaluate the ground and river survey to determine the parameters for bridge design.

### **702 Determine Bridge Configurations**

Collaborate with the highway designer to determine the vertical and horizontal alignments and typical cross-sections for both the roadway over and the roadway under. Determine a preliminary span length and vertical bridge clearance. Provide accommodations on the bridge for both existing and proposed utilities.

Phase 2A - This effort is for the Route 2A bridge approaches and cross section as well as final dimensions for the 6 existing bridges to be reused.

Phase 2C – This effort is for the existing bridge over Nashoba Brook, the structure over the Assabet River and the Powder Mill Road tunnel.

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**703 Preliminary Structural Analysis**

None anticipated.

Phase 2A - The 6 existing bridges were reviewed in the January 2007 preliminary structures report and determined adequate for reuse without strengthening. The bridge over Route 2A will be a new structure.

Phase 2C – Bridge C-19-032 was evaluated in previous reports and is assumed adequate for support of a rail trail bridge. The other two locations will be a new prefabricated superstructure and a new tunnel.

**704 Comparative Design and Cost Analyses**

Evaluate those alternate bridge structure types that are appropriate to the site based on considerations of highway design parameters, traffic safety, impacts to surrounding properties and environmentally sensitive areas, traffic management, constructability, and aesthetics. Cost shall only be used to select between alternates that have been determined to be equally appropriate to the site based on the Type Section Worksheet.

Phase 2A - This effort is primarily associated with the proposed prefabricated bridge over Route 2A and associated approach embankment options. Some additional work will be involved in determining the final existing bridge deck type considering concrete, timber, or some other material.

Phase 2C - This effort is primarily associated with the proposed prefabricated bridge at C-19-031 and the tunnel under Powder Mill Road.

**705 Preliminary Structures Report Preparation**

No effort is anticipated.

Phase 2A - This report was previously completed in January 2007 for the 6 existing bridges. No further work is anticipated.

Phase 2C – Reports have been compiled previously by others during the 25% design.

**706 Bridge Type Selection Worksheet Preparation**

Prepare a Type Selection Worksheet per the MassDOT Bridge Manual detailing the various design alternatives for the bridge, complete with appropriate graphics, descriptive text and cost breakdowns justifying the recommendations presented.

Phase 2A - This effort is associated with the Route 2A bridge and associated approaches.

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Phase 2C – This effort is associated with the new bridge at C-19-031 and the tunnel under Powder Mill Road.

**707 Meetings and Liaison**

Attend meetings and coordinate with MassDOT during the preparation of the type study report to advance the work. Respond to MassDOT review comments.

**SECTION 710 SKETCH PLANS**

**711 Establish Boring Locations**

Determine the locations for the proposed bridge borings based on an approved structure type. Coordinate the boring program and the geotechnical design with MassDOT's Geotechnical Section. Prepare the boring location plans.

Phase 2A - This effort is associated with the Route 2A bridge and approaches.

Phase 2C – This effort is associated with the new bridge at C-19-031 and the tunnel under Powder Mill Road.

**712 Hydraulics Study and Report (Bridges over Water)**

No hydraulic reports are anticipated since the existing bridge openings will not be modified.

**713 Sketch Plan Development**

Prepare sketch plans for each structure in accordance with the MassDOT Bridge Manual. Submit review copies together with the foundation report to MassDOT. Check to ensure that the proposed design and construction staging plan addresses the cost and scheduling impacts associated with accommodating both existing and proposed utilities. Review the boring logs and foundation reports. Perform geometric design calculations.

Phase 2A - Sketch plans are anticipated for all 6 existing bridges and the new bridge at Route 2A. The existing bridge sketch plans are anticipated to be two sheets each with no boring log information. The new Route 2A bridge sketch plans are anticipated to be 5 sheets including 2 sheets of boring logs.

Phase 2C - Sketch plans are anticipated for all 3 locations. The existing bridge (C-19-032) sketch plans are anticipated to be two sheets each with no boring log information. The new prefabricated bridge (C-19-031) sketch plans are anticipated to be 5 sheets including 2 sheets of boring logs. The tunnel (C-19-015) under Powder Mill Road is anticipated to be 6 sheets including 3 sheets of boring logs.

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**714 Meetings, Coordination and Liaison**

Participate in MassDOT Sketch Plan review meetings. Prepare responses to agency comments and plan revisions, as necessary. Provide coordination during the soils testing program and prior to the preparation of the soils and foundation reports being provided by the geotechnical staff or a subconsultant.

**715 Constructability Review**

Review the design of the proposed structure to ensure that the structure does not present any 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.

**716 Submission Check List**

Prepare and submit Bridge Section Check list for each bridge.

**SECTION 750 FINAL BRIDGE DESIGN**

**751 Structural Design – Superstructure**

Prepare the design calculations, and perform an independent design check of the calculations for all superstructure components in accordance with the MassDOT Bridge Manual.

Phase 2A - This includes deck designs for the 6 existing structures with variable girder spacing, railing design and compatibility with the chosen deck system, and preliminary prefabricated bridge analysis to determine appropriate loads for substructure design at Route 2A.

Phase 2C - This includes railing design, deck modifications, superstructure repair details, preliminary prefabricated bridge analysis, tunnel wall and ceiling analysis and for design applicability and determination of foundation loads.

**752 Structural Design – Substructure**

Prepare the design calculations and perform an independent design check of the calculations for all substructure components, including any cofferdams and permanent excavation support system requirements in accordance with the MassDOT Bridge Manual.

Phase 2A - This effort includes potential small retaining walls at the existing bridges to support the rail trail embankments and a larger effort for the abutments and approach embankment walls at the Route 2A bridge.

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Phase 2C - This effort includes potential small retaining walls at the existing bridges to support the rail trail embankments and a larger effort for the foundations associated with the Powder Mill Tunnel location.

**753 Bridge Layout Geometrics**

Prepare the design calculations and perform an independent design check of the bridge geometric calculations, including framing, layout, critical clearance and elevation of footings, layout and ties, etc.

Phase 2A - This is for the geometry at all 7 bridges.

Phase 2C – This is for the geometry at all 3 structure locations including approaching retaining walls.

**754 Contract Drawings**

Prepare the structural drawings in accordance with the MassDOT Bridge Manual and check the drawings for content and accuracy.

Phase 2A - It is anticipated that the 6 existing bridges will each have 5 sheets consisting of bridge cover sheet, abutment plan and elevation, abutment details, superstructure and deck details, miscellaneous details. The new bridge at Route 2A will be 9 sheets consisting of bridge cover sheet, boring log sheets, plan and elevation, abutment plans and elevations, embankment wall details, miscellaneous abutment and wall details,

Phase 2C - It is anticipated that the existing bridge (C-19-032) will have 7 sheets consisting of bridge cover sheet, abutment plan and elevation, abutment details, superstructure and deck details, miscellaneous details. The new prefabricated bridge (C-19-031) will be 9 sheets consisting of bridge cover sheet, boring log sheets, plan and elevation, abutment plans and elevations, miscellaneous abutment and wall details. The tunnel at Powder Mill Road will be approximately 12 sheets consisting of bridge cover sheet, boring log sheets, plan and elevation, foundation details, tunnel details, approach wingwalls, and miscellaneous details.

**755 First Review Submission**

Prepare and submit the bridge design plans for MassDOT review and subsequent resolution of the comments and recommendations received from MassDOT.

**756 Quantity Cost Estimates**

Prepare the quantity calculations, and perform an independent check of the quantity calculations of the bridge items and related cost estimates.

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**757 Special Provisions**

Prepare the bridge special provisions in accordance with the MassDOT Bridge Manual.

**758 Second Review Submission**

Prepare and submit updated final bridge designs plans for MassDOT review and subsequent resolution of MassDOT comments and recommendations.

**759 FHWA Reviews**

No FHWA review is anticipated.

**760 Meetings and Liaison**

Participate in meetings and coordinate in scheduling and advancing the bridge design.

**761 Constructability and Quality Control (QC) Review**

Perform an independent review of the project by an experienced engineer who is not directly involved in the preparation of the contract documents. Review shall focus on the practicality of constructing the structure based on access to site, equipment needs, material properties, etc. 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.

**762 Submission Check List**

Prepare and submit Bridge Section Check list for each bridge.

**SECTION 800 PS&E SUBMISSION**

It is assumed that the Phase 2A and Phase 2C submissions will remain independent and will not be combined. The tasks below apply to both Phases 2A and 2C.

**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.

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**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**

Ensure that the highway plans accurately depict the approved bridge design and that the index correctly identifies the page numbering of the bridge plans. Combine Special Provisions and Estimate into one package that eliminates redundancy and ambiguity.

**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 Consultant Peer Review**

GPI will respond to peer review comments.

**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**

Review and approve or take other appropriate action upon structural shop drawings for conformance with the contract documents.

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**905 Bridge Construction Procedures**

Review and approve or take other appropriate action according to the Bridge Manual regarding the conformance of the bridge demolition and erection procedures to the contract documents

**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.

**908 Bridge Rating and Photographs**

Visit project site and evaluate structures for conformance to the contract documents. Take photographs of completed structure. Prepare Bridge Rating Report. The VIRTIS software is not anticipated to be used. to prepare the rating report.

Phase 2A - It is anticipated that the Route 2A bridge manufacturer/designer will complete bridge rating calculations and provide a professional engineers stamp for those calculations. GPI will only be responsible for compiling the report into MHD format. Bridge rating reports will not be provided for the 6 existing bridges.

Phase 2C - It is anticipated that the prefabricated bridge (C-19-031) manufacturer/designer will complete bridge rating calculations and provide a professional engineers stamp for those calculations. GPI will only be responsible for compiling the report into MHD format. Bridge rating reports will not be provided for the existing bridge (C-19-032) or the tunnel under Powder Mill Road.

**909 Traffic Signal Inspection and Fine Tuning**

Assist with Fine Tuning and Adjustment of Traffic Signals and assist with Final Inspection and Approval of Traffic Signals.