

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT**

**WORK HOUR ESTIMATE FOR DESIGN SERVICES–TASK DESCRIPTION**

**SECTION 100**

**PROJECT DEVELOPMENT ENGINEERING**  
**(PROJECT TYPE CODE [BR, BH, ETC.]–PROJECT DESCRIPTION [BRIDGE**  
**REPLACEMENT, BRIDGE REHABILITATION/RECONSTRUCTION, ETC.])**

**101 Project Concept Preparation**

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

**102 Preliminary Corridor Analysis**

Prepare an overview that evaluates the corridor in light of the project goals to determine various studies that may be required. Also, examine planning criteria, degree of citizen and agency involvement and other issues and factors that may influence the design of the project.

**103 Reasonable Alternative Determination**

Evaluate all alternatives to determine which are feasible.

**104 Alternative Selection and Report Preparation**

Select engineering and environmental solutions to accomplish the project goals and prepare a report that presents all findings.

**105 Value Engineering (VE)**

Prepare a value engineering report that contains recommendations that will reduce the overall project cost without sacrificing safety or environmental project attributes. The VE Report shall be in accordance with the FHWA definition and application of Value Engineering as published in the Federal Register on February 14, 1997, as well as the Federal-Aid Policy Guide, dated September 8, 1998.

**SECTION 150**

**ENVIRONMENTAL**

**151 Early Coordination with Local Commissions**

Ensure that the information submitted to MassHighway at the 25% stage is in accordance with the requirements of Engineering Directive E-02-005, Early Environmental Coordination for Design Projects, including providing evidence of coordination with state and local agencies, boards and commissions, including local historic commissions or Tribal historic preservation officers if necessary. Specific information detailed in the Engineering Directive (i.e., wetland boundary lines, street addresses, existing drainage structures and outlets, etc.) must be included in the 25% plan submission.

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**152 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 government agencies, local boards and commissions, and conducting public meetings as necessary.

**153 Project Development Meetings and Public Hearings**

Prepare for and hold public meetings and a public hearing.

**154 NEPA—Draft Environmental Impact Statement (EIS)**

Prepare a Draft EIS in accordance with the NEPA process that includes a description of the purpose and need for action; the proposed alternatives; the affected environment; the social, economic, and environmental impacts of the alternatives; mitigation measures, comments and coordination. See FHWA Technical Advisory T6640.8A, dated 10/30/87.

**155 NEPA—Final Environmental Impact Statement (EIS)**

Prepare a Final EIS in accordance with the NEPA process that includes all the information in the Draft EIS; describes the basis for the selection of the preferred alternative; includes a transcript of the public hearing, copies of hearing comments received from agencies and the public with responses to these comments. See FHWA Technical Advisory T6640.8A, dated 10/30/87.

**156 NEPA—Environmental Assessment (EA)**

Prepare an Environmental Assessment (EA) in accordance with the NEPA process that includes a description of the proposed project; the reasonable alternatives under consideration; the social, economic and environmental impacts of the alternatives; mitigation measures and a section on comments and coordination. See FHWA Technical Advisory T6640.8A, dated 10/30/87.

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

Prepare a Categorical Exclusion (CE) Determination Checklist for Federal-Aid Actions in accordance with the NEPA process, MassHighway Policy Directive 90-04, dated March 13, 1990, and Federal Highway Administration Regulation 23 C.F.R. § 771.117 (1987).

**158 ACOE Programmatic General Permit (PGP)**

Prepare backup documentation for Category I or Category II (Work not performed in water) permitting under the Massachusetts Army Corps of Engineers (ACOE) Programmatic General Permit upon request. Backup documentation may include photos, written analysis, etc.

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**159 Individual ACOE (404) Permit**

Coordination with the Army Corps of Engineers (ACOE) shall be conducted for project review pursuant to Federal Highway Methodology. The application shall be prepared and submitted to the ACOE pursuant to Section 404 of the Federal Clean Water Act following completion of the Phase I review. The application shall be submitted to the Regulatory Branch, New England Division. Preparation of the submission shall include the application form, text describing the proposed work, impacts and mitigation measures. The application shall include consultation with other agencies such as the U.S. Fish and Wildlife, the National Parks Service, Environmental Protection Agency and Massachusetts Coastal Zone Management, as necessary.

**160 U.S. Coast Guard Bridge Permit**

Prepare an application for a U.S. Coast Guard bridge permit pursuant to Section 9 of the Rivers and Harbors Act and the General Bridges Act. The application shall be submitted to the District Bridge Administration, First Coast Guard District. Preparation of the application shall include the application form, text and plans, and all associated meetings and agency coordination.

**161 Programmatic Section 4(f) Evaluation**

Prepare Programmatic Section 4(f) Evaluation in accordance with associated programmatic Section 4(f) Evaluation and Approval Processes. There are four nationwide programmatic Section 4(f) evaluations: projects that involve historic bridges, projects that involve minor amounts of parkland, recreation areas, wildlife and waterfowl refuges; projects that involve minor amounts of land from historic sites; and bikeway projects. See FHWA Technical Advisory T6640.8A, dated 10/30/87, FHWA Section 4(f) Policy Paper, Revised June 7, 1989 and associated Programmatic 4(f) Federal Notices, Regulations and Policy Papers.

**162 Draft Individual Section 4(f) Evaluation**

Prepare a Draft Section 4(f) Evaluation that includes a description of: the proposed project, the 4(f) property, impacts on the property, avoidance alternatives and their impacts, measures to minimize harm; and a discussion of the results of preliminary coordination with agencies. See FHWA Technical Advisory T6640.8A, dated 10/30/87 and FHWA Section 4(f) Policy Paper, Revised June 7, 1989.

**163 Final Individual Section 4(f) Evaluation**

Prepare a Final Section 4(f) Evaluation that includes: all information required for a Draft 4(f) Evaluation, formal comments and responses from all agencies, and a discussion of the basis for the determination that there are no feasible and prudent alternatives to the use of Section 4(f) land. See FHWA Technical Advisory T6640.8A, dated 10/30/87 and FHWA Section 4(f) Policy Paper, Revised June 7, 1989.

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**164 MEPA–Draft Environmental Impact Report (DEIR)**

Prepare a DEIR in accordance with the Massachusetts Environmental Policy Act and MEPA Regulations 301 CMR 11.00. Include analyses necessary to adequately address all environmental issues contained in the EOEA Scope and Participation publication distributed at MEPA scoping sessions.

**165 MEPA–Final Environmental Impact Report (FEIR)**

Prepare an FEIR in accordance with the Massachusetts Environmental Policy Act and MEPA Regulations 301 CMR 11.00. Include a resolution of agency comments and the necessary preparation for attending the public hearing.

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

Prepare an ENF form and associated correspondence to various agencies as necessary in accordance with the Massachusetts Environmental Policy Act and MEPA Regulations 301 CMR 11.00. Prepare all associated filing attachments including a distribution list, public notice, etc., responses to comments, as necessary; and attend public meetings.

**167 Wetland Resource Area Delineation**

Conduct wetland resource area delineation in accordance with the Massachusetts Wetlands Protection Act, MGL C. 131 § 40 and MEPA Regulations 310 CMR 10.00, and/or the Federal Clean Water Act, Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Jan. 1989). Includes all field time associated with delineating wetland boundaries and time attending local, state and federal site meetings to review and verify wetland boundary lines. Documentation will be provided on state Appendix G Wetland Delineation Forms upon request.

**168 Wetlands Protection Act (WPA) ANRAD**

Prepare an Abbreviated Notice of Resource Area Determination (ANRAD) in accordance with the Massachusetts Wetlands Protection Act and MEPA Regulations 310 CMR 10.00 to obtain approval of Bordering Vegetated Wetland line. Includes the preparation of all associated forms and backup documentation, coordination during review, site walks and attending Conservation Commission meetings.

**169 WPA Request for Determination of Applicability (RDA)**

Prepare and submit an RDA in accordance with the Wetlands Protection Act and MEPA Regulations 310 CMR 10.00 to determine if work within the 100-foot or 200-foot buffer zones of certain wetland resource areas is subject to the WPA and whether or not it will have an impact on wetland resource areas. Includes the preparation of all associated forms and backup documentation, coordination during review, site walks and attending conservation commission meetings.

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

Prepare and submit an NOI to the local conservation commission in accordance with the Massachusetts Wetlands Protection Act and MEPA Regulations 310 CMR 10.00. Includes the preparation of all associated forms and backup documentation; permit plans, coordination during review, site walks and attending conservation commission hearings.

**171 WPA Variance**

Prepare and submit a variance to the local conservation commission/DEP in accordance with the Wetlands Protection Act and MEPA Regulations 310 CMR 10.00. Includes the preparation of all associated forms and backup documentation, permit plans, coordination during review, site walks and attending conservation commission hearings.

**172 Chapter 91 License Application**

Prepare an application for a Chapter 91 License in accordance with the Massachusetts Chapter 91 Waterways Act and MEPA Regulations 310 CMR 9.00. Includes the preparation of the application form, backup documentation and plans/mylars in accordance with Chapter 91 submission requirements.

**173 Chapter 91 Permit Application**

Prepare an application for a Chapter 91 Permit in accordance with the Massachusetts Chapter 91 Waterways Act and MEPA Regulations 310 CMR 9.00. Includes the preparation of the application form, backup documentation and plans/mylars in accordance with Chapter 91 submission requirements.

**174 Water Quality Certification**

Prepare an application for a Water Quality Certificate in accordance with the Massachusetts Surface Water Quality Standards and MEPA Regulations 310 CMR 9.00 and 314 CMR 4.00. Includes preparation of the appropriate state application form, WQC Standard Form for applicable Footprint Bridge projects, supporting documentation, plan preparation, and sediment analysis when applicable.

**175 Coastal Zone Management Consistency Certificate**

Prepare an application for a Consistency Certificate pursuant to the Massachusetts Coastal Zone Management Program. Agency coordination and meetings are included as necessary.

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

Provide design information to the MassHighway Cultural Resources Section for Section 106 project reviews. Also includes responding to comments from local and state historical commissions, and attending meetings as necessary.

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**177 Hazardous Materials Research/Review**

Provide design information to the MassHighway Hazardous Materials Unit during its review. Also includes responding to comments from local and state agencies and attending meetings as necessary.

**178 Wildlife/Biological Assessment**

Prepare a wildlife habitat assessment, vernal pool study, and/or an endangered species study, etc. in accordance with associated regulations and/or as required by the Massachusetts Natural Heritage Program, EPA, ACOE, DEP or local conservation commissions, etc.

**179 Coordination and Liaison**

Includes scheduling and participating in environmental meetings with MassHighway, assisting in expediting the permitting process, and compiling and maintaining environmental files and records.

**180 ACOE 404 Permit PGP II or PGP I (Not Individual)**

Prepare backup documentation for Category I or Category II (Work performed in water) permitting under the Massachusetts Army Corps of Engineers (ACOE) Programmatic General Permit upon request. Backup documentation may include photos, written analysis, etc.

**SECTION 200**

**FUNCTIONAL DESIGN REPORT**

**201 Evaluate Existing Conditions**

Provide a narrative of the existing study area including lane configurations, dimensions, running speed, functional classification, etc.

**202 Traffic Count Analysis**

Coordinate the procurement of the appropriate traffic counts for the study area and provide an analysis of the data factor and volume data regarding background growth and seasonal adjustments, respectively.

**203 Safety Analysis**

Review crash data and document trends and causes. Prepare crash rate work sheets and collision diagrams.

**204 Manual on Uniform Traffic Control Devices (MUTCD) Signal Warrants**

Review MUTCD Signal Warrants based on the existing geometric conditions to determine if signals are justified.

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**205 Intersection Analysis**

Determine Peak-Hour Factor and Truck Percentage. Determine Level of Service and vehicle delays using current approved software packages. Analyze Existing Traffic Volumes (No Build) and Future Traffic Volumes (in both No Build and Build). Perform Systems Analysis for closely spaced and or coordinated systems. Provide average and 95<sup>th</sup> percentile Back Queue calculations. Develop Basic Signal Strategy including proposed geometry, signal housing locations, and proposed phasing. Determine lane widths and pavement markings layout.

**206 Proposed Geometrics**

Describe how the proposed geometrics will improve traffic operations and public safety.

**207 Report Preparation**

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

**SECTION 220**

**DESIGN EXCEPTION REPORT**

**221 Evaluate MHD HDM Ch. 8 –13 Controlling Criteria**

Compare the recommended values of the 13 controlling criteria 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 proposed designs. Also include a summary of impacts of designs in the range between the minimum and the proposed. Include right of way impacts, impacts to trees, walls, wetland resource areas, constructions costs and any other impacts which influence the selected design.

**223 Prepare Narrative/Report**

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

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**SECTION 300**

**25% HIGHWAY DESIGN SUBMISSION**

**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.

**302 Utility Coordination**

Contact utility companies to verify locations of existing utilities and to determine impacts to those facilities. Ensure that the proposed design addresses cost and scheduling impacts associated with accommodating both existing and proposed utilities. Provide a list of all utility companies affected by the proposed work with the 25% submission.

**303 Survey Coordination and Controls**

Coordinate ground survey effort, review survey controls and closures, baseline ties and overall quality of survey.

**304 Base Plans, Profiles and Typical Sections**

Perform field review of base plan information. Verify location of existing features, note legends on all warning, regulatory and route marker signs. Verify that plans provide sufficient information regarding existing drainage and sewer systems. Verify that cross sections include all 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.

**305 Field Reconnaissance**

Perform detailed 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 of existing facility and surrounding environment.

**306 Plot Existing Layout Lines**

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

**307 Meetings and Liaison**

Attend coordination meetings as needed with MassHighway, the community, utility-owners, local commissions and others. Record and distribute minutes of the meeting.

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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 Highway Design Manual. 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 and the proposed design speed. 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 based on the interface with the proposed roadway cross-section and existing features.

**312 Prepare Cross Sections**

Tweak each cross section 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 based on the limits of work determined by the cross sections.

**314 Pavement Design**

Prepare a pavement design in accordance with the Highway Design Manual for review by MassHighway. Prepare pavement design checklist, determine DBR value, and assemble traffic data. For Footprint Bridge R&R projects refer to the 10-10-96 MassHighway Memorandum on Pavement Design.

**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 details, pavement structure and material types in accordance with Standard Nomenclature and Materials Specifications.

**316 Construction Details**

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

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**317 Hydrological Studies and Hydraulics Report**

Investigate hydrological characteristics of rivers and streams in the vicinity of the project based on storm frequencies commensurate with roadway functional classification and MassHighway standards. Include calculations to determine size of opening to accommodate the design flows and prepare a hydraulics report with pertinent data and recommendations.

**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 Arrangements**

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

**320 Traffic Signals**

Review traffic volumes, traffic signal warrants, capacity analysis, signal type and installation options. Prepare basic signal strategy plans depicting signal head locations and phasing.

**321 Preliminary Signs and Pavement Markings**

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

**322 Preliminary Traffic Management Plan (TMP)**

Develop a methodology for constructing the proposed project that minimizes the impact to the motoring public and abutters while at the same time addresses construction costs and constructability.

**323 Early Environmental Coordination**

Ensure that the information submitted to MassHighway at the 25% stage is in accordance with the requirements of Engineering Directive E-02-005, Early Environmental Coordination for Design Projects, and includes providing evidence of coordination with local conservation commissions.

**324 Constructability Review**

Review the proposed project to ensure that the project 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.

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**325 Quality Control (QC) Review**

Perform an in depth review of the quality and accuracy of the documents to ensure that all aspects of the information to be presented to MassHighway are prepared in accordance with the Highway Design Manual, 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 the Highway Design Manual for plan preparation. The design should also be reviewed for conformity to design standards. Any deviations from the 13 controlling criteria in Chapter 8 of the Highway Design Manual must be documented under Section 220, Design Exception Report.

**326 Preliminary Construction Estimate**

The preliminary cost estimate must be prepared with a level of detail commensurate with a 25% submittal. Assumptions relative to method estimating including adjustments for inflation and economy scale based size of project must be described.

**SECTION 350**

**DESIGN PUBLIC HEARING**

**351 Modifications and Revisions**

Revise plans accordingly to ensure that the information presented at the public hearing agrees with the MassHighway 25% review.

**352 Meeting Preparation**

Prepare graphics and other visual aids to display at the public hearing. Prepare a public hearing brochure.

**353 Design Public Hearing**

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

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**SECTION 400**

**75% HIGHWAY DESIGN SUBMITTAL**

**401 Response to 25% Comments**

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

**402 Field Reconnaissance**

Review the proposed project interface with adjacent properties, streets, drives, drainage, utilities, wetlands, etc. Define additional survey needs.

**403 Meetings Liaison and Coordination**

Attend all meetings necessary to advance the design of a project including meetings with MassHighway Boston and District Offices, community representatives, planning agencies, etc. Provide MassHighway with a transcript the minutes of the meetings.

**404 Utility Coordination**

Contact all 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 all utility work that is to be performed by the contractor.

**405 Final Horizontal Design Geometries**

Tweak 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 ( $\Delta$ ), 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 Geometries**

Tweak the vertical geometry based on 25% review comments and comments stemming from the Design Public Hearing. Plans must clearly show all 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). Ensure that profiles are prepared in accordance with the Highway Design Manual.

**407 Pavement Design**

Respond to Pavement Design Engineer's comments and prepare detailed pavement design with completed data sheets per Highway Design Manual. For Footprint Bridge R&R projects refer to the 10-10-96 MassHighway Memorandum on Pavement Design.

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**408 Typical Cross Sections**

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

**409 Plot Cross Sections**

Tweak 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**

Tweak 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. All existing layout lines, proposed alterations and any temporary or permanent easements must be clearly labeled.

**411 Construction Plans**

Prepare Construction Plans in accordance with the Highway Design Manual. Each item of work with the project limits must be clearly labeled. Drawings must be formatted exactly as described in the Highway Design Manual.

**412 Grading & Tie Plans**

Prepare grading and tie plans 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. Design must address all work as a result of proposed roadway improvements.

**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 a complete design for signal installations, supports, and foundations. Finalize phasing details. Develop signal specifications.

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**417 Pavement Markings and Plan Preparation**

Design and layout roadway pavement markings, stop lines, cross walks, gore markings, etc.

**418 Traffic Management Plans (TMP)**

Finalize construction staging. Prepare 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**

Complete lighting distribution system, wiring schematics, control equipment and other relevant details.

**420 Landscaping and Plan Preparation**

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

**421 Erosion Control Plans**

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

**422 Miscellaneous Contract Plans**

Prepare miscellaneous full size drawings for presentation of the proposed project. Include Title Sheet, Index, Key Plan, Boring Plans, Boring Logs, etc.

**423 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. The estimate shall be prepared 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. This task includes an estimate of all work hours associated with calculating quantities.

**424 Draft Special Provisions**

Review 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) 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 project based on access to site, equipment needs, material properties, etc. Provide an overall review of the plans, specifications and estimate for conformity to the Highway Design Manual, 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.

**SECTION 450**

**100% HIGHWAY DESIGN SUBMITTAL**

**451 Respond to 75% Comments**

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

**452 Finalize Plans**

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

**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 clear and not ambiguous.

**454 Finalize Estimate**

Prepare a calculation book in accordance with Chapter 13 of the Highway Design Manual. Ensure that all items of work have a pay item. Identify any non-participating work.

**455 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 MassHighway web site for the latest edition of all reference documents, Engineering Directives and Policy Directives and verify that plans, specifications and estimate are prepared in accordance with these documents.

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**SECTION 500**

**RIGHT OF WAY**

**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 2 of the Highway Design Manual. Plans include Title Sheet, Typical Sections, Parcel Summary Sheet, Location Maps and Property Plan Sheets.

**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 2 of the Highway Design Manual 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. Include the preparation of a Decree Plan, if required.

**503 Written Instrument**

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

**504 Final Right of Way Plans**

After FHWA has granted authority to the state to acquire right of way with federal participation 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. The plan will be subject to any additions and revisions that may be required.

**SECTION 600**

**GEOTECHNICAL REPORT**

**601 Research Available Subsurface Data**

Research, compile, and evaluate available subsurface and foundation data relative to the project (plans, maps, etc.).

**602 Field Reconnaissance**

Inspect project site to view site conditions, consider existing and proposed substructures, foundation elements and assess requirements for the subsurface investigation plan.

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**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 a Department review. Includes the preparation of the specifications and estimates if boring contract is to be paid for with direct expenses.

**604 Office Studies, Analysis and Testing**

Review soil/rock samples and field/laboratory test results. Evaluate foundation options and determine parameters for foundation design.

**605 Geotechnical Report**

Prepare and edit the Geotechnical Report, per Directive M15-1, Bridge Manual, Footprint Program and other guidelines. Correlate the contents of the report with the project construction plans.

**606 Meetings, Reviews and Liaisons**

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

**607 Final Plans, Specifications and Estimates**

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

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**WORK HOUR ESTIMATE FOR DESIGN SERVICES-TASK DESCRIPTION**

**SECTION 700**

**PROJECT DEVELOPMENT – STRUCTURAL**

**701 Field Investigation**

Review in the field the bridge site and adjacent conditions. Evaluate ground and river survey parameters for bridge design.

**702 Determine Bridge Configuration**

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.

**703 Preliminary Structural Analysis**

Determine bridge types per scope of work. Perform preliminary structural analysis to determine approximate superstructure depth.

**704 Comparative Design and Cost Analysis**

Evaluate alternative bridge designs based on considerations of construction cost, traffic management, traffic safety, constructability, aesthetics, etc.

**705 Preliminary Structures Report Preparation**

Prepare a Preliminary Structures Report where scope of work warrants an investigation of rehabilitation verses replacement. The report shall evaluate the structural components that have less capacity than required for statutory live load and shall justify the recommendation for rehabilitation or replacement.

**706 Type Study Report Preparation**

Prepare a Type Study report detailing the various design alternatives for the bridge complete with appropriate graphics, descriptive text and cost breakdowns justifying the recommendations presented.

**707 Meetings and Liaison**

During the type study phase coordinate with others to advance the work and respond to MHD comments in the report document.

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT**

**WORK HOUR ESTIMATE FOR DESIGN SERVICES–TASK DESCRIPTION**

**SECTION 710**

**BRIDGE SKETCH PLANS**

**711 Establish Boring Locations**

Determine the locations for proposed bridge borings based on an approved scheme and coordinate the program with the geotechnical design effort.

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

Review the hydrological analysis and hydraulics report relative to the size of the hydraulics opening. Make all calculations necessary to determine the size of the opening necessary to accommodate the design flows. Prepare a Hydraulics Report that presents pertinent data and recommendations.

**713 Sketch Plan Development**

Prepare bridge sketch plans for each bridge in accordance with the MHD Bridge Manual. Submit review copies with foundation report to MHD. Ensure that the proposed design and construction staging plan addresses cost and scheduling impacts associated with accommodating both existing and proposed utilities.

**714 Meetings, Coordination and Liaison**

Participate in MHD reviews, preparation of responses to agency comments and plan revisions, as necessary. Provide coordination during the soils testing program and during the preparation of the soils and foundation reports by geotechnical staff or sub-consultant. Review bridge boring logs, foundation reports, and calculate geometric design.

**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.

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT**

**WORK HOUR ESTIMATE FOR DESIGN SERVICES–TASK DESCRIPTION**

**SECTION 750**

**FINAL BRIDGE DESIGN**

**751 Structural Design - Superstructure**

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

**752 Structural Design – Substructure**

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

**753 Bridge Layout Geometries**

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

**754 Contract Drawings**

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

**755 First Review Submission**

Prepare and submit the first copy of the final plans for MHD review and subsequent resolution resulting from MHD comments and recommendations.

**756 Quantity Cost Estimates**

Prepare two sets of independent quantity calculations of bridge items and cost estimates for the bridge structures.

**757 Special Provisions**

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

**758 Second Review Submission**

Prepare and submit copies of the bridge PS&E package for MHD review and subsequent resolution of MHD comments and recommendations.

**759 FHWA Review**

Submit updated copies of bridge PS&E for FHWA review and resolution of all related FHWA comments.

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT**

**WORK HOUR ESTIMATE FOR DESIGN SERVICES–TASK DESCRIPTION**

**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 Highway Design Manual, 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.

**SECTION 800**

**PS&E SUBMISSION**

**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 Highway Design Manual. 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 MassHighway website for the latest reference documents such as Engineering Directives and Policy Directives, and verify that 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 contractor for performing work described in the permits.

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT**

**WORK HOUR ESTIMATE FOR DESIGN SERVICES–TASK DESCRIPTION**

**806 Value Engineering (VE)**

Prepare a value engineering report that contains recommendations that will reduce the overall project cost without sacrificing safety or environmental project attributes. The VE Report shall be in accordance with the FHWA definition and application of Value Engineering as published in the Federal Register on February 14, 1997, as well as the Federal-Aid Policy Guide, dated September 8, 1998.

**SECTION 900**

**CONSTRUCTION ENGINEERING**

**901 Subsurface Investigation Inspection**

Conduct full on-site inspections during subsurface operations. Follow inspection procedures, coordinate activities between the designer and the Department, and verify and record quantities for records and payment.

**902 Pre-Bid Conference**

Participate in Pre-Bid Conference. Provide written responses to contractor's questions.

**903 Pre-Construction Conference**

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

**904 Highway Shop Drawings and Signal Permit**

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

**905 Bridge and Wall Shop Drawings**

Review and approve structural shop drawings.

**906 Bridge Construction Procedures**

Review and approve bridge demolition and erection procedures.

**907 Furnishing Advice and Field Visits**

Provide assistance to MassHighway in interpreting the contract documents. Includes field visits to the construction site during all phases of construction as necessary.

**908 Geotechnical Construction Evaluation**

Provide a resolution to foundation issues during all phases of construction.

**909 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.

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.:	<b>30275</b>
Location:	Assignment No.:	
Bridge No.:	ProjInfo No.:	

<b>SECTION 100</b>							
<b>PROJECT DEVELOPMENT ENGINEERING</b>							
<b>PROJECT TYPE CODE: BR--PROJECT DESCRIPTION: BRIDGE REPLACEMENT</b>							
		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
101	Project Concept Preparation						
102	Preliminary Corridor Analysis						
103	Reasonable Alternative Determination						
104	Alternative Selection & Report Preparation						
105	Value Engineering (VE)						

SUBTOTAL

<b>SECTION 150</b>							
<b>ENVIRONMENTAL</b>							
		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
151	Early Coordination with Local Commissions						
152	NEPA/MEPA Determination						
153	Project Development Meetings and Hearings						
154	NEPA - Draft Environmental Impact Statement (EIS)						
155	NEPA - Final Environmental Impact Statement (EIS)						
156	NEPA - Environmental Assessment (EA)						
157	NEPA - Categorical Exclusion (CE)						
158	ACOE Programmatic General Permit (PGP)						
159	Individual ACOE (404) Permit						
160	U.S. Coast Guard Bridge Permit						
161	Programmatic Section 4(f) Evaluation						
162	Draft Individual Section 4(f) Evaluation						
163	Final Individual Section 4(f) Evaluation						
164	MEPA - Draft Environmental Impact Report (DEIR)						
165	MEPA - Final Environmental Impact Report (FEIR)						
166	MEPA - Environmental Notification Form (ENF)						
167	Wetland Resource Area Delineation						
168	Wetlands Protection Act (WPA) ANRAD						
169	WPA - Request for Determination of Applicability						
170	WPA - Notice of Intent (NOI)						
171	WPA - Variance						
172	Chapter 91 License Application						
173	Chapter 91 Permit Application						
174	Water Quality Certification (401)						
175	Coastal Zone Management Consistency Certificate						
176	Hist./Arch. Impacts (Section 106 and Chapter 254)						
177	Hazardous Materials Research/Review						
178	Wildlife/Biological Assessment						
179	Coordination and Liaison						
180	ACOE 404 Permit PGP II or PGP I (Not Individual)						

SUBTOTAL

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.: <b>30275</b>
Location:	Assignment No.:
Bridge No.:	ProjInfo No.:

**SECTION 200  
FUNCTIONAL DESIGN REPORT (FDR)**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
201	Evaluate Existing Conditions						
202	Traffic Count Analysis						
203	Safety Analysis						
204	MUTCD Signal Warrants						
205	Intersection Analysis						
206	Proposed Geometrics						
207	Report Preparation						

SUBTOTAL

**SECTION 220  
DESIGN EXCEPTION REPORT**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
221	Evaluate 13 Controlling Criteria (MHD HDM, Ch. 8)						
222	Perform Incremental Analysis						
223	Prepare Narrative/Report						

SUBTOTAL

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.:	30275
Location:	Assignment No.:	
Bridge No.:	ProjInfo No.:	

**SECTION 300  
25% HIGHWAY DESIGN SUBMISSION**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
301	Project Initiation and Data Compilation						
302	Utility Coordination						
303	Survey Coordination and Controls						
304	Base Plans, Profiles and Typical Sections						
305	Field Reconnaissance						
306	Plot Existing Layout Lines						
307	Meetings and Liaison						
308	Determine Roadway Cross Section						
309	Preliminary Horizontal Geometry						
310	Preliminary Vertical Geometry						
311	Cross Section Studies						
312	Prepare Cross Sections						
313	Plot Proposed Layout and Easements						
314	Pavement Design						
315	Typical Sections						
316	Construction Details						
317	Hydrological Studies and Hydraulics Report						
318	Preliminary Drainage and Utility Studies						
319	Lane Configuration						
320	Traffic Signals						
321	Preliminary Signs and Pavement Markings						
322	Preliminary Traffic Management Plan (TMP)						
323	Early Environmental Coordination						
324	Constructability Review						
325	Quality Control (QC) Review						
326	Preliminary Construction Estimate						

SUBTOTAL

**SECTION 350  
DESIGN PUBLIC HEARING**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
351	Modifications and Revisions						
352	Meeting Preparation						
353	Design Public Hearing						

SUBTOTAL

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.: <b>30275</b>
Location:	Assignment No.:
Bridge No.:	ProjInfo No.:

**SECTION 400  
75% HIGHWAY DESIGN SUBMISSION**

	Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
401 Response to 25% Comments						
402 Field Reconnaissance						
403 Meetings, Liaison and Coordination						
404 Utility Coordination						
405 Final Horizontal Design Geometrics						
406 Final Vertical Design Geometrics						
407 Pavement Design						
408 Typical Cross Sections						
409 Plot Cross Section						
410 Plot Proposed Layout and Easements						
411 Construction Plans						
412 Grading & Tie Plans						
413 Drainage and Water Supply Details						
414 Preliminary Traffic Signs						
415 Guide Sign Design & Overhead Directional Elevations						
416 Traffic Signals and Plan Preparation						
417 Pavement Markings and Plan Preparation						
418 Traffic Management Plans (TMP)						
419 Highway Lighting Plans and Details						
420 Landscaping and Plan Preparation						
421 Erosion Control Plans						
422 Miscellaneous Contract Plans						
423 Estimate						
424 Draft Special Provisions						
425 Constructability and Quality Control (QC) Review						

SUBTOTAL

**SECTION 450  
100% HIGHWAY DESIGN SUBMISSION**

	Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
451 Respond to 75% Comments						
452 Finalize Plans						
453 Finalize Special Provisions						
454 Finalize Estimate						
455 Quality Control (QC) Review						

SUBTOTAL

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.:	30275
Location:	Assignment No.:	
Bridge No.:	ProjInfo No.:	

**SECTION 500  
RIGHT OF WAY**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
501	Preliminary Right of Way Plans						
502	Layout and Order of Taking Plans						
503	Written Instrument						
504	Final Right of Way Plans						

SUBTOTAL

**SECTION 600  
GEOTECHNICAL REPORT**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
601	Research Available Subsurface Data						
602	Field Reconnaissance						
603	Subsurface Investigation Plan						
604	Office Studies, Analysis and Testing						
605	Geotechnical Report						
606	Meetings, Reviews and Liaison						
607	Final Plans, Specifications and Estimate						

SUBTOTAL

**SECTION 700  
PROJECT DEVELOPMENT (STRUCTURAL)**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
701	Field Investigation						
702	Determine Bridge Configuration						
703	Preliminary Structural Analysis						
704	Comparative Design and Cost Analysis						
705	Preliminary Structures Report Preparation						
706	Type Study Report Preparation						
707	Meetings and Liaison						

SUBTOTAL

**SECTION 710  
BRIDGE SKETCH PLANS**

		Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
711	Establish Boring Locations						
712	Hydraulics Study and Report (Bridges over Water)						
713	Sketch Plan Development						
714	Meetings, Coordination and Liaison						
715	Constructability Review						

SUBTOTAL

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.: <b>30275</b>
Location:	Assignment No.:
Bridge No.:	ProjInfo No.:

**SECTION 750  
FINAL BRIDGE DESIGN**

	Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
751 Structural Design - Superstructure						
752 Structural Design - Substructure						
753 Bridge Layout Geometrics						
754 Contract Drawings						
755 First Review Submission						
756 Quantity Cost Estimates						
757 Special Provisions						
758 Second Review Submission						
759 FHWA Review						
760 Meetings and Liaison						
761 Constructability and Quality Control (QC) Review						

SUBTOTAL

**SECTION 800  
PS&E SUBMISSION**

	Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
801 Respond to 100% Comments						
802 Finalize Plans, Specifications and Estimate						
803 Prepare Detail Sheets						
804 Combine Highway and Bridge						
805 Constructability and Quality Control (QC) Review						
806 Value Engineering (VE)						

SUBTOTAL

**SECTION 900  
CONSTRUCTION ENGINEERING**

	Proj. Mgr.	Sr. Engr.	Design Engr.	Jr. Engr.	Technician	TOTAL
901 Subsurface Investigation Inspection						
902 Pre-Bid Conference						
903 Pre-Construction Conference						
904 Highway Shop Drawings and Signal Permit						
905 Bridge and Wall Shop Drawings						
906 Bridge Construction Procedures						
907 Furnishing Advice						
908 Geotechnical Construction Evaluation						
909 Bridge Rating and Photographs						

SUBTOTAL

**COMMONWEALTH OF MASSACHUSETTS  
HIGHWAY DEPARTMENT  
WORK-HOUR ESTIMATE**

City/Town	Contract No.:	30275
Location:	Assignment No.:	
Bridge No.:	ProjInfo No.:	

**HOURLY RATE SUMMARY**

		Proj. Mgr.	Sr. Engr.	Design Engr	Jr. Engr.	Technician
DIRECT HOURLY RATE (\$)		\$45.00	\$40.55	\$26.69	\$24.82	\$32.32
INDIRECT COST(%)	135	\$60.75	\$54.74	\$36.03	\$33.51	\$43.63
FEE (%)	11.8	\$12.48	\$11.24	\$7.40	\$6.88	\$8.96
<b>NET HOURLY RATE (\$)</b>		<b>\$118.23</b>	<b>\$106.54</b>	<b>\$70.12</b>	<b>\$65.21</b>	<b>\$84.91</b>

**WORK HOUR AND FEE SUMMARY**

TASK DESCRIPTION	PROJ. MGR.	SR. ENGR.	DESIGN ENGR.	JUNIOR ENGR.	TECHN	TOTAL HOURS	TOTAL FEE
100 PROJECT DEVELOPMENT ENGINEERING							\$ -
150 ENVIRONMENTAL							\$ -
200 FUNCTIONAL DESIGN REPORT							\$ -
220 DESIGN EXCEPTION REPORT							\$ -
300 25% HIGHWAY SUBMISSION							\$ -
350 DESIGN PUBLIC HEARING							\$ -
400 75% HIGHWAY SUBMITTAL							\$ -
450 100% HIGHWAY SUBMITTAL							\$ -
500 RIGHT OF WAY							\$ -
600 GEOTECHNICAL REPORT							\$ -
700 PROJECT DEVELOPMENT/STRUCTURAL							\$ -
710 BRIDGE SKETCH PLANS							\$ -
750 FINAL BRIDGE DESIGN							\$ -
800 PS&E SUBMITTAL							\$ -
900 CONSTRUCTION ENGINEERING							\$ -
<b>TOTAL WORK-HOURS</b>							
ACTUAL PERCENTAGES (TYPICAL PERCENTAGES)	#DIV/0! 1 to 2	#DIV/0! 10 to 15	#DIV/0! 15 to 25	#DIV/0! 30 to 35	#DIV/0! 30 to 40	#DIV/0!	
							<b>TOTAL \$ -</b>
(a) Salary Costs							\$ -
(b) Indirect Costs (%)	135						\$ -
(c) Net Fee (%)	11.8						\$ -
TOTAL LIMITING FEE							\$ -
(d) Direct Expenses							\$ 8,000.00
MAXIMUM PAYMENT AMOUNT							\$ 8,000.00
(e) Special Engineering							\$ 5,000.00
MAXIMUM OBLIGATION							\$ 13,000.00
						SAY	\$ 13,000.00
MHD Personnel (%)	12						\$ 1,560.00
						SAY	\$ 1,500.00

## ATTACHMENT A

### SCOPE OF SERVICES

#### VALUE ENGINEERING CONSULTANT

##### **Project Narrative**

Under the terms of this Contract, the Consultant shall provide the necessary design and engineering services to assist Massachusetts Highway Department (Department) staff with the implementation of the Department's Value Engineering (VE) Program.

The work will generally consist of performing Value Engineering Studies for selected projects that are under design.

##### **General**

Value Engineering is defined as: "The systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide the needed functions to accomplish the original purpose of the project reliably, and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project."

##### **Scope of Services**

###### VE Team Studies

It is assumed that each VE Study will take 5 weeks (1 week for data collection and discussion, and 2 weeks for submission of a Draft Report). A Final Report will be due within 2 weeks of receiving the Draft Report comments.

The Value Engineering Study Team shall consist of a Team Leader and a minimum of four individuals from different specialty areas, such as design, construction, environment, maintenance, and right-of-way. The team leader shall be a Certified Value Specialist (CVS). There shall be at least two registered Professional Engineers on the team. Consultants or firms shall not be retained to conduct the VE Team Studies of their own designs.

The Consultant shall review all existing information including but not limited to: EIR, mitigation commitments, 25% design plans, public hearing transcript, 75% design plans, 100% design plans, interim design submissions, bridge type studies and structural submissions, functional design reports, design exception reports, MEPA and NEPA filings and other environmental permit documents.

The Consultant shall prepare a Value Engineering Report that contains recommendations that will reduce the overall project cost without sacrificing safety or environmental project attributes.

## ATTACHMENT A

### Scope of Services

(Cont'd.)

#### Annual Report:

The Consultant shall assist in the development of the Annual Report to the FHWA regarding the progress of the VE Program.

#### VE during Construction:

The Consultant shall assist in the development of specifications and in the processing of Value Engineering Change Proposals (VECP) in construction projects.

#### Training:

The Consultant shall assist the Department in conducting VE Training, including but not limited to Module I and Module II courses.

### Experience

The Consultant shall have a Certified Value Specialist (CVS) on staff and shall be familiar with FHWA rules and regulations regarding Value Engineering.

The Consultant shall be familiar with the FHWA's definition and application of Value Engineering as published in the Federal Register on February 14, 1997 as well as the Federal-Aid Policy Guide, dated September 8, 1998.

57598-A

