



Quality Management Plan (QMP)

PROPOSAL NO.: 605306
CONTRACT NO.: 103045
FEDERAL AID NO.: NHP(BR-ON)-003S(113)

BRIDGE REPLACEMENT
H-12-039, INTERSTATE 495
(NB & SB) OVER
MERRIMACK RIVER
DESIGN-BUILD PROJECT

HAVERHILL, MASSACHUSETTS

January 18, 2019

Revision 00





New England, Inc.



Quality Management Plan Haverhill I-495 Design-Build

FOREWORD

The Design-Build Entity (DB Entity) commits the strong reputations of SPS New England, Inc and HNTB Corporation to the proper implementation and documentation of the following Quality Management Plan. We acknowledge our responsibility for delivering a quality project and reaffirm the dedication of ALL members of the team to implement a proactive Quality Control system.

The DB Entity recognizes that Quality Control requires the guidance and commitment from senior personnel along with proper training and communication to ALL members of the project team to ensure compliance and engagement with the requirements established herein. The Quality Control personnel included in this plan, led by the Quality Control Administrator, have the experience, respect and ultimate stop-work authority to ensure this project is completed with excellence, efficiency and unparalleled cooperation.

The following Quality Management Plan defines the methods necessary to implement a proactive Quality Control system and the steps and documentation that will assist the DB Entity in matching the "plan" with "performance". The document details the collaboration, technology and follow-through required to build a culture, attitude and philosophy centered on exceeding expectations and taking the steps necessary to ensure tasks are *done right the first time*.

SPS New England and HNTB take great pride in the quality of our work, as well as the methods and processes that have been developed to achieve this quality. To maintain this commitment to quality, we have created and will continuously reference, use, and update this Quality Management Plan.

Submitted by:

1/21/19

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President, Transition Engineering, Inc.

Date

Endorsed by:

01/21/2019

SPS New England, Inc. – Executive Committee

Date

Accepted by:

3/16/19

Massachusetts Department of Transportation

Date

Revision-00

January 18, 2019

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Appendix I - Quality Control Organization Chart and Tables

- 1) DB Entity Project Team Organization Chart
- 2) NETTCP 1-Day Quality Assurance Technologist Certificates
- 3) Submittal Distribution Matrix

Appendix II - Design Quality Control Forms

- 1) General Quality Procedure (CQP) Forms

Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
CQP 1.01 Form 1	Quality Control Checklist	0	06/15/18
CQP 1.02 Form 1	Early Release for Construction (ERC) Checklist	0	06/15/18
CQP 2.01 Form 1	Critical Item List / Matrix	0	06/15/18

- 2) Design Quality Procedures (DQPs) & Forms*

Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
DQP 1.01	Preparation and Revision of Design Quality Procedures	0	6/15/18
DQP 1.02	Design Document Control System	0	6/15/18
DQP 1.03	Software Validation	0	6/15/18
DQP 1.04	Design Quality Control Process Review	0	6/15/18
DQP 1.05 Form 1	DQCM Submittal Review Memorandum	0	6/15/18
DQP 1.05 Form 2	DQCM Submittal Review Checklist	0	6/15/18
DQP 1.06	Design Directives	0	6/15/18
DQP 1.06 Form 1	Design Directive Log	0	6/15/18
DQP 1.07	Notice of Design Change	0	6/15/18
DQP 1.07 Form 1	Notice of Design Change	0	6/15/18
DQP 1.07 Form 2	Notice of Design Change Log	0	6/15/18
DQP 1.08 Form 1	Corrective and Preventative Action Process (CAP)	0	6/15/18

* Forms are provided with each DQP as noted. Alternative forms may be substituted with approval of the Quality Control Administrator.



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Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
DQP 1.09	Designer Pre-AFC Design Change	0	6/15/18
DQP 1.09 Form 1	Pre-AFC Design Change Memorandum	0	6/15/18
DQP 1.09 Form 2	Pre-AFC Design Change Memorandum Log	0	6/15/18
DQP 2.01	Checking of Calculations	0	6/15/18
DQP 2.01 Figure 1	QC Color Code	0	6/15/18
DQP 2.01 Form 1	Level 1 Check Print Sign-Off Sheet	0	6/15/18
DQP 2.02	Checking of Drawings	0	6/15/18
DQP 2.03	Checking of Input to Computer Programs	0	6/15/18
DQP 2.04	Checking of Calculations Utilizing Independent Design Checks	0	6/15/18
DQP 2.05	Checking of Studies or Report-Type Documents	0	6/15/18
DQP 2.05 Form 1	Review Memorandum - Studies, Report Documents, and Supplemental Specifications	0	6/15/18
DQP 2.06	CADD Quality Control Audits	0	6/15/18
DQP 2.06 Form 1	CADD Quality Control Audit Review Memorandum	0	6/15/18
DQP 2.06 Form 2	CADD Quality Control Audit Checklist	0	6/15/18
DQP 2.06 Form 3	CADD Quality Control Review Log	0	6/15/18
DQP 2.07	Checking of Supplemental Specifications	0	6/15/18
DQP 2.08	Review of Documents Prepared by Others	0	6/15/18
DQP 2.09	Design Quality Control Reviews	0	6/15/18
DQP 2.09 Form 1	Comment Disposition Form	0	6/15/18
DQP 2.09 Form 2	Certification of Conformance for Design Submittal – Permanent Work	0	6/15/18
DQP 2.09 Form 3	Certification of Conformance for Approved for Construction (AFC)	0	6/15/18
DQP 2.09 Form 4	Certification of Conformance for Construction Engineering Design Submittal	0	6/15/18
DQP 2.09 Form 5	Certification of Conformance for Construction Engineering Design Submittal	0	6/15/18



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Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
DQP 2.10	Interdisciplinary Reviews	0	6/15/18
DQP 2.10 Form 1	Interdisciplinary / Senior Technical Review Memorandum	0	6/15/18
DQP 2.11	Environmental Compliance Design Reviews	0	6/15/18
DQP 2.11 Form 1	Environmental Compliance Review Memorandum	0	6/15/18
DQP 2.12	Constructability Reviews (CR)	0	6/15/18
DQP 2.13	Color Codes	0	6/15/18
DQP 2.14	Visual Check	0	6/15/18
DQP 2.14 Form 1	Visual Check Sign-Off Sheet	0	6/15/18
DQP 2.15	Senior Technical Review	0	6/15/18
DQP 2.16 Form 1	Deliverable Quality Matrix	0	6/15/18
DQP 3.01	Field Design Services	0	6/15/18
DQP 3.01 Form 1	Field Design Change Log	0	6/15/18
DQP 3.01 Form 2	Request for Information Log	0	6/15/18
DQP 3.02	Shop Drawing Reviews	0	6/15/18
DQP 3.02 Form 1	Shop Drawing Submission Log	0	6/15/18
DQP 3.02 Form 2	Shop Drawing Review Memorandum	0	6/15/18
DQP 3.03	Preparation of Record Drawings	0	6/15/18
DQP 3.03 Form 1	Record Drawing Review Memorandum	0	6/15/18



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Appendix III - Quality Control Inspection Report Forms

1) Construction Quality Procedure (CQP) Forms

Form No.	Form Title	Revision No.	Effective Date
CQP 1.03 Form 1	Construction QC Daily Report	0	6/15/18
CQP 1.04 Form 1	Example QC Inspection Report Forms (NETTCP)	0	6/15/18
CQP 1.05 Form 1	Material Receipt Inspection Report (MRIR) Form	0	6/15/18
CQP 2.02 Form 1	Work Instruction Procedure	0	6/15/18
CQP 2.03 Form 1	Pre-Excavation Checklist	0	6/15/18
CQP 2.04 Form 1	Concrete Pre-Placement Inspection Checklist	0	6/15/18
CQP 3.01 Form 1	Daily Job & Safety Briefing	0	6/15/18
CQP 3.02 Form 1	SPS New England Site Inspection Form	0	6/15/18
CQP 3.03 Form 1	SPS Hoisting Permit	0	6/15/18
CQP 4.01 Form 1	MassDOT Non-Conformance Report (SharePoint)	0	6/15/18
CQP 4.02 Form 1	Request for Information (SharePoint)	0	6/15/18

Appendix IV - Quality Control Test Report Forms

Form No.	Form Title	Form Originator
D3665	Random Sampling Test Report	NETTCP
T27	Sieve Analysis Test Report	NETTCP
T27x4	Sieve Analysis Test Report	NETTCP
T119	PCC Slump, Air Content & Unit Mass Test Report	NETTCP
T22	PCC Field Test and Cylinder Strength Test Report	NETTCP
T96	Resistance to Degradation of Aggregate by Abrasion Test Report	NETTCP
PCCCVR	PCC Cover over Reinforcing Steel Test Report	NETTCP
FDT	Soils In-Place Density Test Report Form	ATC



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Appendix V - Preliminary QC Inspection & Testing Schedules	
1) Preliminary Quality Control Inspection Schedules	
2) Preliminary Quality Control Sampling & Testing Schedules	
3) Quality Control Sampling & Testing Ledger (Rev 0)	
Appendix VI - Mock-Up and Control Section Forms	
1) Control Section Form	



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1.0 INTRODUCTION

The Quality Management Plan (QMP) by definition is developed to ensure that the performance of the Design-Build (DB) work fulfills the design and construction requirements of the RFP and Contract. However, the DB Entity realizes that this document must lay the ground work for ALL Quality Control on the project and detail the collaborative process required to ensure tasks are completed right *the first time*. The Quality Management Plan is intended to achieve the following objectives:

- Place the responsibility for achieving design quality and construction quality with the DB Entity.
- Establish protocols for disseminating the QMP to all members of the team, including field personnel.
- Establish procedures for coordinating and ensuring consistency and quality of work performed by Sub-consultants, Subcontractors, Producers, Fabricators, and Manufacturers.
- Ensure that all design and construction documents developed by the DB Entity are prepared in accordance with all standards identified in the Contract.
- Establish a method of distributing all Quality Control documents that provides ALL team members and MassDOT with immediate and organized access.
- Ensure that the quality of the materials and workmanship of all completed construction work meets or exceeds the quality requirements set forth by MassDOT.

To ensure the incorporation of quality into every aspect of the Haverhill I-495 Bridge Replacement project, the DB Entity will build on the Total Quality Management (TQM) program first implemented by SPS in 2009. The TQM philosophy will be adopted by EVERY member of the DB Entity team, with the following goals:

- To exceed clients' and employees' needs and expectations
- To remain committed to developing and preserving long-term client relationships
- To enhance employee skills and training to ensure diversified industry excellence
- To improve processes, products, safety and services
- To promote a team atmosphere with shared vision
- To take the time to complete tasks right *the first time* to limit rework
- To learn from any oversights and implement immediate corrective actions to prevent reoccurrence
- To build on SPS's core values of honesty, integrity, quality & pure professionalism

All team members, from executive management to trade employees, are involved and empowered to continuously improve the business and reduce losses. TQM strives to incorporate the knowledge and experience of all employees and contract owners to improve the processes by which we do business.



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1.1 Project Work Packages

The DB Entity will utilize specific Project Work Packages throughout the design and construction process to ensure the utmost efficiency of the Design-Build delivery system. Work Packages will make information related to specific work activities easy to navigate throughout the duration of the project. The project scope will be divided into the specific Work Packages identified below:

- I. Project Management
 - A. Project Management Plan
 - B. Quality Management Plan
 - C. Contingency Plan
 - D. Public Participation Plan

- II. Environmental
 - A. Dredge Material Plan
 - B. Dust Control Plan
 - C. Environmental Monitoring Plan
 - D. Environmental Permits / Amendment Submittals
 - E. Groundwater & Soil Management Plan
 - F. Health & Safety Plan
 - G. Invasive Species Management Plan
 - H. Lead Containment Plan
 - I. Noise Control Plan
 - J. Stormwater Pollution Prevention Plan (SWPPP)

- III. Interstate 495 Bridge Package
 - A. Design
 - 1. Early Release – Geotechnical Report
 - 2. Early Release – Northbound Alignment & Profile
 - 3. Early Release – Northbound Drilled Shafts
 - 4. Early Release – Northbound Structural Steel & Bearings
 - 5. Early Release – Northbound Substructure Design
 - 6. Early Release – Northbound Superstructure Design
 - 7. Early Release – Stage 1 Temporary Traffic Control Plan
 - 8. Bridge Sketch Plans
 - 9. 1st Bridge (NB & SB) Design Submittal
 - 10. 2nd Bridge (NB & SB) Design Submittal (100%)
 - 11. Bathymetric Survey
 - 12. Hydraulic & Scour Analysis
 - 13. Design of Temporary Works
 - 14. 75% Special Provisions (as needed)
 - 15. 100% Special Provisions (as needed)



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- B. Construction
 - 1. Applicable Shop Drawings
 - 2. Deck Placement Procedure
 - 3. Demolition Plan
 - 4. Drilled Shaft Installation Procedure
 - 5. Existing Sewer Protection Plan
 - 6. Steel Erection Plan
 - 7. Support of Excavation Procedure
 - 8. Applicable Quality Control Plans (as needed / specified)
- IV. Interstate 495 Highway Package
 - A. Design
 - 1. Drainage Plans
 - 2. Stages 2 & 3 Temporary Traffic Control Plans
 - 3. 75% Highway Design Submittal
 - 4. 100% Highway Design Submittal
 - B. Construction
 - 1. Real-Time Traffic Management Plan
 - 2. Applicable Shop Drawings
 - 3. Applicable Quality Control Plans (as needed / specified)

1.2 Project Quality Assurance Requirements

To ensure that the goals for the Project quality are met, MassDOT has established Quality Assurance (QA) requirements for DB projects. This includes a Design QA Program to address quality in the design process and a Construction QA Program to ensure the quality of construction.

1.2.1 Design QA Program

MassDOT's Design QA Program for DB projects includes the following two core elements:

- Design Quality Control (QC) system by the DB Entity
- Design Acceptance system by MassDOT

1.2.2 Construction QA Program

MassDOT's Construction QA Program for DB projects includes the following six core elements:

- Construction Quality Control (QC) system by the DB Entity including subcontractors
- Construction Acceptance system by MassDOT (or its Designated Agent)
- Independent Assurance (IA) by MassDOT (or its Designated Agent)
- Dispute Resolution system established by MassDOT
- Qualified/Accredited Laboratories (All Contractors and MassDOT)
- Qualified/Certified Inspection & Testing Personnel (All Contractors and MassDOT)



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1.2.3 QA Program Responsibilities

As the DB Entity Lead for the Haverhill Design-Build Project, SPS is responsible for implementing a comprehensive Quality Control (QC) system that addresses Design QC activities, Construction QC activities, qualified/accredited laboratories, and qualified/certified inspection & testing personnel. MassDOT is responsible for Design Acceptance/ Approval actions, Construction Acceptance actions, an IA system, and a Dispute Resolution system.

1.3 Quality Management Plan

This Quality Management Plan (QMP) is intended to formally document the Quality Control system and procedures established to achieve quality design documents, quality materials, and quality construction workmanship on the project. The QMP includes policies and procedures that the DB Entity will use to formalize, standardize, and continuously improve the processes needed to provide a design that conforms with the project design standards and to construct the project in accordance with all approved plans and specifications.

This QMP is intended to support an effective operation of work processes, and places emphasis on the proactive *prevention of problems* rather than their detection and correction. The QC procedures in this QMP create a framework for the identification, correction and/or improvement of conditions adverse to quality should they occur during the project.

1.4 Quality Management Plan Approval and Revisions

This QMP will be submitted by SPS for review and acceptance by MassDOT and FHWA. Revisions will be tracked within the SharePoint website, and the revision number can also be found on the document cover and footer. Once the QMP is accepted by MassDOT, SPS will distribute the document to all key personnel of the DB Entity, as well as the Subcontractors, Producers, Fabricators, and Manufacturers. It will also be uploaded to the SharePoint website in the “Accepted Quality Management Plan” directory, within a folder designated solely for the clean, conformed copy of the most recently approved QMP. This will ensure that all project QC requirements and procedures contained in the approved QMP are adhered to at all times.

This QMP is intended to be a living document, and as such will likely require revision or updates as the work progresses and processes are refined. In such cases, SPS will submit all proposed revisions to MassDOT and FHWA for review with a cover sheet identifying, at a minimum: revision number, date, section(s) revised including page number, and a brief description if/as needed. Once the revisions are accepted by MassDOT & FHWA, SPS will issue the revised document to all personnel originally included in the QMP distribution.



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1.5 Construction Quality Control Plans (QC Plans)

Quality Control Plans (QC Plans) are project-specific documents that will address specific production facility and field placement processes for individual elements of work on the project. These QC Plans will provide MassDOT and the DB Entity a forum to discuss and resolve the QC procedures before any related work begins on the applicable Work Item. All QC Plans will be submitted to MassDOT for review and acceptance a minimum of 45 days prior to the planned start of work on the subject Work Item. The specific anticipated Work Items to require QC Plans for this project include:

- Bridge Superstructure - Deck Membrane Waterproofing System
- Bridge Superstructure – Steel Elements (Bearings & Girders)
- Concrete Structure Elements – Cast-in-Place (Abutments, Bridge Barrier, Bridge Decks, Piers & Retaining Walls)
- Drilled Shafts
- Earthwork
- Hot Mix Asphalt Pavement
- Other Work Items (as deemed necessary as the work progresses)

For additional information on project QC Plans, refer to QMP Section 5.

1.6 Fabricator and Manufacturer Quality System Manuals (QSMs)

Each Fabricator & Manufacturer is required to have their own Quality System Manual (QSM) outlining their QC System. The QSM shall follow the format and outline contained in AASHTO R38 – Section 5.2.1, or a similar format and outline that has previously been accepted by MassDOT. Each Fabricator's or Manufacturer's QSM will be reviewed and accepted by the Construction QC Manager and then transmitted to MassDOT for their use and information prior to fabrication or manufacture. If a Fabricator's or Manufacturer's QSM is referenced in a Quality Control Plan, the QSM will be attached as an appendix to the QC Plan for reference.



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2.0 QUALITY CONTROL ORGANIZATION

2.1 DB Entity Project Team

This section describes the key project management personnel, their duties and responsibilities, and the chain of command for reporting activities.

2.1.1 Management Structure

SPS is the DB Entity Lead for the Haverhill I-495 Design-Build project, and will be responsible for project management, quality, safety, bonding and overall execution of all construction and field operations.

SPS has teamed with HNTB Corporation (HNTB), an organization with a long history of success on many civil/bridge projects for MassDOT, to be the lead Design Engineer.

The project team organization chart is attached in Appendix I.

2.1.2 Design Organization

HNTB is responsible for the overall design and development of contract plans. The Design Production Team will be responsible for: operation, validation and approval of computer software; discipline coordination reviews; independent technical reviews; drawing and specification cross-checks; constructability reviews; and detailed checking of calculations, plans, and specifications. The Design QC Team will be responsible for managing the review comment procedures and forms and conducting all final checks and verifications for formal submissions; for more detailed information on design team roles and responsibilities, see QMP Section 4. HNTB will also provide relevant design expertise through the following key Sub-consultants:

- Green International Affiliates, Inc. – utility engineering, ROW, bridge and highway engineering design support
- Regina Villa Associates, Inc. – public participation/outreach
- Shadley Associates, P.C. – landscape architecture

2.1.3 Construction Organization

SPS is responsible for the oversight & execution of construction and field operations, comprising work related to earthwork, site work, drainage, roadway improvements, and bridge demolition and construction activities.



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SPS has entered into teaming agreements with several key entities, listed below:

- ATC Group Services - Construction Quality Control
- Atlantic Bridge Engineering – Furnish & Install Structural Steel (partial)
- Prime Engineering, Inc. – Environmental Compliance & Permitting Management
- Transition Engineering, Inc. - Eric Cederholm, PE, Quality Control Administration

Additionally, SPS will engage the specialty services of other Subcontractors and Suppliers for various disciplines of work. Once determined, each Subcontractor or Supplier will be identified in applicable QC Plans or Construction Procedures. Subcontractors and Suppliers will be given the opportunity to supply their own QSM or Construction Procedure, as applicable, if it includes all the necessary QC procedures; if they are unable to provide their own compliant document, they will be integrated into and contractually obligated to this QMP.

2.2 Project Management Personnel

2.2.1 Executive Committee

The Executive Committee consists of Robert Naftoly of SPS New England, Inc. and Phil Brake of HNTB Corporation. They have the responsibility of overseeing the project and providing input and resolution when deemed necessary.

2.2.2 Project Manager

The Project Manager is Matthew McCue of SPS. Matt is responsible for the day-to-day management of field and office project staff; acts as the DB Entity Lead's authorized representative; reports directly to the Executive Committee, as well as several other SPS executives; is responsible for communication between SPS and the MassDOT Resident Engineer; manages implementation of the Quality Control System; and oversees the engineering, construction, and execution of the contract. In addition, Matt has the following responsibilities:

- Review and interpret engineering documents, which includes providing technical guidance on the application of design requirements for designated work and the development of work plans
- Finalize field requests/notices for design changes
- Assure that record drawings are completed and transmitted to the Client as required
- Determine that engineering design work is subjected to all applicable design control measures
- Approve procurement orders
- Prepare work procedures that detail the methods by which requirements of the Owner's Contract Specifications and Contract drawings will be accomplished
- Review shop drawings, field drawings, fabrication drawings, and construction drawings prepared by Subcontractors, Vendors, Suppliers, and Fabricators
- Act as the primary point of contact with MassDOT



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2.2.3 Design Manager

The Design Manager for the project is John Smith, PE of HNTB Corp. John is responsible for the day-to-day management of the Design Production Team, and reports directly to the Project Manager, Matt McCue. John is responsible for directing and implementing the Technical, Discipline and Constructability reviews prior to final Design QC check. John will also have a regular on-site presence throughout the construction phase of the project, and will play a critical role facilitating coordination and integration between the design and construction processes, as well as in helping Construction Management staff resolve technical issues in the field in real-time.

2.2.4 Construction Manager

The Construction Manager for the project is Jon Dyer of SPS. Jon, in conjunction with the Construction Superintendent, is responsible for the day-to-day management of the Construction Production Team and is a key point of communication for field operations.

2.2.5 Construction Superintendent

The Construction Superintendent is Matt St. Cyr of SPS. Matt is responsible for the day-to-day management of the Construction Production team. Matt reports directly to and works closely with the Construction Manager to plan and schedule labor, equipment, material and subcontractor resources. A more detailed explanation of Matt's responsibilities is included in Section 2.4.2.

2.2.6 Design Principal-in-Charge

The Design Principal-in-Charge is Gary Bua, PE of HNTB. Gary will work closely with Design Manager John Smith to oversee the design team and interface with Project Manager Matt McCue throughout the project. Gary will also, in conjunction with MassDOT Liaison Tim McLaughlin, conduct regular progress reviews of the project with Matt McCue and John Smith, and will help facilitate regular, streamlined communication with the MassDOT management team.

2.2.7 Deputy Design Manager

The Deputy Design Manager is Matt D'Angelo, PE of HNTB Corp. Matt will work closely with and assist the Design Manager in day-to-day management of the Design Production team, and will perform all of John Smith's duties in the case of his absence.

2.2.8 MassDOT Liaison

The MassDOT Liaison is Tim McLaughlin, PE of SPS. Tim will conduct regular progress reviews of the project with Matt McCue and John Smith, and will help facilitate communication with MassDOT by providing an easily accessible point of contact for members of the MassDOT management team.



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2.2.9 Environmental Permitting Manager

The Environmental Permitting Manager is Evan Watson of Prime Engineering, Inc. Evan is responsible for coordinating directly with John Smith, Design Manager, during the design and permitting phase to ensure that critical project-wide elements receive the necessary level of attention. Evan will also work closely with the construction team on the development & implementation of the Site-Specific Stormwater Pollution Prevention Plan (SWPPP) and will provide services required of a Wetlands Specialist to ensure the protection of adjacent wetlands and the Merrimack River throughout the project.

2.3 Formal Quality Control Team Personnel

2.3.1 Quality Control Administrator

The Quality Control Administrator is Eric Cederholm, PE of Transition Engineering. Eric is President of Transition Engineering, Inc. and is an expert in design engineering and construction management. He has been instrumental in developing procedures for complex bridge and highway construction and other collaborations with SPS, and was the Quality Control Administrator for SPS on the recent MassDOT Lexington Design-Build project. Eric has Design-Build project management experience as Project Manager of the \$385 million Route 3 North Transportation Improvements with MassDOT. Eric is a registered professional engineer and has over 20 years of transportation experience. In addition, Eric will maintain the required NETTCP Quality Assurance certification.

The QC Administrator is a key member of the project's team, and is responsible for overall management of the QC System as established in this QMP. Ultimately, the quality of design, materials, and construction workmanship on the Project is the responsibility of the QC Administrator. The QC Administrator reports directly to the DB Project Manager and coordinates all QC issues directly with MassDOT. If conditions warrant the need to replace the QC Administrator during the project, prior written approval will be received from MassDOT.

The QC Administrator has the following responsibilities:

- Ensure that the processes and procedures outlined in the QMP are established, implemented and maintained
- Manage the activities of all QC personnel
- Oversee the preparation of QC Plans for major Work Items
- Perform construction site audits of Quality Control sampling, testing, and inspection
- Prepare construction site quality documentation & maintenance of QC records
- Perform audits of Subcontractor, Producer, and Fabricator Quality Control programs on and off site
- Control the measuring and testing equipment program
- Provide technical direction for the work of testing laboratories, as well as inspection and nondestructive examination by Contractors & Subcontractors



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- Complete regular review of the Non-Conforming Item control system
- Review, prior to release, purchase orders and contracts/subcontracts
- Perform receiving inspection for completeness and traceability to the Work Item(s)
- Initiate stop-work action when conditions warrant
- Identify quality problems, initiate corrective actions, recommend solutions, coordinate and take lead where appropriate
- Report to the SPS Chairman/CEO on performance and areas requiring improvement
- Provide training and awareness of MassDOT's technical and quality requirements throughout the Project Staff

2.3.2 Design Quality Control Manager

The Design Quality Control Manager (DQCM) is William Edberg, PE, Ph.D. of HNTB. Bill is a Registered Professional Engineer in Massachusetts and holds a B.S., M.S., and Ph.D. in Civil Engineering. Bill has 21 years of transportation design engineering experience. In addition, Bill is a certified NETTCP QA Technologist (certification #879). In his role at HNTB, Bill has been project manager, department manager, Quality Control engineer and quality assurance engineer for a variety of assignments.

Bill is responsible for the implementation of all Design QC procedures and activities as established in the QMP. The DQCM has the necessary authority and organizational freedom to ensure that the procedures for Design Quality Control are being followed. As Design QC Manager, Bill will report all design-related findings to the QC Administrator.

Assisting Bill as the Deputy Design Quality Control Manager is Myles Kuchas, P.E. (CT) of HNTB. Myles will aid Bill in the creation of the QMP Design QC procedures, assist in providing quality support to the Design Team and provide QMP training. Under Bill's direction Myles will perform QC reviews as outlined in Section 4 and Appendix II, and is authorized to sign for the DQCM on the Design QC forms.

The Design QC Manager has the following responsibilities:

- Identify responsibilities, interfaces and authorities for design activities that affect quality
- Identify resource requirements and assist the Design Manager in assignment of appropriately qualified and trained personnel
- Conduct Quality Control reviews of design activities
- Coordinate Quality Control and Constructability reviews
- Ensure that calculations and plans have been independently checked and all design and construction comments have been addressed prior to submittal to MassDOT
- Work independently of Design Production Personnel
- Manage all design QC activities



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2.3.3 Construction Quality Control Manager

The Construction Quality Control Manager (CQCM) is Dan Jolda of SPS. Dan has recent Construction QC experience on Design-Build projects including the MassDOT East-West Parkway Project and the MassDOT All Electronic Tolling System (AETS) Project. Dan is also certified as a NETTCP Quality Assurance Technologist (Certificate No. 437).

The Construction QC Manager is responsible for implementation of all Construction QC procedures and activities as established in this QMP. The Construction QC Manager has primary responsibility and authority for developing and implementing the many details of the Construction QC Plans. The Construction QC Manager is responsible for coordinating with all trades-workers of each Subcontractor, Producer, Fabricator, and Manufacturer to ensure that their QC systems are providing products that conform to the contract specification targets and quality limits. As Construction QC Manager, Dan will report all construction-related findings to the QC Administrator.

Assisting Dan as the Deputy Construction Quality Control Manager is Devon Wilton of SPS. Devon has recent Construction QC experience on Design-Build projects including the MassDOT All Electronic Tolling System (AETS) Project. Devon is also certified as a NETTCP Quality Assurance Technologist (Certificate No. 938). Devon will aid Dan in the creation of the QMP Construction QC procedures, assist in providing quality support to the construction team and provide QMP training. Under Dan's direction Devon may perform QC reviews and is authorized to sign for the Construction QC Manager on the QC forms.

The Construction QC Manager has the following responsibilities:

- Establish the Construction QC system
- Prepare complete and functional QC Plans for major Work Items
- Manage the activities of all Construction QC Personnel
- Communicate regularly and proactively with Producer, Fabricator, and Construction Personnel to ensure quality
- Initiate corrective action when a process is found to need improvement or revision
- Review and approve Subcontractor, Producer, and Fabricator Quality Control documentation, including QC Inspection Reports and QC Sampling and Testing Reports
- Ensure proper QC documentation and records, QC Record Books, and Producer, Fabricator & Subcontractor QC Records
- Collect, upload, and maintain QC data on the Project SharePoint site
- Review and Accept Producer, Fabricator & Manufacturer QSMs
- Prepare and Submit Non-Conformance Reports
- Verify Non-Conformance Corrective Action
- Manage control of material delivery, storage and documentation, including preparation and issuance of materials and workmanship quality certificates
- Initiate field requests/notices for design changes
- Initiate procurement orders
- Initiate construction procedures that detail the methods by which requirements of the



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- Owner's Contract Specifications and Contract Drawings will be accomplished
- Perform basic review of shop drawings, field drawings, fabrication drawings, and construction drawings prepared by Subcontractors, Vendors, Suppliers and Fabricators

2.4 Design and Construction Personnel Frontline Quality Control Roles

All design and construction Production Personnel, consisting of staff performing design and construction work activity, are responsible for ensuring the quality of their work *and the work of all personnel working under their direction*. Design and construction production personnel will be trained to apply QC “self-checks” or “self-inspection” throughout the process of work.

All design and construction personnel will receive startup QC Training and Guidance from the QC Administrator and the lead Quality Control staff, as well as periodic follow-up and specialty training. The QC staff will also conduct formal QC checks, inspections & testing, independent of the Design and Construction Production Personnel checks.

The following team members are considered Key Production Personnel and will be responsible for adhering to the requirements and philosophies of the QMP, as well as *disseminating them directly to the production personnel working under their direction*.

2.4.1 Design Production Personnel

- Highway Design – Christopher Smith, PE (HNTB)
- Bridge Design – Mike Beintum, PE (HNTB)
- Traffic Engineering – Alex Sui, PE (HNTB)
- Environmental Permitting – Mark Kolonoski (HNTB)
- Geotechnical Engineering – Nabil Hourani, PE (HNTB)
- Drainage Engineering – Chris Naylor, PE (HNTB)
- Hydraulics/Scour – Steve Flormann, PE (HNTB)

2.4.2 Construction Production Personnel

- Construction Superintendent – Matt St. Cyr (SPS)
- Bridge Superintendent – Chris Green (SPS)
- Marine Superintendent – Greg Bashaw (SPS)
- Roadway Superintendent – Don Beaudoin (SPS)
- Structural Steel Superintendent – Dave Blais (ABE)
- Traffic Superintendent – Jim Zechello (SPS)



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This team of Superintendents is responsible for oversight of all field operations; coordination of equipment; supervision of all construction activities; designation and delegation of work to be performed by the various foremen and Subcontractors; and labor relations. Superintendents are also responsible for ensuring that personnel performing tasks and activities have the requisite skills and ability to make informed decisions. Superintendents other than the Construction Superintendent report to the Construction Superintendent; the Construction Superintendent reports directly to the Construction Manager.

Superintendents will be responsible for ensuring crews under their direction complete all applicable digital checklists as described in Section 5.2.2, including but not limited to: daily Job Hazard Analyses (JHAs); Quality Control checklists; pre-placement checklists; and daily tool box safety talks. Superintendents shall meet with the Construction QC & Construction Management teams prior to meeting with their foremen daily in order to ensure that crews are aware of all critical information as it pertains to planning for and ensuring quality, schedule, resource allocation and safety.

2.4.3 Construction Engineering Personnel

All Construction Engineering Personnel, consisting of staff performing project and field engineering activities, are responsible for ensuring the quality of their work, work they are assigned to manage / oversee and the work of all personnel working under their direction. To ensure uniform inspection and management of activities, detailed work procedures and standard or custom (as required) digital checklists will be utilized to focus attention on critical elements of the work. Checklists are seamlessly shared digitally with Construction Engineering Personnel from upper management, including QC Managers, using Project Management software. For examples of these digital checklists, see Appendix III. For further detail on Construction QC Procedures, refer to Section 5.

All Construction Engineering Personnel will receive comprehensive initial and periodic QC training and guidance from the QC Administrator and the Construction QC Manager. Quality Control management staff will have immediate access to all digital checklists completed by Construction Engineering Personnel to conduct formal QC checks of their inspections, notes, observations and testing.

2.5 Quality Control Organization Charts

The project team Organization Chart is included in Appendix I, including formal Quality Control Personnel denoted via light blue boxes on the chart.



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3.0 DOCUMENT MANAGEMENT PROCEDURES

This section describes the methods used to control the use of various design plans, specifications, reports, calculations, shop drawings and procedures. These methods and procedures are designed to ensure that appropriate quality requirements are specified and included in Design Documents and to control deviations from such requirements.

3.1 General

The objectives of Document Management and Control are to ensure that:

- All Project correspondence and documents are reviewed by, approved by, recorded by, and/or distributed to appropriate personnel
- Documents are date-stamped and logged upon receipt, including the revision number
- All documents are verified against the transmittal letter when appropriate
- Revisions to project documents are clearly identified and reapproved by appropriate personnel prior to redistribution
- All project documents are available and accessible to appropriate personnel
- All documents of external origin are reviewed by, approved by (if necessary), recorded by and distributed to appropriate personnel
- The inadvertent use of obsolete documents is prevented; obsolete-but-still-in-use documents are controlled (Reference Documents)
- Construction and fabrication activities are performed with the latest approved revision to the applicable documents

3.1.1 Summary of Responsibilities for Document Management

The Document Control Engineer assigned to this project is Leah Williams of SPS. Leah has 15 years of experience in the construction industry and has progressed from a Construction Administrator to Field Engineer & Assistant Project Manager on a number of projects. Leah will manage the day-to-day responsibilities of document control on the project, comprising the receipt, logging, and distribution of all documents; she will be supported and supervised in this role by the Project Manager, who will maintain ultimate responsibility for document control accuracy and contract compliance.

The Document Management and Control Procedures are designed to ensure that document filing and distribution is transparent, traceable, retrievable, and auditable at all times. It is the responsibility of each team member receiving or sending correspondence to file the document in the project files and to distribute the document to the appropriate team members.

The Project Manager and Document Control Engineer will be copied on all pertinent project correspondence. The Document Control Engineer will create and maintain a Document Log summarizing the Project Correspondence File, which will be reviewed by the Project Manager on a regular basis to ensure compliance. Only documents that are reviewed, approved and accepted will be used for construction, fabrication and erection. Design or contract documents



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will be distributed to the responsible organizations/individuals, as determined by the Project Manager.

The Project Manager will be responsible for all engineering coordination and interfaces with MassDOT concerning drawings, specifications and the work, as well as for reviewing design documents and specification changes for possible incorporation in the work.

3.2 Document Management System

The Document Management Procedures establish a standardized system for controlling, filing, and archiving project design plans, specifications, reports, calculations, and other construction documents and records. This system ensures that only the latest reviewed and approved documents are used and distributed to the Construction and Quality Control personnel performing and inspecting the work. The Document Management System also ensures that all relevant documentation, such as approved drawings and specifications, QC Inspection Reports, QC Test Reports, Certificates of Compliance, Submittals, Record Drawings, Non-Conformance Reports, and other contract documents are maintained, received, distributed, and filed appropriately.

3.2.1 Electronic Records System

3.2.1.1 Electronic Filing System Guidelines

The project will be set up with an individual electronic folder containing the following predetermined categories, which are proprietary to SPS:

- | | |
|---|--|
| 1) Bid File | g) Consulting Engineer |
| 2) Owner/SPS Team Contract and Insurance | h) Resident Engineer |
| 3) Subcontractors | i) City or Town |
| a) Each individual Subcontractor with copy of executed contract | 6) Document Organization |
| 4) Suppliers | a) Meeting Minutes (Including Log) |
| a) Each individual Supplier with copy of agreement or P.O. | b) Extra Work Orders (Including Log) |
| 5) Correspondence – Letters / Transmittals / Telecons / Emails | c) CRIM Spreadsheets |
| a) DB Entity to MassDOT | d) Request for Information (RFI) (Including Log) |
| b) MassDOT to DB Entity | e) Submittals (Including Log) |
| c) Transmittals – DB Entity to MassDOT | i) Design Submittals |
| d) Transmittals – MassDOT to DB Entity | ii) Shop Drawing Submittals |
| e) Utility Company | f) Contact List |
| f) Railroad | g) Production Meeting Reports |
| | h) Construction |
| | i) Issued for Construction Drawings |



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- ii) Accepted Construction Procedures
 - iii) Accepted Construction Quality Control Plans
 - iv) Approved Shop Drawings
- 7) Schedule
 - a) Baseline
 - b) Updates
- 8) Health and Safety Plan
- 9) Quality Control Documentation
 - a) Quality Management Plan
 - b) Quality Control Plans
 - c) Design QC Review Comments
 - d) Quality Checklists
 - e) QC Inspection Reports
 - f) QC Testing Reports
 - g) Subcontractor QC Documents
 - i) QC Inspection Reports
 - ii) QC Testing Reports
 - iii) Other Subcontractor QC Documents
 - h) Fabricator/Manufacturer QC Documents
 - i) QC Inspection Reports
 - ii) QC Testing Reports
 - iii) Other Fabricator/Manufacturer QC Documents
 - i) QC Daily Logs (HCSS HeavyJob)
 - j) Quality Level Analysis
 - k) QC Record Books
 - l) Certificates of Compliance
 - m) Material Sample Correspondence (Transmit of Samples)
 - n) Material Receiving Inspection Reports
 - o) Materials QC Ledger RMS 360
 - p) RMS 768 – Verification of Sources
 - q) Monthly QC Reports
 - r) Non-Conformance Reports
 - s) MassDOT NCR Responses
 - t) Corrective Action Reports
- 10) Certified Payrolls
- 11) Contract Documents
 - a) Specifications
 - b) Drawings
 - c) Existing / Record Plans
 - d) Contract Modification Notice
- 12) Project Photos
- 13) Subcontractors/Suppliers not chosen
- 14) Pay Estimates
 - a) Pay Estimates
 - b) Pay Estimate Reports
- 15) Accounts Payable
 - a) Invoices
 - b) Requisitions
 - c) Delivery Slips
- 16) Dig-Safe
- 17) Equal Employment Opportunity (EEO / EBO)
- 18) Cost Control



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3.2.2 Standard File Naming Convention

3.2.2.1 SharePoint Website

The Project SharePoint website is utilized on this project for control and distribution of submittals, correspondence, QC documents, and other project documents. The SharePoint site will be a secure document control system hosted and audited by MassDOT. The DB Entity is responsible for uploading project documents and submittals.

The project SharePoint site will act as a means of communication among all associated parties involved in the project. All design and construction submittals will be disbursed through the SharePoint site, and the status of each item will be trackable from submission to acceptance. See below for the current file structure of the SharePoint site; modifications may be made to this structure as the project progresses:

- 1) Home
- 2) Project Reporting
 - a) Project Photos
 - b) PCO EWO Tracking
 - c) Meeting Minutes
 - d) Civil Rights Reporting
- 3) Correspondence Logs
 - a) Letters – DB Entity to MassDOT
 - b) Letters – MassDOT to DB Entity
 - c) Transmittals – DB Entity to MassDOT
 - d) Transmittals – MassDOT to DB Entity
- 4) Submittals
 - a) Submittal Library
 - b) Sub-Contractor Approval
- 5) Early Release for Construction
 - a) Early Release for Construction Submittals
 - b) Materials – Early Release Reconciliation
 - c) Design Change – Early Release Reconciliation
 - d) Fabrication – Early Release Reconciliation
 - e) Construction – Early Release Reconciliation
- 6) Quality Management Plan (QMP)
 - a) Accepted Quality Management Plan
- 7) Approved Quality Control Submittals
- 8) Design
 - a) RFI Library
 - b) RFI Responses
 - c) RFI Review and Distribution List
 - d) RFI (For Information Only)
 - e) Plans and Specs
 - f) Field Design Change Notices



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- 9) Environmental
 - a) Permits and OOC
 - b) Environmental Monitoring Reports
- 10) Construction (MassDOT)
 - a) Accepted Construction Procedures
 - b) Approved Shop Drawings (View)
 - c) Deficiency Reports
 - d) Nonconformance Reports
 - e) MassDOT NCR Review Responses
 - f) NCR Review and Distribution Tasks
- 11) Construction Quality Control (DB Entity)
 - a) DB Entity Monthly QC Reports
 - b) Daily Quality Control Reports
 - c) QC Inspection Forms
- 12) Materials QC Documents (DB Entity)
 - a) Materials QC Ledger (RMS 360)
 - b) Materials QC Documents (by Item Number)
- 13) Materials Acceptance (MassDOT)
 - a) Materials Acceptance Ledger (RMS 360)
 - b) Materials Acceptance Documents (by Item No.)
- 14) Independent Assurance
 - a) Independent Assurance Documentation
- 15) Permits and OOC
- 16) Project Administration
 - a) Reference Library
 - b) Training Documents
 - c) Issue Tracking
 - d) Announcements
 - e) Calendar
 - f) Contacts
- 17) Issued for Construction



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3.2.2.2 Design and Construction Submittals

All design and construction submittals will be given a unique code prior to submission. The code is derived from: Submittal Prefix – Sequential No. (within given Prefix) – Revision No. – Submittal Title. See below for an example:

Prefix	Sequential No.	Revision No.	Submittal Title
ERC-	001-	00-	Early Release – NB Alignment & Profile

*ERC-001-00 Early Release – NB Alignment & Profile (first ERC Submittal, first Revision Submitted to MassDOT)

Submittal Prefix will be derived using the four categories shown in the table below:

Submittal Type	Prefix	Example [Prefix]-[Sequential no.]-[Revision] [Submittal name]
Early Release Packages	ERC	ERC-001-00 Early Release – NB Alignment & Profile
		ERC-002-00 Early Release – Stage 1 TTCP
Design Packages	D01 - Highway (Including Traffic, Utilities, Drainage, Landscape, Lighting)	D01-001-00 75% Highway
	D02 -Structural (Including Geotech)	D02-001-00 Geotechnical Report
	D03 - Other	D03-001-00 Special Provisions ^{1**}
Construction / Environmental Submittals	MassDOT Standard Spec Section	901-001-00 Concrete Mix Design
		960-001-00 Steel Shop Procedures
		756-001-00 SWPPP
Other Submittals	C [RFP Vol. II, Applicable Section] ² - for any submittal not covered under the standard spec book. e.g. QMP is addressed in RFP Vol. II, Section 2.5. Prefix is therefore “C0205”.	C0101-001-00 PMP
		C0205-001-00 QMP
		C0211-001-00 Shop/Working Drawings
		C0207-001-00 Const. QC Plans
		C0901-001-00 Baseline Contract Progress Schedule

¹ D03 is reserved for Special Provisions submitted as a standalone document; Special Provisions provided in support of a submittal package will be included as a component of said submittal.

²To avoid overlap, “Other submittals” prefix is a 5-digit identifier based on the first two outline levels of RFP Volume II; the first digit is always “C” to designate that it is a prefix which references the RFP, the next two digits refer to the first outline level (e.g., “02” for RFP Section 2), and the last two digits refer to the second outline level (e.g., “11” for Section 2.11). For example, C0211 refers to **Section 2.11 Shop Drawings**; a submittal related to **Section 2.1.1 Design QA Program** would have the prefix C0201, referencing **Section 2.1 Quality Assurance Program Elements**.



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3.2.2.3 Non-Submittal Project Documents

The following file naming format will be used for all electronically-stored documents in the DB Entity's files:

xxx.yyyy.mm.dd.<description of subject matter>.nnn

where: yyyy = year
 mm = month
 dd = day
 nnn = Author's initials

& where: xxx = 3-letter code for document type (see below)

LTR: Letter	PIC: Photo
INV: Invoice	QUO: Subcontractor/Supplier Quote
REQ: Requisition	PER: Pay Estimate Report
EWO: Extra Work Order	DEL: Delivery Slip
RFI: Request for Information	DIG: Dig-Safe Ticket
MIN: Meeting Minutes	QMP: Quality Management Plan
SCH: Schedule	QCP: Quality Control Plan
SUB: Submittal	QCD: QC Documentation (General)
POR: Purchase Order	DQC: Design Quality Control
COC: Certificate of Compliance	CQC: Construction Quality Control
EST: Pay Estimate	COR: Misc. Correspondence
BID: Bid Document	EML: Email
INS: Insurance Certificate	FAX: Fax
SUC: Subcontract	CAL: Calculations
CON: Contract with Owner	QCA: QC Administrator
SUP: Supplier's Agreement	QSM: Quality System Manual
CER: Certified Payroll	ERC: Early Release Construction
SPC: Specification	NCR: Non-Conformance Report
DWG: Drawing	PCO: Project Change Order

3.2.3 Submittal Distribution

Project Design and Construction Submittals will be uploaded to the MassDOT SharePoint site, and appropriate personnel will be notified in accordance with the submittal distribution matrix provided by MassDOT and included in Appendix I. Following the initial review by MassDOT, hard copies will also be sent in accordance with the distribution matrix.



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3.3 Project Correspondence

In addition to being filed electronically in the appropriate folder on MassDOT's Project SharePoint website, all incoming and outgoing correspondence, including letters, transmittals, submittals, and telephone conversations that pertain to decisions or are otherwise significant to the progress of the project, shall be filed in the project's correspondence file. No original project documentation will be destroyed.

It is the responsibility of the project team member that the correspondence originates from to file it in the appropriate location (if necessary) and ensure it is filed and distributed electronically to the appropriate team members. The Project Manager will be copied on all pertinent project correspondence. The Project Manager and Document Control Engineer will be responsible for reviewing the Project Correspondence File on a regular basis to ensure compliance.

In order to ensure that all correspondence is properly reviewed for quality prior to distribution, all correspondence to MassDOT and/or other outside agencies shall be reviewed prior to transmittal and shall be signed by the Project Manager (or designee) and/or Executive Committee.

3.4 Design Submittals

All design submittals received and sent will be filed in the Project Correspondence file and MassDOT's Project SharePoint webpage.

All design submittals intended for the MassDOT or outside agencies by the DB Entity or a Sub-consultant will be circulated to the key members within the DB Entity. It is the responsibility of the Quality Control Administrator to conduct the final review of the correspondence for quality prior to transmitting to MassDOT.

3.5 Project Files

3.5.1 Paper Document Files

Paper or "hard" copies of correspondence, memos, minutes, calculations, and submittals will reference the project number and will be filed in the designated location. Each originating Project Team member will be responsible for filing the paper copy. The Document Control Engineer will be responsible for maintaining the hard files, and the Project Manager will review the Project Files on a monthly basis to ensure compliance.

3.5.2 Electronic Files

Electronic copies of correspondence, memos, minutes, calculations, and submittals will be stored under the DB Entity internal server file directory in accordance with this QMP. The Document Control Engineer is responsible for maintaining the electronic files. The Project Manager will review the project files on a monthly basis to ensure compliance.



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Electronic files sent to MassDOT shall be routed through the SharePoint website. Backup copies of electronic file correspondence will be stored in the DB Entity electronic file directory.

All electronic CADD files will comply with MassDOT and HNTB standards. A complete list of CADD files shall be established at the beginning of the project and amended as needed when drawings are deleted or added.

3.5.3 E-Mail Correspondence

Emails that pertain to decisions or are otherwise significant to the progress of the project will be saved to the appropriate folder under the project directory on the office's computer server and on MassDOT's Project SharePoint site. Emails will also be filed in the project correspondence file as necessary/required; the Project Manager will decide which email correspondence warrants hard copy filing.

3.5.4 Quality Management Plan and QC Documents

All QC Documents, including this QMP, are controlled documents. They will be: saved, including the review check sign-off sheets, under the project directory on the office's computer server; uploaded and available on MassDOT's Project SharePoint webpage; and a hard copy will be stored in the project file.

The QMP and QC Documents are working documents that must be available to all members of the project team, including crews, fabricators and inspectors. Several copies of the QMP will be distributed to the QC Team after acceptance and will be forwarded to all subcontractors and suppliers as part of the Contract execution. Hard-copies will also be available in the project field office and site trailer. A list of distributed QMPs will be maintained to ensure that all copies are updated with any changes following initial acceptance. Bookmark links to the approved QMP will be saved to all team members' laptops and tablets.

QC Documents will be shared electronically with the entire project team, including MassDOT, through Project Management software and saved to cloud-based storage integrated with the software in order to ensure immediate access to all current and previous documents.

3.5.5 Construction QC Record Books

Construction QC Record Books will be established and maintained for each Work Package. The QC Record Books will be organized by Work Item and will contain all completed QC Inspection Report Forms (IRFs), Test Report Forms (TRFs), QC records, and related QC documentation. Further details for the QC Record Books are provided in Section 5.



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3.6 Subcontractor and Supplier Agreements

This section describes the methods used to assure that the applicable requirements of the Contract are passed on to the Subcontractor/Supplier. Included in this section are the methods used to monitor the quality of the work performed by the Subcontractors and obtain the required quality records.

All prepared agreements include reference to all applicable contract specifications, drawings, code requirements and schedule requirements. Agreements are issued to the Executive Director and Project Manager, as needed, for review prior to final approval by the Chairman/CEO. The Agreement is issued to the Subcontractor/Supplier including all attachments. A copy of the Agreement is available to the QC Administrator for reference during inspection activities.

The QC Administrator will review the submittal list and contract requirements to determine receiving, inspection, maintenance, installation, and testing requirements. The QC Administrator will also review all QSMs and QC Plans from Subcontractors, Producers, Fabricators, and Suppliers for conformance.

Prior to construction of any items under the contract, all submittals and shop drawings will be reviewed and approved by the Design Manager (HNTB). The drawings submitted to MassDOT shall start from Revision 0; the DB Entity will track internal revisions using a different notation from MassDOT. All approved shop drawings will be distributed to MassDOT electronically via the SharePoint site and as hard copies for reference in accordance with the latest revision of the Submittal Distribution Matrix.

Subcontractors/Suppliers may submit a QSM for approval by the QC Administrator prior to the start of work; if a Subcontractor or Supplier does not have a QSM, they are contractually obligated to endorse this QMP for the Project. The DB Entity must ensure that any QC Plan under Section 5.3.5 contains all necessary information; if the Subcontractor's or Supplier's QSM does not contain all necessary information, it must be supplemented in the DB Entity's QC Plan.

The work of the Subcontractors, Fabricators, Suppliers, and Producers will be monitored and controlled by the QC Team. When work performed and/or materials produced (delivered) are found to be outside of project specifications, the QC Administrator and the Project Manager will work with MassDOT to determine corrective actions to be taken by the Subcontractor, Fabricator, Supplier, and/or Producer in accordance with Section 3.7 in order to bring their work into conformance.

3.7 Non-Conformance Reporting and Resolution

This section describes the methods to be followed when work is found not to meet contract requirements, and the means to document and provide resolution. A non-conformance is defined as a deficiency in characteristic, documentation, service or process that renders the quality of an item, material or service as unacceptable or indeterminate. A construction related non-conformance is addressed through the processes described throughout this section. A design non-conformance, defined as a design that does not meet MassDOT requirements, as well as failure to follow the QMP and the forms and procedures it contains, will be addressed through the QC process of the Independent



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Technical Review and Design QC Team Review of Formal Submissions; see Appendix II, Design Quality Procedure (DQP) 2.09 for additional information. If after Independent Technical Review, Formal QC Review and MassDOT Review, a Design Non-Conformance is reported, it will be fully vetted through MassDOT for review and approval.

In accordance with the Contract, the DB Entity will be responsible for identifying, documenting and reporting to MassDOT all instances of DB Work that have not been constructed in accordance with the drawings and specifications and/or designed in accordance with the DB Request for Proposals or governing codes and standards. The documentation, follow-up and closure shall be documented and processed in accordance with this QMP and under the guidance and supervision of the QC Administrator and Project Manager.

The identification of a non-conformance may occur as a function of:

- Independent technical/design review
- Quality Control checks
- Internal or external audit
- Receiving inspection
- Field or Shop inspection
- MassDOT inspection or feedback
- A surveillance activity
- Field or shop testing

SPS's corrective action process provides for the prompt identification and correction of conditions adverse to quality. Corrective actions taken shall correct the nonconformance identified, as well as identify, solve, & eliminate the root cause(s) of the nonconformity *and* prevent its recurrence.

Records of any nonconformity and all subsequent actions taken including final resolution are maintained by the DB Entity in the Quality Control Record and MassDOT's SharePoint site. All project non-conformances are tracked via the Non-Conformance Reports library on the SharePoint site, with notification to MassDOT in accordance with Section 3.7.3.

3.7.1 Immediate Correction

Items that are deficient and can be immediately reworked to meet requirements will be documented on an inspection report. The appropriate QC Management staff member (QC Administrator, Construction QC Manager or Design QC Manager) will reinspect for conformance with contract requirements and document the corrective action taken and the results of the re-inspection on the inspection report. Acceptance of the inspection report by MassDOT will close the item and preclude initiation of a Non-Conformance Report (NCR).

Design items that are deficient and can be immediately reworked to meet the contract requirements will be documented on the appropriate QC Comment and Resolution Sheet, and will not require initiation of a Non-Conformance Report (NCR).



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3.7.2 Not Immediately Corrected

Items that are found to be deficient to the contract requirements, and which are not (or cannot be) immediately corrected, will be brought to the attention of the QC Administrator and documented on a Non-Conformance Report (NCR).

A Non-Conformance Report can be generated from design, construction, inspection, receiving, test reports or reports from MassDOT personnel identifying a nonconformance.

3.7.3 Non-Conformance Report (NCR) Content

The NCR will describe the element of DB Work that is nonconforming and the reason for the non-conformance. *At initiation*, the NCR will be categorized under one of the following categories:

- Field
- Fabrication (Steel)
- Fabrication (Precast)
- Fabrication (Other)

NCR categorization will be dictated by the setting/location in which the non-conforming condition occurred, and is not based on where the issue is identified and/or resolved; for example, an issue with structural steel fabrication, not identified until steel has been delivered to the jobsite, would still be initiated as a “Fabrication (Steel)” NCR.

The Design Manager who is responsible for stamping and sealing the drawings will evaluate the effect of the non-conformance. If remedial actions are necessary, they will be documented on the SharePoint NCR Form. The Construction QC Manager will also sign off on the NCR stating that the remedial actions to be employed have undergone a thorough QC review. Non-Conformance Reports will include the following:

- Initiation:
 - NCR No.
 - Date
 - Contract Name
 - Contract Number
 - Subcontractor/ Fabricator’s NCR Form (if applicable)
 - Contractor
 - Subcontractor/ Fabricator (if applicable)
 - Subject of NCR
 - Nonconformance
- Location of Affected Component
- Contract Requirements
- Referenced Drawings
- ERC Package Reference
- Referenced Specs
- Photos
- Name of “Initiated By” Individual
- NCR Type: Field, Fabrication (Steel), Fabrication (Precast), Fabrication (Other)



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Once the NCR is initiated, the DB Entity then enters the proposed disposition in the form, including the following information:

- Proposed Disposition:
 - Root Cause Identification
 - Action Taken to Prevent Nonconformance
 - Description of Proposed Disposition and Attachments (if available)
 - Name of “Proposed By” Individual and date proposed
 - Signatures of Design Engineer, Construction QC Manager, and QC Administrator, including dates and both electronic and wet signature before the proposed disposition is submitted
 - NCR Type: Field, Fabrication (Steel), Fabrication (Precast), Fabrication (Other)

MassDOT can either approve the disposition, request more information, and/ or enter a response. The final disposition and corrective action taken, with verification, shall be entered into the form including the following information:

- Final Disposition:
 - Final Disposition Description and Attachments (if available)
 - NCR Disposition Status
 - Signature of “Authorized By” Representative
 - Signature of Quality Control Administrator
- Field Verification of Corrective Action:
 - Action Taken
 - Action Date
 - Other
 - Corrective Action Taken, Description with Attachments (if available)
 - Final Sign-off and date from Construction QC Manager and MassDOT Representative
 - Note: Fabrication NCRs relating to Precast Elements will be accepted by the Field Control Engineer, while Fabrication NCRs relating to steel and other metal items will be accepted by the Metals Control Engineer.

MassDOT will be notified that a non-conformance has occurred as soon it has been identified, or within 24 hours maximum. When enough information is available, the NCR will be initiated in the Project SharePoint website in the NCR library folder; a sample copy of an NCR report can be found in Appendix III. The website will simultaneously notify HNTB. If an NCR is reported in either the field or plant where access to the SharePoint website is not available, the report will be filled out on a hard copy as shown in Appendix III and signed, then entered into the SharePoint website by SPS. The original NCR hard copy will be scanned and attached to the SharePoint file. All records of Non-Conformance Reports will be stored on the SharePoint site and in the QC Record Book.



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3.7.4 Action on Non-Conformance Reports

When a Non-Conformance has been identified, the Project Manager and the QC Administrator will provide a means of resolution.

The means of resolution may include redesign, rework, repair, use as is, or scrap. Where required/appropriate, advice may be given by consultants to determine an adequate means of resolution. The agreed upon means will be described in the Non-Conformance Report.

The Construction QC Manager will notify MassDOT if the proposed disposition deviates from the contract requirements. MassDOT approval will be received on design and construction NCRs before implementing the work.

3.7.5 Completion and Closeout of NCRs

After approval of the disposition, corrective action will be implemented by either the Design Production Team or Construction Production Team. The Construction QC Manager will document the action taken on the NCR. Fabrication NCRs relating to Precast Elements will be accepted by the MassDOT Field Control Engineer, while Fabrication NCRs relating to steel and other metal items will be accepted by the MassDOT Metals Control Engineer.

Upon completion of corrective actions and inspection by the Quality Control Inspector or Technician, the Construction QC Manager and MassDOT Representative will sign the NCR to verify that the work has been satisfactorily performed.

Design Non-Conformances will be documented in accordance with Section 3.7, reflecting all corrected issues in the Final Design Documents and As-Built Drawings.

3.7.6 NCR Log and Distribution

A log including all NCRs will be automatically created on the SharePoint site, and will be checked regularly for accuracy and completeness by the Project Engineer. A monthly report will be provided to the MassDOT Resident Engineer and will also be available on the SharePoint site at all times.

The Design Manager, Project Manager, Construction Manager, and select MassDOT personnel will automatically receive a copy of the NCR via the SharePoint site when it is initiated. When means of resolution has been achieved and approved, the NCR will be distributed to all Construction Production Personnel whose scope of work may be affected.



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3.8 Old, Invalid or Obsolete Documents

Any document that becomes invalid, obsolete, or superseded shall promptly be removed from use. Documents that no longer serve a function shall be discarded. Superseded documents that may have benefit at a later date shall be kept with the new document that takes the place of the superseded document.

Superseded electronic files will remain in the same directory as the original file under a separate subdirectory marked “Superseded,” thus providing a clear “flag” that it is not the current file.

3.9 Monthly QC Report

A Monthly Report will be prepared by the Construction QC Manager and Design QC Manager outlining ongoing QC activities for both design and construction and highlighting outstanding or unresolved issues. The report will contain the following:

- Summary of Construction QC Inspection & Test Results
- Summary of Design QC Activity
- Quality Control Sampling & Testing Ledger (Form RMS-360)
- Non-Conformance Report Log (SharePoint)
- Submittal Log (SharePoint)

3.10 Project Closeout

The Construction QC Manager will coordinate with MassDOT to compile and update the list outlined below and verify the documentation activities during the closeout phase of the project. An initial project closeout list includes the following:

- All NCRs have been closed
- Punchlist items have been addressed
- Required As-Built Drawings have been completed and submitted to MassDOT
- Copies of required QC inspection, sampling, and testing documentation have been forwarded to MassDOT
- RMS 360 is completed with documentation
- Certificates of Compliance (COCs) and warranties have been transmitted to and accepted by MassDOT
- Bridge Ratings Reports have been completed and transmitted to MassDOT
- “Materials & Workmanship Quality Certificate” has been signed by the Construction QC Manager and QC Administrator and transmitted to MassDOT per Contract Section 2.14



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4.0 DESIGN QUALITY CONTROL PROCEDURES

The responsibility for quality work belongs fully to each individual associated with the project. All design work shall be performed in accordance with this Section 4 of the Quality Management Plan. The supervisor of persons performing design work is responsible for providing qualified personnel and adequate resources to achieve schedule milestones and to provide contract deliverables that meet the requirements of this QMP. Frequent surveillance by the Formal Quality Control Team staff is expected in order to achieve conformance to the standards set forth herein. All Quality Control staff shall have free access to work areas and the authority and organizational freedom to identify deficiencies, initiate or recommend solutions, and verify and document corrective actions taken to resolve any deficiencies.

Sub-consultants working on this project under subcontract agreements with HNTB shall perform their services in strict accordance with this QMP, and shall provide QC staff free access to their work areas as set forth above. Sub-consultants will be required to provide written certification of their adherence to this QMP.

The Design Quality Control Team for the Haverhill I-495 Bridge Replacement over Merrimack River Project is an independent group, separate from the design and construction line organizations, that reports directly to the Design QC Manager, Quality Control Administrator, and SPS New England's Executive Committee.

4.1 Design Quality Control Organization

4.1.1 Design Production Team

The Design Production Team is the front line of the Design QC Organization. They are responsible for frontline Quality Control of the design documents being developed by HNTB and its sub-consultants. Section 4.2 covers Quality Control activities by the Design Production Personnel. The Design Production Team is responsible for organizing and executing design Quality Control activities, including filling out the appropriate forms for the quality checks performed. Documents include plans, specifications, reports, design calculations, estimates, and Quality Control forms. The Design Production Team will address comments by MassDOT and other outside agencies, as well as comments provided via internal independent reviews. The Design Production Team cannot rely upon the Design Quality Control Team to correct deficiencies in design, calculations, reports, or plans.

The Design Team and its sub-consultants will work closely with MassDOT, FHWA, local agencies, utilities, third parties and SPS New England on the development of the design. The design team includes discipline leads for the primary work components, project controls personnel, and a design document control manager. The design team will be responsible for performing all the frontline quality control on the project.



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4.1.1.1 Design Manager

The Design Manager has the overall responsibility of the Design Production Team activities on the project and reports to SPS New England's Project Manager. This critical role must enforce and promote the Quality Management Plan and its prescribed procedures to the discipline leads and the technical production staff.

4.1.1.2 Independent Technical Reviewer

The Independent Technical Review for the project will be performed by a qualified sub-consultant. The independent technical reviewer will be responsible for performing independent design calculations in accordance with MassDOT standard practices for comparison with the original design calculations. They will be responsible for performing front line quality checks on all independent design calculations in conformance with frontline quality procedures in this QMP.

4.1.2 Design QC Team

The Design Quality Control Team includes the Design QC Manager and Formal "QC Checkers" who are responsible for implementing all Formal QC activities, as further described below. These QC team members are senior technical leaders who will be responsible for formal reviews of submittals to evaluate design completeness and to verify RFP compliance and adherence to the Design Quality Procedures. The Design Quality Control Team will document their reviews on comment disposition forms for each submittal. Design QC Team Members will report to the Design Quality Control Manager and therefore will be directly responsible to the Quality Control Administrator. The Design Quality Control Team members will not be directly involved with the design of the item, segment, or phase of work being checked, and will function independently from the Design Production Team.

4.1.2.1 Design Quality Control Manager

The Design Quality Control Manager (DQCM) has the responsibility for developing and implementing the Design Quality Procedures (DQP) of this QMP, training the staff, monitoring design outputs for conformance, and performing Quality Control Audits of each submittal to verify DQP compliance and documentation. The DQCM reports directly to the Quality Control Administrator.

4.1.3 Quality Control Organization Charts

Figure 4.1 lists the Responsible Engineer or Sub-consultant by design component, and the Corresponding Design QC Team Senior Technical Reviewer.



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Figure 4.1 – Responsible Engineers and Design QC Team Personnel

DESIGN COMPONENT	DISCIPLINE	DESIGN PRODUCTION TEAM	DESIGN QUALITY CONTROL TEAM
		TASK LEADS	SENIOR TECHNICAL REVIEWER
Bridge	Bridge -Structural	Michael Beintum	Matt DeAngelo (Senior Technical Review)
Roadway	Highway	Christopher Smith	Joe Cahill (Senior Technical Review)
Geotechnical	Geotechnical	Nabil Hourani	Matt Riegel (Senior Technical Review)
Hydraulics / Scour	Hydraulics	Steve Florman	David Murray (Senior Technical Review)
Drainage	Drainage	Chris Naylor	Joe Cahill (Senior Technical Review)
Traffic Engineering	Traffic	Alex Sui	Joe Cahill (Senior Technical Review)
Environmental Permitting	Environmental	Mark Kolonoski	Joe Grilli (Senior Technical Review)
Landscape	Architecture	Skyler Chick	Pamela Shadley (Senior Technical Review)
Independent Technical Review		Green International	

4.2 Quality Control Activities by Design Production Personnel

4.2.1 Survey Field Checking

A full check and verification of the survey will be performed at the beginning of the design process. The survey check will verify the accuracy of control coordinates and elevations. The survey field check will be finalized before the 75% design submission.

4.2.2 Validating and Approving Computer Software

All design software used for design of the permanent project must be validated. This requirement includes design spreadsheets, Mathcad programs, in-house design programs, and commercial design programs. The Responsible Engineers shall coordinate these validation procedures in accordance with DQP 1.03.

4.2.3 Discipline Coordination Reviews

Discipline Coordination Reviews, referred to as Interdisciplinary Reviews (IDR) in this document, are conducted by the Responsible Engineers to verify that design drawings are properly coordinated between the disciplines on the project, to confirm regulatory conformance, and to identify areas of potential conflict. IDRs will be conducted in accordance with DQP 2.10. The IDR session includes the Environmental Compliance Review conducted by the Responsible Engineer for Environmental Permitting. Environmental Compliance Reviews will be conducted in accordance with DQP 2.11.

Interdisciplinary Reviews shall be performed on project deliverables involving more than one discipline. IDRs are performed by the Task Leads or designees (including sub-consultants, if applicable) on the project to ensure consistency of the design between: disciplines and segments; design prepared by HNTB and its sub-consultants; design of the project and potential adjacent projects; design of the project and potential affected facilities owned by other stakeholders; and construction documents in order to prevent coordination errors.



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Interdisciplinary Reviews are most effective when performed collectively in an interactive session to avoid duplicate or conflicting comments, and to facilitate interdisciplinary solutions to the benefit of the project. It should be noted that while Interdisciplinary Reviews serve to identify, resolve, and prevent coordination errors, the most effective method to prevent such issues is through frequent interdisciplinary coordination and interface management throughout the design development process.

To ensure the effectiveness of Interdisciplinary Reviews, deliverable packages shall not be submitted for Interdisciplinary Review until Discipline QC Check, Senior Technical Review (if applicable), and Independent Design Check (if applicable) have been completed and comments resolved and verified. All comments resulting from Interdisciplinary Reviews shall be responded to, resolved, and verified, and all required reviewers must participate in the review. All records of Interdisciplinary Review shall be maintained. Interdisciplinary Review Procedure DQP 2.10 describes this process in detail.

4.2.4 Independent Technical Reviews

Independent structural calculations will be performed by a qualified sub-consultant for all structural components on the project. The independent reviewer (sub-consultant) will be responsible for quality control on all calculations performed during the Independent Technical Review and shall be performed in conformance with this project QMP and form DQP 2.04. The independent technical review will then be compared to the project design calculations to identify discrepancies in the project design. Any discrepancies are to be discussed and resolved between the two designs before submittal to the Client. The independent technical review document is required to be submitted to and reviewed by the Responsible Engineer prior to submittal of the structural component package to the Client.

4.2.5 Drawing-Specification Cross-Check

Drawing-Specification Cross-Checks will be performed as part of the Discipline QC Check as outlined in Section 4.2.6. The Drawing-Specification Cross-Check shall be performed any time both specifications and drawings are part of a design deliverable. Procedures and documentation of the Drawing-Specification Cross-Check shall be completed in conformance with Section 4.2.6.

4.2.6 Detailed Checking of Calculations, Plans, and Specifications

A Discipline QC Check is required prior to submittal to the Client on all project deliverables, and applies to the detailed checking of plans, calculations (including quantities and construction cost estimates), specifications, reports, and studies. Discipline QC Checks shall be performed by a qualified Checker with sufficient, relevant experience to the check being performed, and in some cases may possess specific subject matter expertise. The Checker shall be independent of the Originator of the deliverable being checked, but should have familiarity with the client, project requirements, and approved design criteria.



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During Discipline QC Checks, the Checker shall perform:

- A Conformance Check to verify that the deliverable meets the design criteria, including any approved design changes.
 - Note: Conformance Checks shall be performed using the design criteria itself (when sufficiently detailed), a client-provided design criteria report or checklist, or a discipline-specific design criteria checklist developed by the Task Lead to ensure key discipline-specific criteria are fulfilled. These checklists are not intended to be duplicates of the design criteria, but are intended to capture, based on experience, those discipline-specific critical items in danger of being missed and which are not adequately checked by other means. The Conformance Check should include a check that environmental commitments and other commitments made during the planning phase have been incorporated.
- An Accuracy Check to verify that deliverable inputs and outputs are correct, and that assumptions and conclusions made are accurate.
- A Scope Check to ensure that the deliverable meets the required level of completeness for the phase/milestone being submitted.
- A Style Check to verify compliance with applicable CADD standards and style requirements. It should be noted that in some instances this check may be more effectively performed by a CADD Manager or similar responsible party on the project.
 - Note: It is not intended that each of these checks be performed discretely; the intent is to capture the full scope of the Discipline QC Check activity.

Comments made by the Checkers shall be documented, backchecked by the Originator, updated by an Updater, and verified by the Checker. All records of Discipline QC Checks shall be maintained. Procedures for Discipline QC Checks are detailed in DQP 2.01, DQP 2.02, DQP 2.03, DQP 2.05, and DQP 2.13.

4.2.7 Sub-consultant Design Document Reviews

Sub-consultants are required to perform their own front-line Quality Control in accordance with this Quality Management Plan. The Sub-consultant is required to submit quality documents along with the submission, including Form DQP 2.01-1. The Design Team will review the submission prepared by the sub-consultant and compare the results of the design calculation to the corresponding design calculation performed by HNTB. If a discrepancy between the two corresponding design calculations is found the reason for the discrepancy will be investigated and resolved.

4.2.8 Design Package Milestone Reviews

Key milestone reviews are defined in the RFP and herein. The Responsible Engineer or designee shall provide design reviews in advance of a milestone review to ensure that all Quality Control documentation is completed in accordance with the DQPs and this QMP.



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4.2.9 Constructability Reviews

Constructability Reviews are coordinated by the Design Manager and Responsible Engineers and performed by the Contractor (SPS New England Inc). These reviews are conducted in order to evaluate the design in terms of conduciveness for efficient and safe project construction (“constructability”), as well as suitability for the local site conditions. DQP 2.12 provides detailed procedures for these reviews.

4.2.10 Over-the-Shoulder Reviews

At least one Over-the-Shoulder (OTS) review is required for each submittal prior to the 75% submittal. These reviews will be conducted by the design team with MassDOT and FHWA personnel in order to provide feedback to the Design Team on the design development. OTS reviews are informal reviews of progress prints, computer images, or other draft documents. The Design Team will prepare minutes and a comment resolution sheet of each OTS review. The Design Team will also be responsible to incorporate over the shoulder comments on the design document.

4.2.11 Visual Check

Review of each final submittal is performed using a Visual Check. The Visual Check is performed by a Task Lead or qualified member of the Design Team. In addition to the Visual Check, a design Quality Control procedure review is performed. The Visual Check is required on all deliverables and is performed to ensure that the deliverable is complete, in order, has been scanned, printed, or converted (e.g. to .pdf) as intended, and is representative of the electronic files that have been checked/reviewed, updated, and verified in accordance with the QMP. This is especially important if CADD files are converted from MicroStation to AutoCAD or vice versa. The Design Manager shall notify the CADD Manager, or designee, to scan, print/plot, or convert the deliverable in accordance with contractual submittal requirements. Task Leads shall check the scanned, printed/plotted, or converted files to verify that the deliverable has been printed or converted as intended. Task Leads shall document the results of the Visual Check, and any noted issues shall be resolved by the CADD Manager or designee and verified by the Task Lead. Records of Visual Check shall be maintained per DQP 2.14.

4.2.12 Design Criteria

The Design-Build Contract between SPS New England, Inc and MassDOT includes mandatory standard documents for use in the project design and construction. These documents are listed in Section 1.2 of the RFP Volume 2.

In general, the design and construction documents prepared for the project shall meet the requirements of these standard documents unless modifications are approved by MassDOT. Procedures for amendments and revisions of standard documents are provided in the Design-Build Contract.



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These standard documents will be stored in SharePoint in a convenient location for access by the Design Team. Current versions of the documents will be maintained and updated as required.

4.3 Quality Control Activities by Design QC Team

4.3.1 Review Comment Procedures and Forms

4.3.1.1 Design Review Comment and Resolution Form

A Design Review Comment and Resolution Form is required for all quality checks. The review documents and resolution forms are to be stored in the design project quality directory “69060 MassDOT Haverhill 495 DB\03 Deliverable Quality Records\03.3 PostAward”. The task leads are responsible for generating and storing the review documents and resolution forms for frontline Quality Control in the quality folder. Task leads are also responsible for organization and document control of QC reviews performed by the QC team. The Design QC Manager is responsible for organizing and managing Interdisciplinary Coordination Reviews (IDR). Managing the Interdisciplinary Coordination Reviews involves creation of the Bluebeam review session, management of the Bluebeam session, and storage of the final IDR documents, which include the review comments and the comment resolution summary produced by Bluebeam.

4.3.1.2 Design Review Design Quality Control Checklist

The Design Quality Control Checklist requirement is covered by form DQP 1.05-2 Design Quality Control Manager (DQCM) Submittal Review Checklist. The checklist will be completed and signed by the Design QC Manager, then submitted to the QC Administrator for final signature. This form will accompany each formal design submittal to MassDOT to ensure that each document has undergone a thorough and complete QC review prior to submittal for MassDOT Acceptance. All Design Review Comment Summary and Resolution Sheets will be attached to the Design QC Checklist for reference during a milestone submission. This will provide MassDOT with a background on comments and issues concerning the design item, segment, or phase under review.

4.3.2 Quality Control Review of Computer Software Validation

Design software proposed for use on the project by designers shall be validated and documented prior to use in accordance with DQP 1.03. The DQCM will review the Software Validation records to ensure that all programs have been validated and documented as required in the QMP for this project.



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4.3.3 Design QC Team Reviews

4.3.3.1 Review of Studies, Reports, and Other Design Documents

A Senior Technical Review of studies, reports and other design documents will be performed by members of the Quality Control team. Senior Technical Reviews shall be performed on all project deliverables when required by the Delivery Quality Matrix for the project. It should be noted that Discipline QC Checks shall be completed prior to engaging in Senior Technical Review. Senior Technical Reviews are performed by subject matter experts, independent of the production team, in order to review high risk and complex project elements. These reviews are intended to ensure that the design fulfills the intended use, and that it meets the basis of design and/or approved design criteria. These reviews are also used to ensure that the design has been developed in accordance with applicable standards of professional practice.

Dependent upon project scope, previous successful experience of the local office on similar projects, client sensitivity, and project risk, the DM, DQCM, and Task Leads shall consult National/Divisional Practice and Market Sector Leads in the determination of Senior Technical Review (including the identification of appropriately qualified resources to perform those reviews).

In general, Senior Technical Reviews shall apply to project deliverables judged to be complex or critical. Senior Technical Reviews may also be performed on sub-consultant work products when determined to be complex or critical. Senior Technical Reviews involve an independent review of project concepts, basis of design/design criteria, and design methodology. All comments resulting from Senior Technical Review must be responded to, resolved, and verified. All records of Senior Technical Review shall be maintained. Procedure DQP 2.15 describes this process in detail.

4.3.3.2 Over-the-Shoulder Reviews

Over-the-Shoulder-Reviews performed by the Design Team will be reviewed by the Design Quality Control Manager to ensure that all comments have been incorporated to the design documents. This review will also include the proper documentation of both the resolution sheet and forms.

4.3.4 Design QC Team Review of Formal Submissions

A Design QC Process Review is required prior to submittal to the Client on all formal deliverables and shall be the last Formal QC review completed in the series of quality checks and reviews as defined by the Delivery Quality Matrix. It is important to note that Design QC Process Review activities may be started as soon as practical but cannot be considered complete until all other required checks and reviews have been completed and resulting comments resolved and verified.



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Design QC Process Review shall be performed by the DQCM. The DQCM shall review the Delivery Quality Matrix for the project to confirm the Quality Control checks and reviews that were determined to be required for the deliverable. Through examination of records of quality checks and reviews, the DQCM shall assess compliance with this QMP and shall confirm the completion of required checks and reviews, including comment resolution and verification. The DQCM shall verify through the examination of sub-consultant certifications (or sub-consultant quality records, if necessary) that sub consultant deliverables have been checked/reviewed in accordance with this QMP and/or sub-consultant quality plan.

The DQCM shall document the results of Design QC Process Review on Forms DQP 1.05 1, DQP 1.05 2, and DQP 2.09 2, and shall bring to the attention of the PM and QC Coordinator any nonconformance with the QMP or the Client Deliverable Quality Matrix.

Based upon the nature of the nonconformance and the actions necessary to remedy it, the Design Manager and DQCM shall determine if any or all of the quality checks or reviews should be repeated prior to resubmission for Design QC Process Review. The Design Manager or designee shall resolve any issues and provide the necessary evidence to the DQCM for verification. Deliverables shall not be submitted to the client without successful completion of the Design QC Process Review. Records of Design QC Process Review shall be maintained. Procedure DQP 2.16 - Design QC Process Review describes this process in detail.

4.3.5 Procedures for Formal QC Documentation

The Design QC Review Process shall be documented on the Comment Disposition Form (Form 2.09-1). The process for utilizing this form is as follows:

1. After the design documents have been completed for a formal submittal and the Milestone Review has been completed (if applicable), the Design Manager uploads the Quality Control documents to a QC Review File folder with a unique identifier for the subject submittal.
2. The Checker then reviews the submittal and records their comments on a comment resolution form (Form 2.09-1) or in Bluebeam. If the review is supplemented by markups on the plans, specifications, or reports, the comment resolution form (RCR) shall include a comment that references the markups so that the action/resolution of these markups can be tracked and documented.
3. The Back Checker (typically the Originator) assesses and evaluates the comments, then records their responses on the form in the “RESPONSE” column and fills in the “Status” code. If the Designer disagrees with a comment or requires clarification on the intent of a comment, efforts shall be made to resolve the disagreement and/or to clarify the intent at this step in the process.
4. The Updater incorporates appropriate changes to the design documents as necessary to address the comments.



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5. The verifying process entails the checking of the design documents by the Checker to verify that the comments have been incorporated accurately. The Checker will sign Form DQP 2.09-1 to verify the incorporation process.
6. The Design QC Manager reviews Form DQP 2.09-1 to verify that all comments have been addressed and resolved as part of the submittal certification process.

During this process, the 2.09-1 form(s) are uploaded as an MS Excel document, so that they can be completed electronically, or the Blue Beam summary is saved in PDF format.

4.3.5.1 Quality Documents

Quality documents including milestone plan submittals, checked design calculations, checked computer outputs, checking prints of drawings, reports, and specifications, checklists, comment disposition forms, QC files, etc., will have specific filing, storage, and retrieval requirements. It is a project standard that all design quality reviews be performed in Bluebeam and filed in the project document control directory on HNTB's server in the PMwork directory. Upon completion of the design phase on the project, the quality document will be transferred to HNTB's ProjectWise site for the Haverhill Project.

4.3.5.2 Design Document Control

All design documents will be stored on the HNTB Boston server in the PMwork directory for the Haverhill project. Specific information related to accessing and storing information, file naming conventions, file retrieval, and retention of quality documents are described in DQP 1.02 – Design Document Control System. The Design Document Control System is configured to work in conjunction with SPS New England's document control system. Upon completion of the design phase of the Haverhill project, the design Quality documents will be moved to the HNTB ProjectWise site developed for the Haverhill Project.

4.3.6 Internal Quality Control Project Control Documents

4.3.6.1 Project Quality Plan Approval

The Design Quality Control Plan (QMP Section 4) must be approved per HNTB's quality requirements upon completion of the Quality Management Plan and Client Delivery Quality Matrix (sample provided in DQP 2.16-1). The Design Quality Control Plan must meet MassDOT's requirements and must be signed off by MassDOT before HNTB will internally approve the Design Quality Control Plan.



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4.3.6.2 Delivery Quality Matrix

The Delivery Quality Matrix shall be developed during the project quality planning process and is used to identify the types of quality checks and reviews required for each client deliverable or submittal, inclusive of internal deliverables. This matrix forms the basis of the Design Quality Control Plan.

As deliverables, according to milestones or phases, are identified through the work planning process, they shall be documented within the Delivery Quality Matrix. The Design Manager, in concert with the DQCM and Task Leads, shall determine the quality checks and reviews necessary to ensure quality for each deliverable, and shall document those required checks and reviews within the Deliverable Quality Matrix. The Discipline QC Check, Visual Check, and Design QC Process Review are mandatory for all deliverables, and Interdisciplinary Reviews are mandatory for all deliverables involving more than one discipline. Other reviews, such as Over the Shoulder Reviews, Senior Technical Reviews, Independent Design Checks, Field Reviews, and Constructability Reviews, shall be applied to deliverables as required by the client and/or based upon complexity and risk.

The resulting Delivery Quality Matrix shall serve to communicate to the project team the quality check and review activities to be carried out on each deliverable prior to submittal to the client. This matrix shall also be used to communicate the “quality” schedule on the project. The matrix shall identify the start and end dates for all quality check and review activities in order to facilitate time for effective reviews and resolution of resulting comments prior to due dates to clients. The Delivery Quality Matrix is stored on the HNTB Project SharePoint site, and is a live document that is maintained and updated by the DQCM as needed to meet project demands and requirements; the Delivery Quality Matrix can be found in Appendix II, DQP 2.16-1.

4.4 Coordination Activities with Construction

4.4.1 Review of Shop Drawings

The Design Team will be responsible for reviewing shop drawings prepared by SPS New England’s fabricators and manufacturers for general conformance with the design documents. DQP 3.02 provides the quality procedures for shop drawing reviews.

Shop drawings will be logged in accordance with the requirements of the Design Document Control System and uniquely filed for each structure or design component. Shop Drawings are designated as quality documents.

Shop drawing review shall be the responsibility of the Responsible Engineer.

Upon resolution of all comments, Shop Drawings shall be distributed per MassDOT requirements.



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4.4.2 Review of Mock-Ups, Control Sections and Color Samples

Mock-Ups, Control Sections and Color Sample submissions shall be reviewed by the Construction QC Team before submitting to the Design Team for review and approval.

The review process shall be the same as the process defined in Section 4.4.1 Review of Shop Drawings, with the exception being that color samples shall be reviewed and initialed by the Lead Architect as required.

4.4.3 Materials Approval

Material Sample submissions shall be reviewed by the Construction QC Team before submitting to the Design Team for review and approval. The review process shall be the same as the process defined in Section 4.4.1 Review of Shop Drawings.

4.4.4 Responses to Requests for Information (RFI)

Requests for Information (RFI) originate from MassDOT, SPS New England, or its subcontractors, vendors, or suppliers seeking information about a design or construction detail, plan note, or specification prior to or after the start of construction. RFIs represent a potential deviation from the accepted plans and specifications. RFIs submitted by the Construction Production Team shall be reviewed by the Design Production Team and posted to SharePoint for MassDOT concurrence. RFI responses which represent a material deviation from the RFP documents must be reviewed and approved by MassDOT prior to implementation.

Document control of RFIs (DQP 3.01) is critical since this information is frequently the source of construction modifications which must be reflected in the record drawings. RFIs will be given a unique designation pertaining to that specific construction component and will be sequentially numbered. RFIs are considered quality documents and are retained and filed in accordance with the requirements of the Design Document Control System.

The Responsible Engineer shall be the approving authority for RFIs. DQP 3.01 provides specific QC procedures for administering RFIs.

4.4.5 Evaluation of Field Design Changes

Design changes may originate from Design Directives issued by MassDOT, SPS New England requests, the Design Team, or regulatory agencies in response to changed field conditions, contractor preferences, design error, or other external factors. The mechanism for a design change may be a Design Directive, Contractor Design Change (CDC), Field Design Change (FDC), or Notice of Design Change (NDC). Figure 4.3 depicts the procedures for design changes for MassDOT, SPS New England, and the Design Team.



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Figure 4.2 - Design Change Procedures

Design Change Procedures		
Originating Party	Prior to AFC	After to AFC
MassDot	Design Directive (DQP 1.06)	Design Directive (DQP 1.06)
SPS New England, Inc.	Contractor Design Change Directive	Field Design Change (DQP 1.07)
Design Team	Design Pre-AFC Design Change (DQP 1.06)	Notice of Design Change (DQP 1.07)

Prior to the Approved for Construction (AFC) submittal, a design change may be executed with the approval of the Responsible Engineer within the general Quality Control process in a similar manner as any design comment with the requisite documentation process. The Contractor will issue a Contractor Design Change Directive requesting that the Design Team modify the design for the indicated reasons. This directive may be verbal or written. The Design Team will respond to this directive with a Change Order Notification (CON) that documents the request and defines budgetary or schedule implications. The CON form is for internal accounting purposes.

After the AFC submittal and upon determining and confirming the need for a design change, the Design Manager will issue a Notice of Design Change (NDC) to the Project Manager, Construction Superintendent, and QC Administrator. The NDC will notify all of the above referenced parties that a design change is required to previously released plans in order to meet the requirements of the contract or the design criteria. MassDOT will receive copies of all NDCs.

After the AFC submittal, a design change will require re-issuance of the affected drawings with design changes noted in the revision block and highlighted in a specific manner, usually a cloud. In general, plan or document revisions prior to AFC submittal will be denoted as Revision A, B, C, etc. Revisions after AFC submittal will be denoted as Revision 1, 2, 3, etc. Modifications or supplements to the design calculations shall be performed with reference to the specific design change. Quality Control procedures for drawing modifications must follow the design quality control. Checking prints for design changes shall be maintained as quality documents. Specific care must be given to identifying all drawings and details that are affected by a design change. Specific procedures for design changes and document revisions are outlined in DQP 1.06, 1.07, 1.09, 2.02, and 3.01. Re-issued drawings shall be sealed by the Responsible Engineer.

Alternative forms for the design changes covered in DQP 1.06, 1.07, 1.09, and 3.01 are permitted with the approval of the Design QC Manager, SPS New England, and MassDOT.



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4.4.6 Design Dispute Resolution Procedures

Disputes or disagreements between the Design Team and Contractor (SPS New England, Inc) will be resolved in accordance with the dispute provisions in the Design Subcontract.

4.4.7 Record Drawings/As-Builts

During construction of the project, Record Drawings will be maintained by SPS New England's Field Project Engineer(s), under the direction of the Project Manager, that reflect the changes or deviations made from the original design drawings during the construction process (see DQP 3.03). Sources for these changes will include RFIs, FDCs, NCEs, NCRs, re-issued drawings, and information provided by SPS New England directly. The Record Drawings shall be generated by HNTB in the CADD format required by the Design-Build Contract and submitted to MassDOT for final review upon completion.

4.5 Design Hold/Control Points

Design Hold/Control Points are predetermined stopping points in the design process at which the design must be put on hold or design activity is limited without the approval/acceptance of MassDOT.

For this project, the only Design Hold/Control Points anticipated are limited to the design review periods identified on the project schedule. It is recognized that due to the aggressive schedule, selected design activities must continue during these review periods. Design of major items that require MassDOT acceptance or evaluation will not progress significantly during this period without MassDOT concurrence. Other than the MassDOT Review Periods, there are no defined circumstances beyond which a design activity must not proceed.

4.6 Early Release Construction (ERC)

ERC design plan submittals may be made for a specific construction element in order to meet procurement and construction schedules. ERC design review submittals shall include design plans of the particular component, design calculations, QC documentation, and a thorough description of the elements to be released. The plans and calculations shall be sealed by a Massachusetts Professional Engineer. Generally, 75% and 100% Design Submittals are required based on the submittal type for ERC packages.

Certain items, segments, or phases of work will be started prior to the completion of Final Design Documents to facilitate the schedule associated with this Design-Build project, such as:

- Fabrication of Structural Steel
- Foundation Elements – Shafts, Piers, and Abutments
- Stage 1 Temporary Traffic Control Plan
- Bridge Profile and Alignment Highway



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When the Design Production Team has completed the design for an item or segment on which SPS New England wishes to proceed, an Early Release Construction Submittal will be forwarded to MassDOT for review that shall include (as applicable):

- Work Plan and Schedule
- Design plans, calculations, and/or reports
- Specifications
- Electronic files
- Documentation that the DB Entity has obtained all required Governmental and Utility Owner approvals
- Design QC Documentation
- QC Administrator Certification stating that: design meets all applicable requirements; the design has been checked in accordance with the QMP; item or segment is ready for construction, including relevant Construction QC Plans and Construction Procedures; and all State, Local, Environmental and Utility permits and approvals required for the early release construction have been obtained

An Oversight Review Meeting will be held, attended by the Designer, DB Entity QC Reviewers, and all MassDOT Reviewers. Both DB Entity QC Reviewers and Client (MassDOT/FHWA) Reviewers are expected to report to the meeting prepared to discuss their review comments. A page by page review of all documents will be performed at this meeting, and comments from Client Reviewers will be recorded. Designers will respond in the meeting and discuss proposed changes in order to reach agreement as to action to be taken (i.e. changes to the design documents). A clean set of design documents will be annotated at the meeting with comments, responses, and actions. DB Entity QC Reviewers will also present any additional review comments, which will be resolved with the Designers and recorded. The objective is to air and resolve all comments on the Client side and the DB Entity side by the end of the meeting.

Depending on the nature and volume of comments and responses, they may remain as mark-ups on drawings or they may be transferred to a Comment Disposition Form or MassDOT's equivalent form. If they remain as mark-ups on drawings, the mark-ups will be accompanied by an RCR form that refers back to the mark-ups. The intention is that a single DB Entity/Client Comment Disposition Form will be prepared to record both MassDOT and DB Entity QC Reviewer Comments and Designer responses. The names of attendees of the Comment Resolution Meeting will be attached to the Comment Disposition Form to record who participated in the review.

Designers will incorporate agreed-upon changes to the design documents, and the Design QC Reviewer will review the revised submittal to confirm that each comment has been incorporated, as described in QMP Section 4.3. SPS New England will not commence Early Release Construction until the MassDOT design review is complete and MassDOT concurs in writing with the QC Administrator's certification approving construction. A copy of the Early Release Submittal Cover Sheet is included in Appendix II. SPS New England may start fabrication at risk, prior to MassDOT approval of final design documents, but will not be permitted to commence any construction until MassDOT concurrence is received.



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4.6.1 Early Release Construction

As permitted by the RFP, the Design Team may release design plans (prior to the completion of Final Design Documents) for an Early Release of construction on certain components of Work in order to meet project schedule requirements. Typically, this will apply to the procurement of long-lead items such as specialty bridge components or high-strength materials. MassDOT considers such Work at the sole risk of the Contractor until the complete design has been certified by the Design QC Manager.

The DB Entity will prepare a formal Design Submittal containing the required information per the RFP requirements for MassDOT and FHWA review. The DB Entity shall address or incorporate comments in its final design prior to MassDOT's acceptance of the Final Design Submittal. For Early Release of Construction work, the Contractor shall prepare Work Plans in accordance with the procedures defined in this QMP. These Work Plans shall specify the procedures for the approval process and the design items to be reviewed by MassDOT and the Design QC Manager. These Work Plans shall be submitted to MassDOT for approval.

4.6.2 Shop Drawing Review for Early Release Construction

The review process for approval of Shop Drawings for Early Release Construction elements and elements required to be ordered to meet project schedule will be identical to the standard Shop Drawing review process outlined in Section 4.4.1, with the following exceptions:

- The Construction QC Reviewer will note in the transmittal to the Design Manager that the shop drawing is based on Early Release Construction drawings.
- The Early Release (ER) Shop Drawing stamp will denote that the review is for Early Release Construction; for reference, see DQP 3.02.

Following completion of Final Design Documents, the Contractor will re-issue the Early Release shop drawings for re-review if changes have occurred since the original review by the Design Team and the associated RFC has been approved. Only the documents revised by the change shall be resubmitted. The ER shop drawing stamp will be used to denote review status and will be marked as a "Final Plan Re-Check". The review status will be denoted as "Approved," "Approved as noted," "Revise and Re-Submit," or "Rejected."

If fabrication of an Early Release item has been completed and the item does not conform to the approved Final Construction Drawings when issued, an NCR may be required.

4.7 Review of Construction Procedure Submittals

Some construction packages may be prepared by other design entities not associated with the design of permanent structures in the contract. These construction engineering packages will follow the same Quality Control procedures as described herein. The Design Team may review these methods as they pertain to the long-term performance of the permanent works. Examples of these construction packages include:



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- Pile Driving and Drilled Shaft Procedures
- Demolition and Erection Procedures (including Temporary Erection Bents)
- Temporary Work Trestle Design
- Bridge Deck Placement Plan
- Support of Excavation

The designer of these construction engineering packages will provide the following information for submittal reviews, as necessary:

- A narrative describing the procedure.
- Stamped calculations to document compliance with codes and standards.
- Stamped drawings indicating dimensions, configurations, and sequence of construction.
- Documentation of QC activities for design calculations and plans for the submittal.

The Design Production Team Reviewer will:

- Review the procedure for conformance with construction documents and applicable codes and standards.
- Mark up the procedure with corrections and notes as required.
- Stamp drawings with the review status, date, and initials.
- Produce a color PDF scan of the document(s).

4.8 Incorporation of Agency Design Review Comments

A comment resolution sheet or Blue Beam Summary Log will be used to document and track the status and resolution of all comments pertaining to the design documents under review. Comments may be logged using the Comment Disposition Form 2.09-1 or by Bluebeam. This same form will then be used by MassDOT to document their Design Acceptance comments on each review.

It will be the Design QC Manager's responsibility to ensure that the forms have been filled out completely indicating that proper reviews have been conducted and issues corrected, as well as to conduct a subsequent review both of the issues brought to light in the reviews, as well as any new items not previously identified.

4.9 Design Quality Control Processes

The Quality Control processes required in the design phase to ensure an end product of quality construction documents that conform to the requirements of the Design-Build Contract, SPS New England's expectations, and the Standard of Care, are shown in Figure 4.3; this flowchart shows the Design Process, including notable QC activities, from NTP through AFC submittal. Figure 4.4 shows a typical sequence for the final design review and approval process.

During the design phase, specific review processes are required to fully embrace the intent of the Design Quality Procedures (DQP). The review processes include:



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Design Production Team Frontline QC Activities:

- Survey Field Checking
- Validating and Approving Computer Software
- Discipline Coordination Reviews (Interdisciplinary Reviews, IDRs)
- Independent Technical Reviews
- Drawing-Specification Cross-Check (Discipline Review)
- Detailed Checking of Calculations, Plans, and Specification (Discipline Review)
- Design Package Milestone Reviews
- Constructability Reviews
- Over-the-Shoulder Reviews
- Visual Check

Design QC Team Formal QC Activities:

- Review Comment Procedures and Forms
- Design Quality Control Checklist
- Quality Control Review of Computer Software Validation
- Design QC Team Reviews (Senior Technical Review & Over-the-Shoulder)
- Design QC Team Review of Formal Submittals (Design QC Process Review)
- Internal Quality Control Project Control Documents

Design QC Team review comments will be tracked, addressed, and later closed during internal design review by the Design Production Staff.

The overall design QC process includes procedures related to the direct checking of design work, along with higher-level reviews that evaluate overall quality. Each individual check and review process will be monitored by the DQCM, who will confirm general compliance with the DQPs. The Design QC System includes procedures for the following processes:

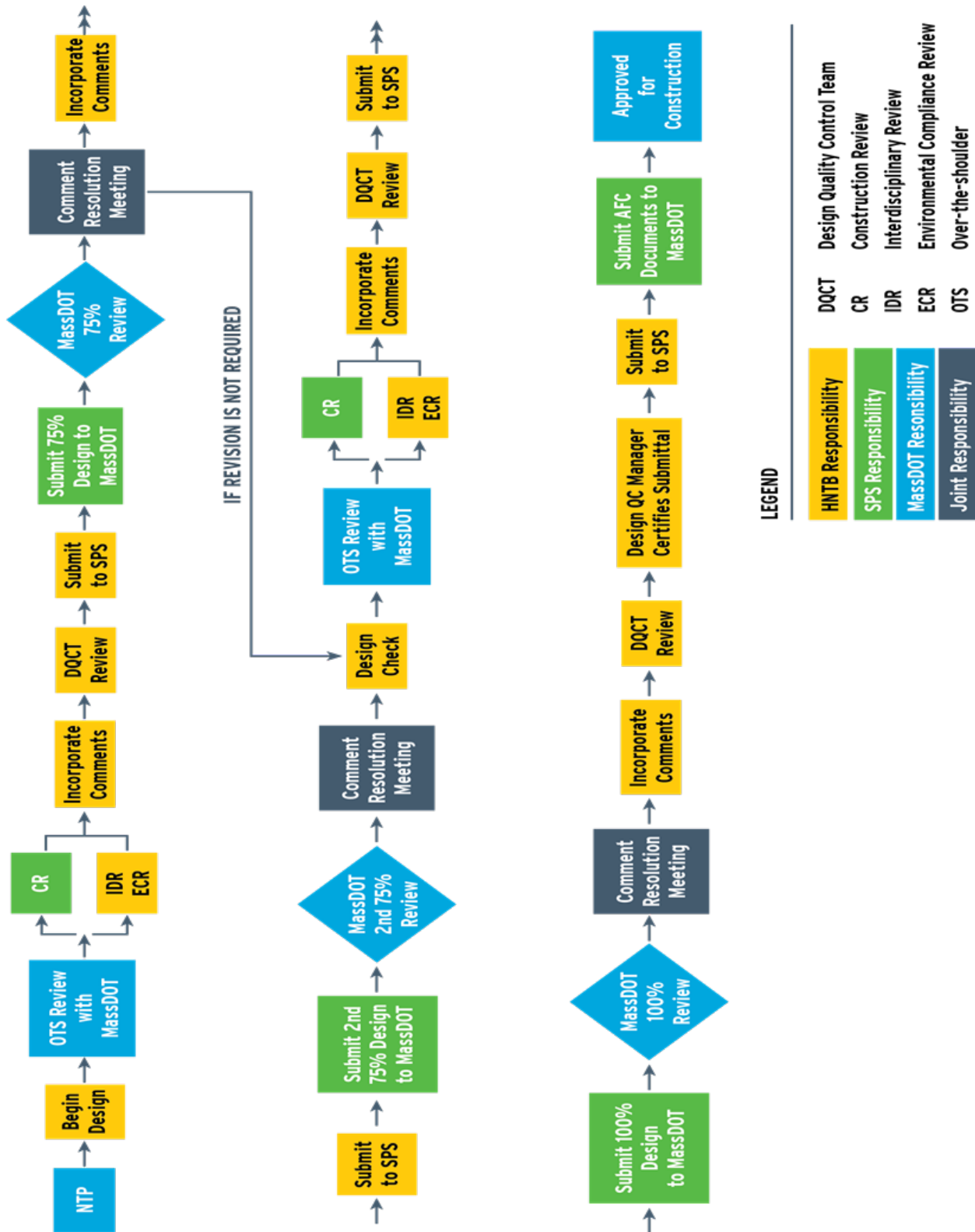
- Validation of design software (DQP 1.03)
- Detailed check of design documents (DQP 2.01 through DQP 2.05)
- Interdisciplinary Coordination Reviews (IDR) (DQP 2.10)
- Independent Design Check (IDC) (DQP 2.01)
- Constructability Reviews (CR) (DQP 2.12)
- Environmental Compliance Reviews (DQP 2.11)
- CADD QC Audits (DQP 2.06)
- Design QC Team Reviews at Early Release of Construction, 75-percent and final Plans and Specifications (DQP 2.09)
- Certification of Design Submittals (DQP 1.04, DQP 1.05, DQP 2.09)
- Color Codes (DQP 2.13)
- Senior Technical Review (DQP 2.15)



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Figure 4.3 – Design Flowchart





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Figure 4.4 –Review Submittal Flowchart





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5.0 CONSTRUCTION QUALITY CONTROL PROCEDURES

To ensure a successful project, Quality Control is adopted and implemented as a shared responsibility of all members of the DB Entity. The Construction QC System is developed, implemented, and monitored by the Construction QC Team, which consists of a group of certified and/or qualified engineers and inspectors that report to the QC Administrator and the Construction QC Manager.

5.1 Construction Quality Control Organization

5.1.1 Construction Production Team

The Construction Production Team comprises the personnel directly involved in execution of fabrication, manufacturing, field production, and field placement. This group is the frontline of constructing the project and plays an irreplaceable role in completing the work, while also playing a critical, active role in construction QC activities. Ultimately, it is essential that the production team be skilled and experienced in their particular role on the project *and* well trained in QC procedures and activities in order to ensure quality workmanship and materials.

5.1.2 Construction QC Team

The DB Entity Construction QC Team reports to the SPS Project Manager, but works independently from the Construction Production Personnel; i.e., the Construction QC Team members that are assigned the responsibility for Quality Control inspection and testing of the construction Work Items are not directly involved with the fabrication, manufacture, production or placement activities for said Work Item. The Construction QC Team will establish procedures for coordinating and ensuring consistency and quality of work performed by the Construction Team, subcontractors, producers, fabricators, and manufacturers. The Construction QC Team brings a completely independent set of eyes to inspect, sample, and test the work.

An Organization Chart showing the relationship of the Construction QC Team with other Project staff is included in Appendix I; Construction QC Team leaders are identified in the QC Organization Chart by light blue boxes.

5.2 Quality Control Activities by Construction Production Personnel

Quality is not attained by the presence or activities of a QC Administrator, QC Manager or QC Inspectors/Technicians, but rather begins with the frontline Construction Production Personnel. These are the skilled Laborers, Carpenters, Operators, Ironworkers and Craftspeople who actually manufacture, fabricate, produce, place, and install the work. Although their primary function is to produce or install the work, Construction Production Personnel also play a key role in Quality Control by continuously and proactively evaluating work processes and products to ensure quality through a process of continuous “self-inspection.” This holds true for all subcontractors on the project as well. All subcontractors, fabricators, and producers are contractually obligated to understand and adhere to the QC requirements outlined in this QMP.



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The Construction QC system provides for an effective process by which the QC staff functions neither above nor below, but parallel to the Production Personnel. The Construction Production Personnel are instructed and trained to engage proactively in the QC process, rather than wait until a formal QC inspection is performed to find out that a particular item of work is substandard. The Construction Production Personnel are trained and dedicated to providing the highest possible level of quality and are active participants in continuous self-inspection for quality. As an organization, SPS relies on and emphasizes the need for input from Construction Production Personnel. These are the members of the team that can provide valuable insight and advice based on their own knowledge and experience in the area of work, taking into account their specific equipment, resources, methods and procedures.

The QC Team will continuously share information, data, and ideas with the Production Personnel in real time in order to ensure conformance and quality of a given Work Item or product; both groups will also work together to determine processes for corrective action if/as needed.

5.2.1 Work Item Coordination Reviews

In order for the Production Personnel to provide continuous self-inspection for quality, it is imperative that they have a uniform understanding of how to achieve and ensure quality; this will be developed through Work Item Coordination Reviews (a.k.a. “Work Instructions”). Work Instructions are created by the project management and field supervisory staff for all major work activities as determined by DB Entity Management Personnel. The intent of the Work Instructions is to provide detailed information on how to forecast, manage, and perform a particular work activity, task, or service function, and to educate the Production Personnel before they set out to accomplish the work. A sample *Work Instruction Procedure Form* is included in Appendix III. Key elements of Work Instructions include, but are not limited to, the following:

- Equipment, tools, and resources required
- Coordination with other Work Items
- Equipment conditions that constitute proper “functioning equipment”
 - Equipment conditions or circumstances that can result in poor quality
- Procedures for maintaining tools and equipment
- Procedures for shipping, handling, receiving and storing materials
- Environmental considerations (weather, required temperature for material placement, etc.)
- Procedures for pre-production and pre-placement checks
- Procedures for placement and installation of materials
- Expected appearance of finished work (i.e. Workmanship)



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5.2.2 Pre-Production & Pre-Placement Checks

Pre-production and Pre-placement Checks are key components of the Work Item Reviews and self-inspection. There are several pre-production and pre-placement checks that SPS has implemented into the QC system, all of which can be shared and reviewed in real time with production personnel via our project management software. Examples of these checks include:

- Critical Item Matrix – This is a project management QC checklist used to track the progress of critical project issues and risks, such as executed subcontracts, purchase orders, insurance requirements, planning tasks, critical fabrication, and third-party coordination. This form has evolved into one of the single most valuable management tools used at SPS to mitigate risk and maintain the quality of materials and work provided by Subcontractors, Producers, Fabricators, and Manufacturers. A sample of the Critical Item Matrix can be found in Appendix II.
- Concrete Inspection and Pre-placement Card – Used as a check prior to placement of concrete in order to verify that formwork and rebar are installed to the proper line and grade and in conformance with the project plans and specifications and that concrete received is what was ordered and specified for a particular item. No concrete placements for permanent works will be completed without completion of a concrete pre-placement card and acceptance by the Construction QC Manager.
- Demolition Checklist – Used as a check prior to demolition activities in order to confirm that demolition is conducted safely and in accordance with all plans and specifications.
- Earthwork Checklist – Used as a check prior to earthwork activities in order to confirm that earthwork is conducted safely and in accordance with all plans and specifications.
- Horizontal and Vertical Control Checklist – Used as a check to mitigate risk during construction and plan work involving survey controls.
- Subgrades/Bases Checklist – Used as a check to mitigate risk and plan work for Roadway subgrade.
- Other “Item Specific” Checklists – Other Checklists relevant to specific Work Items will be developed by the QC Team and included in the applicable QC Plan(s).

Sample forms and checklists are included in Appendix III.



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5.2.3 Self-Inspection During Work Item Production and Placement

Although the primary function of Construction Production Personnel is to produce or install the work, they also play a key QC role through self-inspection and active communication with the Construction QC Personnel. Self-inspection is critical in order to monitor one's work throughout construction, rather than waiting until a formal QC inspection is performed. Construction Production Personnel must identify and evaluate potential construction and quality problems on the basis of their knowledge and experience, taking into account their own proposed equipment, construction methods and procedures.

The DB Entity is dedicated to providing a product of the highest possible quality, achieved in part by creating and cultivating a culture that emphasizes the importance of continuous self-inspection. All Construction Production Personnel are trained, empowered and expected to implement "self-checks" of their work. The Construction QC staff will be readily available to train and assist the work force in what to consider while producing and placing Work Items, as well as to provide instruction and documentation as outlined throughout this QMP.

5.2.4 Site Safety Reviews

In conjunction with Construction Quality Control, site safety is monitored continuously by all project personnel, as well as reviewed at key points and documented on the forms identified below. As with the QC documentation, all SPS safety forms can be shared and reviewed in real time via our project management software; see Appendix III for examples of these forms.

- SPS Daily Job & Safety Briefing – Used on a daily basis at the start of each work shift by the Superintendent Staff to review the scope of the day's activities, identify the associated hazards, and identify/review how the hazards will be controlled.
- SPS Site Inspection Form – Used by the SPS Safety Department or any member of the Project Management Staff to conduct independent site safety inspections. All reports are reviewed with the field supervisors and project management staff.
- SPS Hoisting Permit – Used to obtain clearance from the SPS Corporate Safety Officer that a planned hoist has been thoroughly evaluated prior to the start. The need for a Hoisting Permit is triggered by one of four distinct criteria:
 - o Will hoisting machine come within 40' of energized wires?
 - o Does the lift require more than one hoisting machine?
 - o Will the view of the Operator be obstructed during the lift?
 - o Will the lift exceed 75% of the machine capacity (load chart)?
- Safety Stand-Downs – Used monthly and whenever elevated attention to a task is required.



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5.3 Quality Control Activities by Construction QC Team

An effective QC system is one which functions with Field & Plant Production Personnel and Quality Control Personnel operating parallel to and in conjunction with one another, and which covers both materials and workmanship throughout fabrication, delivery, storage, and installation. All information obtained by the QC Team will be shared with the Production Personnel continuously and in real time to ensure product quality and conformance to contract requirements.

5.3.1 Construction QC Team Review of Plans and Specifications

Review of Plans and Specifications prior to submission to MassDOT will be performed by the Construction QC Team and the QC Administrator (or their designee) via a Bluebeam review session or Comment Disposition Form found in Appendix II (DQP 2.09-1). All Construction QC Team comments require a response from the Design Engineer and will be documented through final resolution. The Construction QC Team will perform Constructability Reviews on Interim (e.g., 75%) Plans and Specifications and Final Plans and Specifications; during these thorough Constructability Reviews, the Construction QC Team will review for constructability and contract/specification compliance.

5.3.2 Review of Construction Submittals Prior to Release

Prior to “release for construction” of Construction Submittals to the Construction Production Personnel, the Construction QC Team will review the submittals and associated documents, including shop & working drawings, installation procedures, reports, and manuals, to verify that only approved and up-to-date documents are distributed and utilized for construction.

5.3.2.1 Review of Other Construction Documents Prior to Release

The Construction QC Team will review all pertinent construction documents prior to release for construction, including but not limited to: final plans, specifications, shop drawings, installation procedures, reports, manuals, product guidelines, and Safety Data Sheets (SDSs). The QC Administrator will determine the most qualified Construction QC Team member to perform each review.

Documentation that the Construction QC Team has reviewed all other Construction Documents and that the documents meet the quality standards is recorded via the QC Checklist included in Appendix II, Construction Quality Procedure (CQP) Form 1.01-1.

All comments from the Construction QC Team will be documented through final resolution via a Bluebeam review session or Comment Disposition Form (DQP 2.09-1).



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5.3.3 Development and Review of QC Inspection and Testing Schedules

The Construction QC Manager, with the assistance of the QC Administrator, will develop QC Inspection Schedules and QC Sampling & Testing Schedules for each Work Item. A preliminary “QC Inspection Schedule” and “QC Testing Schedule” for all Work Items anticipated to be incorporated into the Project are included in Appendix V. The Construction QC Manager will also review and confirm the QC Inspection Schedules & QC Sampling & Testing Schedules presented in each Quality Control Plan.

The QC inspection process will comprise three quality measurement criteria, identified below, for each work item to be inspected:

- Inspection Components
 - Equipment
 - Environmental Conditions
 - Materials
 - Workmanship
- Inspection Attributes
 - Specific component and/or quality measure being evaluated
- Conformance Measures
 - Benchmark used for each Inspection Attribute to evaluate contract/specification conformance; all conformance measures will be evaluated on a “Pass/Fail” basis unless otherwise specified in the Inspection Schedule or applicable QC Plan.

Using the RMS 360 and pertinent Construction Standards, Standard Specifications, Supplemental Specifications, and Project Special Provisions, each Work Item quantity, sequence and phasing of work will be considered in developing the Lot and Sublot sizes to be included in the QC Inspection & Testing Schedules. Inspection & testing frequencies established will be no less frequent than those specified in MassDOT’s Guide Schedule; in cases where the minimum guideline frequencies established by MassDOT do not provide enough inspection or testing coverage, the Sublot sizes will be adjusted accordingly in the appropriate QC Schedule.

During the course of the work, if it is determined that a change in the inspection or testing schedule of a particular Work Item is warranted, the Construction QC Manager will discuss with MassDOT and develop a supplemental QC Inspection or Testing Schedule as needed.



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5.3.4 Development and Review of Standard QC Operating Documents

Under the guidance and supervision of the QC Administrator, the Construction QC Team will develop and review all standard QC operating documents with reference to all applicable MassDOT Standards and Contract requirements, including but not limited to: Inspection Reports Forms (IRFs), Daily Logs, Test Report Forms (TRFs), and QC Record Books. These IRFs and TRFs will be submitted with the applicable QC Plans for MassDOT review. The most current versions of Standard NETTCP IRFs and TRFs will be used if available; If a NETTCP IRF or TRF does not currently exist for a specific Inspection Attribute or Testing Quality Characteristic, the Construction QC Manager will develop an appropriate IRF and/or TRF for the applicable Work Item(s). Copies of all completed IRFs and TRFs will be uploaded and available on the Project SharePoint site.

A QC Report will be developed monthly with a summary of QC Inspection & Test Results, Project Materials Sampling & Testing Ledger, and the Non-Conformance Report (NCR) Log. If a particular report is needed sooner, a copy of that report will be provided to MassDOT as soon as it is completed or requested. Any required QC documentation from suppliers or fabricators will be uploaded to the project SharePoint site upon receipt and review by SPS.

5.3.5 Development and Review of Quality Control Plans for Major Work Items

Quality Control Plans will be developed by SPS New England and applicable Subcontractors/Producers/Fabricators. The QC Plans will then be: reviewed by the Construction QC Team and checked for conformance to the requirements of Section 5.3.4; approved and signed by the Construction QC Manager; reviewed by the QC Administrator; submitted; and accepted by MassDOT prior to the start of work for the following Work Items:

- Bridge Superstructure - Deck
Membrane Waterproofing System
- Bridge Superstructure – Steel
Elements (Bearings & Girders)
- Concrete Structure Elements – Cast-
in-Place (Abutments, Bridge Barrier,
Bridge Decks, Piers & Retaining
Walls)
- Drilled Shafts
- Earthwork
- Hot Mix Asphalt Pavement
- Other Work Items (as deemed
necessary as the work progresses)

The QC Plans for Project Produced items will be outlined using the NETTCP “Model Quality Control Plan” (December 2014) and Chapter 5, Section 5.4 of the NETTCP Transportation Construction Quality Assurance Reference Manual as a guide, and QC Plan content will be based on the aforementioned resources as well as the MassDOT Quality Control Plan Commentary.



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The model plan follows a recommended standard format that includes the following:

- Terms and Definitions
- Scope and Applicable Specifications
- Quality Control Organization
- Quality Control Laboratories
- Materials Control
- QC Sampling and Testing
- Production Facilities QC Procedures
- Field QC Procedures
- Appendices

The Construction QC Manager will be assisted by the materials testing consultant (ATC) in the development of QC Plans for Earthwork as well as all plans addressing Portland Cement Concrete. The QC Plan for Hot Mix Asphalt Pavement will be developed by the paving subcontractor (yet to be determined).

5.3.6 QC Inspection at Production Facilities and at Field Placement

All QC inspection activity (i.e. visual observations and check measurements) will be performed by qualified personnel at the on-site and off-site production facilities and field placements, and will be documented on the appropriate form(s) in accordance with the governing QC Plan. Qualified QC Personnel (including ATC) will perform all field placement inspections under the direction of the Construction QC Manager. At a minimum, a qualified member of the QC team will:

- Arrive prior to the start of production for that particular work day
- Alert responsible personnel of their presence
- Verify that the activity is still scheduled
- Verify anticipated production totals in order to determine Lot/Sublot sizes
- Start/complete the QC Construction Daily Report
- Ensure that both production/installation and inspection equipment is properly calibrated and in good working condition
- Verify correct material(s) are being used and stored appropriately
- Ensure conforming materials are produced and shipped
- Verify that all required material documentation has been received prior to incorporating items into permanent work
- Perform, or confirm completion of, all QC inspections required by the approved QC Plan or producer's QSM

Regular feedback will be provided to the Production Personnel and Construction QC Manager based on the inspections performed. The fabrication shops will also have their own qualified inspectors performing inspection to verify that they are complying with their approved QSM. The Construction QC Manager or his designee will visit the fabricators to verify that they are complying with their QSM procedures at the start of fabrication and then as deemed necessary (but not less than monthly) in accordance with the governing QC Plan. The Construction QC Manager will also work with the fabrication facilities to ensure that they have a clear understanding of the Design-Build Process, especially as it pertains to the NCR/RFI process.



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5.3.7 QC Sampling and Testing at Production Facilities and Field Placement

All QC sampling and testing will be performed by certified/qualified personnel at the on-site and off-site production facilities and field placements, and will be documented on the appropriate form(s) in accordance with the governing QC Plan. At a minimum, a certified/qualified member of the QC Team should:

- Arrive prior to the start of production for that particular work day
- Alert responsible personnel of their presence
- Verify that the activity is still scheduled
- Verify anticipated production totals in order to determine Lot/Sublot sizes
- Select random numbers and determine random sample locations
- Ensure that both production/installation and inspection equipment is properly calibrated and in good working condition
- Document testing equipment, sampling procedure, and testing procedure
- Verify correct material(s) are being used and stored properly
- Verify that laboratory performing QC testing conforms to Section 5.7
- Ensure conforming materials are produced and shipped
- Perform, or confirm completion of, all QC inspections required by the approved QC Plan or producer's QSM

Regular feedback will be provided to the Production Personnel and Construction QC Manager based on testing results. QC Samples, whether split or not, will be protected and stored at either ATC's accredited laboratory or the Producer's/Fabricator's laboratory. If the Producer/Fabricator does not have a qualified laboratory, then the samples will be stored and tested exclusively at ATC's laboratory. If ATC is not certified to perform the particular testing, then it will be outsourced to a certified facility.

5.3.8 Documentation of QC Inspection and QC Testing Results

All QC inspection, sampling, and testing that is performed by QC Technicians or Inspectors from the DB Entity, subcontractors, suppliers, producers, or fabricators will be documented daily on Inspection Report Forms (IRFs) and Test Report Forms (TRFs) in accordance with Section 5.3.4 and submitted in accordance with Section 3.5.4. Samples of IRFs & TRFs to be used on this Project are included in Appendix III and Appendix IV respectively.

QC inspection and testing results will be transmitted to MassDOT with the Monthly QC Report, uploaded to the project SharePoint site, and provided upon request. Any non-conformances identified through QC Inspection or Testing will be communicated to MassDOT immediately, and documented and tracked through final disposition in accordance with Section 3.7.



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5.3.9 Maintenance of QC Record Books and QC Database

The Construction QC Team will maintain all QC inspection, sampling and testing records as stated in the Document Management Procedures in Section 3.

5.3.9.1 Quality Control Daily Report

A Quality Control Daily Report will be maintained for each production facility or field placement operation in accordance with the relevant approved QC Plan. The QC Daily Report documents all major activities or actions related to the QC system, and serves as a summary record of key actions taken by QC personnel.

Information recorded in the QC Daily Report includes, but is not limited to:

- Weather and environmental conditions
- Summary of production or placement activities completed
- Any “non-quality” issues identified by Production Personnel or QC Personnel
- Any corrective actions recommended or taken by QC Personnel
- Discussions held with Production, other QC, and/or MassDOT Personnel
- Visitors to production facilities or field placement operations

5.3.9.2 Quality Control Record Books

“QC Record Books” will be established for each applicable Work Package. Each QC Record book will be split into three sections as follows:

- Section 1: All approved QC Plans relevant to the work package
- Section 2: All on-site QC Documentation
- Section 3: All off-site QC Documentation.

Each QC Record Book will contain, at a minimum, the following:

- Current approved QC Plan(s)
- Material Receiving Inspection Report Forms (MRIRs)
- Certificates of Compliance
- QC Checklists, IRFs and TRFs
- Random Sampling Location forms
- Up-to-date copies of all Control Charts generated
- Up-to-date copies of all Quality Level Analyses performed
- Summary of all individual QC test results to date (by Lot and Sublot)
- Summary of all material quantities produced or placed to date (by Lot and Sublot)
- Off-site QC reports from producers or fabricators
- Copies of all applicable QC Daily Reports



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The QC Record Books will be maintained in SPS's Project File, and a physical copy may also be maintained in the DB Entity's Project Field Office. The QC Record Books will be readily accessible by all QC Personnel and Agency Acceptance Personnel.

5.3.9.3 Contractor Quality Control Database

This project will use MassDOT's SharePoint site as described in Section 3 to store all QC documentation. This system facilitates seamless sharing of documentation and data between the DB Entity and MassDOT. The Construction QC Manager is responsible for collecting, uploading, and maintaining QC data to the SharePoint site; MassDOT access will be on a "read only" basis. The monthly QC Reports, approved QC Plans, and NCRs will all be posted to the SharePoint site.

5.3.10 Analysis of QC Inspection Data & QC Testing Data

QC data will be analyzed as noted in the governing, approved QC Plan to confirm that the process being monitored is consistently providing a product in conformance with specification requirements; i.e., that said process is "in control". Construction QC personnel will ensure that QC inspection and test results are properly reviewed, and that corrective action is taken as needed to maintain a quality product.

Multiple test values will be used throughout a given Lot to characterize that Lot of material. The two primary tools for data analysis are "Control Charts" and "Quality Level Analysis" (QLA). It will be stipulated in the QC Plan which method(s) will be used for each Quality Characteristics.

Control Charts and/or QLA will be used for: concrete compressive strength, slump, air, and aggregate gradation (including fineness modulus for fine aggregate); earthwork and aggregate sub-base in-place densities and moisture content; and hot mix asphalt Quality Characteristics (per Standard Special Provisions Sections 450 and 455).

The QC Administrator and Construction QC Manager will use the Control Chart and Quality Level Analysis (QLA) information to evaluate operations at the plant or field level and make recommendations as needed to ensure quality compliance for specific Work Items.

5.3.10.1 Control Charts

Control Charts, if stipulated in a Construction QC Plan or a Producer's, Fabricator's, or Manufacturer's QSM, will be used to plot and monitor consecutive QC test results for an individual Quality Characteristic throughout the production or placement of a Work Item. The Producer, Fabricator, Manufacturer or Contractor will set Control Chart Limits based on the historic variability for that Quality Characteristic.

Control Charts will be monitored by the QC Team to identify patterns or trends that indicate whether the process is "in control". Control Chart Limits will be imperative in the observation of specific thresholds that will determine if: the process is "in control"; the



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process is outside of the specified requirements but work may continue while the process is evaluated and adjusted to bring it back “in control”; or the process is outside of the specified requirements and work needs to be stopped.

5.3.10.2 Quality Level Analysis

QLA, if stipulated in a QSM or QC Plan, will be used to measure the level of a Quality Characteristic’s variability against the Target and Specification Limits. Upper and Lower Specification Limits will be applied, and the “Percent within Limits” (PWL) will be plotted. For additional info on QLA Quality Measures, refer to Section 5.4.6.2.

5.3.11 Providing Feedback to Construction Production Personnel

After QC inspection and testing data has been analyzed, the Construction QC Manager will provide regular, timely feedback to the Production Personnel.

5.3.12 Process Adjustments and Corrective Action Implementation

Based on the analysis of QC inspection and testing data and the feedback provided to the Production Personnel by the Construction QC Manager, appropriate process adjustments and corrective actions will be implemented as needed to provide the required level of quality.

5.3.13 Preparing and Updating QC Materials Sampling & Testing Ledger

The Quality Control Materials Sampling & Testing Ledger is a living document which will be updated by the DB Entity throughout the project as project design and construction progresses. A preliminary ledger is included in Appendix V with all anticipated items and quantities; as items and/or quantities are modified, the updated information will be provided to MassDOT personnel, and an updated ledger will be incorporated into Appendix V.

5.3.14 Opportunities for Improvement

The Construction QC Team is responsible for addressing opportunities for improvement by identifying the root cause(s) of any issues that arise and determining modifications to work processes in order to improve the delivery of services and construction activities.

5.4 Quality Control of Project Produced Items

Project Produced items are major items that are produced directly for an individual project either by a contractor or material producer. These types of items are generally produced at the construction site (on-site) or at a plant near the site (off-site). They are subject to potential contamination or segregation during transportation from the plant. These types of items are typically placed at the site in a loose or nonsolid state which requires subsequent mixing, compacting, finishing or curing. Common examples of Project Produced items for a highway construction project include but are not limited to Earthwork, Portland Cement Concrete and HMA Pavement.



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5.4.1 Applicable Project Produced Work Items

Items to be addressed under the category of Project Produced Materials for this project are:

- Bridge Superstructure - Deck Membrane Waterproofing System
- Concrete Structure Elements – Cast-in-Place (Abutments, Bridge Barrier, Bridge Decks, Piers & Retaining Walls)
- Drilled Shafts
- Earthwork
- Hot Mix Asphalt Pavement

5.4.2 Construction Quality Control Plans

QC Plans are project-specific documents which identify all QC personnel and procedures that will be used to ensure quality and conformance of all production and placement processes. QC Plans define the necessary QC processes for materials and workmanship for all major construction Work Items by clearly outlining:

- Qualifications of QC Personnel and Testing Laboratories
- Material sources and properties
- QC Inspection, Sampling and Testing schedules & procedures
- Analysis method(s) and specification limits of QC Data
- Documentation requirements for QC Data
- Process(es) for non-conforming activity resolution

For this Project, all major Work Items involving Project Produced items will be addressed in one of the following QC Plans:

- Bridge Superstructure - Deck Membrane Waterproofing System
- Concrete Structure Elements – Cast-in-Place (Abutments, Bridge Barrier, Bridge Decks, Piers & Retaining Walls)
- Drilled Shafts
- Earthwork
- Hot Mix Asphalt Pavement

As specified in Section 5.3.5, the QC Plans for Project Produced items will be outlined using the NETTCP “Model Quality Control Plan” (December 2014) and Chapter 5, Section 5.4 of the NETTCP Transportation Construction Quality Assurance Reference Manual as a guide, and QC Plan content will be based on the aforementioned resources as well as the MassDOT Quality Control Plan Commentary.



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Each QC Plan will address both Production Facility QC and Field QC activities for all materials incorporated into the Work Item, and will identify production and/or field operations and critical equipment and resources. The “Production Facility QC Procedures” section of each QC Plan may reference the pertinent section(s) of the applicable material Producer’s QSM, as long as there is a QSM available and it meets the Contract Quality Assurance Requirements as presented in Section 2 of the RFP Technical Provisions (Volume II). The “Field Procedures” section of each QC Plan will address QC Inspection Attributes for the applicable Project Produced Items being installed.

All QC Plans will be reviewed and approved by the QC Administrator and accepted by the Project Manager before submission to MassDOT for review and acceptance.

5.4.3 Quality Control Inspection Schedules

5.4.3.1 Inspection Components

Inspection procedures for Quality Control will address each of the following four major Inspection Components:

- 1) Equipment – Ensure that equipment is operating properly and in acceptable condition to produce and place a quality product
- 2) Environmental Conditions – Ensure that weather and site conditions are appropriate for production and placement
- 3) Materials – Ensure that the correct material is being produced, delivered, and incorporated into the work, and inspect the condition of materials at delivery and during handling, storage, and placement to confirm material is free of defects or damage
- 4) Workmanship – Inspect work as it occurs to ensure quality workmanship free of deficiencies and in conformance with project specifications

5.4.3.2 Inspection Attributes

An Inspection Attribute is defined as a characteristic that, by its presence/absence and or specification conformance, classifies an item as conforming or non-conforming. Inspection Attributes for QC are directly related to maintaining control of production and placement processes to ensure quality and conformance with the requirements for each item of work.

Inspection Attributes to be monitored are included in Appendix V for both Production Facilities and the Project Site. Tables will be included in each Quality Control Plan that identify the specific Attributes to be inspected for each of the four Inspection Components.



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A sample table is shown on below.

Inspection Component	Inspection Attributes	Minimum Inspection Frequency	Point of Inspection	Inspection Method
Equipment	Mixer Drum Blade	Per QC Plan	Per QC Plan	Per QC Plan
	Vibrator Frequency	Per QC Plan	Per QC Plan	Per QC Plan
	Finishing Machine Settings	Per QC Plan	Per QC Plan	Per QC Plan
Environmental Conditions	Form Cleanliness	Per QC Plan	At Placement Location	Visual Check
	Temperature of Air & Underlying Surface	1 per Day	At Placement Site	Check Measurement
Materials	Aggregates & Cementitious Material (Correct Type)	Per QC Plan	PCC Production Facility	Visual Check + Manufacturer CoC
	Temperature of PCC Mix	4 per Day	From Point of Discharge	Check Measurement
Workmanship	Form Dimensions	Per QC Plan	At Placement Location	Check Measurement
	Reinforcement Bar Layout	Per QC Plan	At Placement Location	Check Measurement
	Surface Defects (Honeycombing, Cracking)	Per QC Plan	Cured Concrete	Visual Check

5.4.3.3 Lot and Sublot Sizes for Inspection Attributes

The preliminary Lot and Sublot sizes for each Inspection Attribute are provided in the Schedules attached in Appendix V, with the exception of Lot and Sublot sizes for HMA Pavement which have already been established and specified by MassDOT (see Standard Special Provisions Sections 450 and 455). The specific Lot and Sublot sizes for inspection of all Work Items will be determined according to MassDOT Standard Specifications, Supplemental Specification, and Project Special Provisions, and detailed accordingly in the applicable QC Plan. For all Work Items, Lot sizes will not exceed 20 to 30 Sublots, and Sublots will be no larger than allowable per Contract and MassDOT Specifications.



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5.4.4 Quality Control Sampling and Testing Schedules

Preliminary Quality Control Sampling and Testing Schedules for all Work Items are provided in Appendix V. The specific QC Sampling and Testing Schedules for all Work Items will be detailed in the applicable QC Plan.

5.4.4.1 Random Sampling

Random Sampling will be conducted by the qualified QC Inspectors and Technicians under the direction of the Construction QC Manager and in accordance with ASTM D3665; this standard utilizes a table of random numbers to determine the random location of each material sample. For all Project Produced Items, one (1) random QC sample will typically be obtained and tested for each Sublot. The random sample QC test results will be evaluated against applicable Quality Limits and used for Control Charts and/or QLA in accordance with requirements for each Work Item. Random Sampling provides an unbiased estimate of the Quality Characteristics tested for a given Sublot.

5.4.4.2 Selective Sampling

Selective Sampling is a non-random procedure in which a sample is obtained for informational purposes only. Selective Sampling provides initial or supplemental QC information during production or placement and assists in isolating apparent non-conforming material. Typically, Selective Sampling is used soon after the start of production or placement to provide some indication of whether the item is meeting specification. Any selective sampling for Quality Control will be performed under the direction of the Construction QC Manager and as stipulated in the applicable QC Plan.

5.4.4.3 Quality Characteristics Tested for QC

Quality Characteristics to be tested, as defined for each material type, are outlined in the QC Sampling & Testing Schedule found in Appendix V; specific Quality Characteristics to be tested for Work Items covered under a QC Plan or QSM will be provided in the applicable document.

5.4.4.4 Lot and Sublot Sizes for QC Sampling & Testing

Lot and Sublot sizes for QC sampling and testing of all Work Items will be provided in the testing tables in the applicable QC Plan. The preliminary Sampling and Testing Schedule is also included in Appendix V, with the exception of Lot and Sublot sizes for HMA, which have already been established and specified by MassDOT (see Standard Special Provisions Sections 450 and 455).

For all Project Produced Items, Lot sizes will not exceed 20 to 30 Sublots. A Lot is defined as a specific quality of material from the same source and produced under the same controlled conditions within the same construction season. The Sublot sizes will be no larger than allowable per Contract and MassDOT Specifications.



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5.4.5 Quality Control Documentation

Quality Control documentation will be handled in accordance with QMP Sections 3, 5.3.8, and 5.3.9. Standard NETTCP Inspection Report Forms (IRFs) and Test Report Forms (TRFs) will be used to document QC Inspection, Sampling, and Testing of all Work Items. Where NETTCP IRFs or TRFs do not currently exist for a specific Inspection Attribute or Testing Quality Characteristic, the Construction QC Manager will develop appropriate IRFs and/or TRFs for the applicable Work Item(s). QC Documentation for Hot Mix Asphalt Pavement will be in accordance with Standard Special Provisions Sections 450 and 455.

5.4.5.1 QC Inspection Records

All IRFs will address the four Inspection Components described in Section 5.4.3.1 and will include all Inspection Attributes applicable to Quality Control of a particular Work Item. The completed QC IRFs will be maintained in the applicable QC Record Book, and will also be available on the project SharePoint site. A preliminary set of Quality Control Inspection Report Forms for Project Produced Materials is included in Appendix III.

5.4.5.2 QC Sampling & Testing Records

The QC Sampling and Testing Records will be maintained in the applicable QC Record Book per Section 5.3.9.2, and will also be available on the project SharePoint site. A preliminary set of Quality Control Sampling & Testing Report Forms for Project Produced Items is included in Appendix IV.

5.4.5.3 QC Record Books

The QC Record Books for all Project Produced Items will be maintained in SPS's Project File, and a physical copy may also be maintained in the DB Entity's Project Field Office. The Record Books will be organized to store all QC documentation as identified in Section 5.3.9.2.

5.4.6 Quality Control Data Analysis

Quality Control Data Analysis provides a powerful tool for QC Personnel to confirm whether a production or placement process is "in control" and to determine the measured quality level of materials as the work progresses.

5.4.6.1 Conformance Measures Applied to QC Inspection Data

QC Inspection results/data for Project Produced Items will be evaluated in a timely manner so that any corrective action may be taken as soon as possible. There must be sufficient data to make an analysis. Each inspection attribute will be evaluated using "Pass/Fail" as the conformance measure, which will be documented on the applicable IRF(s).



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5.4.6.2 Quality Measures and Quality Limits

The Quality Measure (e.g. Percent within Limits, “PWL”) and specific Quality Limits to be applied to the QC test results for all Project Produced Items will be provided in the appropriate QC Plan for each item.

The three Quality Limits for analysis of multiple QC test results are:

- 1) Specification Limits – Comprising Upper Specification Limits (USL) and Lower Specification Limits (LSL), these are statistical, or “soft” limits. For items where the quality of work is being evaluated by statistical analysis using QLA, individual test results that fall outside of the USL or LSL may still be included in the acceptance determination of the item provided that said results are within Engineering Limits (described below). For applicable Work Items, Specification Limits will be obtained from the MassDOT Standard Specifications or Contract Specifications.
- 2) Engineering Limits – Absolute limiting values for test results, or “hard” limits. All Quality Characteristics tested for QC will be evaluated against Engineering Limits; if an individual test result falls outside of these Engineering Limits, it will be evaluated by the Construction QC Manager, utilizing additional QC testing if/as necessary, and presented to MassDOT for appropriate disposition.
- 3) Acceptance Limits – Limits placed on the Quality Measure (e.g. PWL) being used to evaluate a Lot, as opposed to limits on individual test values. The computed quality level derived from multiple test values for each Quality Characteristic for a given Lot is evaluated against these Acceptance Limits; for example, if the Acceptance Limit of a Lot is 60 PWL, the quality level of the Lot must be at least 60 PWL in order for it to be accepted.

If an Inspection or Test Result is given a “fail” status, it will be addressed and/or corrected in accordance with Section 3.7 and its pertinent sub-section(s).

5.4.6.3 Control Charts

Control Charts will be maintained for specific Quality Characteristics in accordance with the applicable QC Plan per Section 5.3.10.1.

5.4.6.4 Quality Level Analysis

Running QLA will be performed and tracked for specific Quality Characteristics in accordance with the applicable QC Plan per Section 5.3.10.2.



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5.5 Quality Control of Fabricated Structural Items

Fabricated Structural items are produced specifically for an individual project by a MassDOT approved Fabricator under a controlled environment. These types of items are stable and have no potential for alteration under proper transportation from the Fabricator. These items typically arrive at the site in a solid state and require little or no additional work after installation. On-site field QC inspection (and QC testing, if applicable) will be performed for all Fabricated Structural items upon receipt, during storage, and during and after installation to ensure that the final installed product meets all quality requirements.

5.5.1 Applicable Fabricated Structural Work Items

The Fabricated Structural Materials Items on this project are:

- Precast Modular Concrete Units (Wall Pier Sections)
- Precast Concrete Barrier
- Structural Steel Bridge Girders
- Bridge Bearing Pads
- Steel Expansion Joints
- Sign Structures and Precast Sign Foundations

5.5.2 Fabricator Quality System Manuals

Quality System Manuals (QSMs) will be prepared and followed by fabricators of the following Fabricated Structural Items:

- Precast Modular Concrete Units (Wall Pier Sections)
- Precast Concrete Barrier
- Structural Steel Bridge Girders
- Bridge Bearing Pads
- Steel Expansion Joints
- Sign Structures and Precast Sign Foundations

Each Fabricator is required to have their own Quality System Manual (QSM) which outlines minimum information using the QSM format and outline contained in AASHTO R38 – Section 5.2.1, or a similar format and outline that has been used and accepted in the past by MassDOT. Each fabricator will provide the DB Entity a copy of their QSM, which will be reviewed and accepted by the Construction QC Manager to ensure conformance with the Contract Quality Assurance Requirements and then transmitted to MassDOT for their use and information prior to fabrication. If a Fabricator or Manufacturer's QSM is referenced in a QC Plan, the QSM will be attached as an appendix to the QC Plan for reference.



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5.5.3 Construction Quality Control Plans

Major Work Items involving Fabricated Structural items fabrication and installation which will require a specific Quality Control Plan include:

- Bridge Superstructure - Steel Elements (Bearings & Girders)

As specified in Section 5.3.5, the QC Plans for Project Fabricated Structural Items will be outlined using the NETTCP “Model Quality Control Plan” (December 2009) and Chapter 5, Section 5.4 of the NETTCP Transportation Construction Quality Assurance Reference Manual as a guide, and QC Plan content will be based on the aforementioned resources as well as the MassDOT Quality Control Plan Commentary.

Major Work Items utilize Standard Manufactured Items in the complete Fabricated Structural item. Each QC Plan will address both Production Facility QC and Field QC Activities for all materials incorporated into the Work Item. The “Production Facility QC Procedures” section of each QC Plan may reference the pertinent sections of the applicable Fabricator’s QSM. Prior to the start of work, each QC Plan will be developed, submitted to, and accepted by MassDOT as stipulated in the contract. It may be necessary to develop additional individual Construction QC Plans once a detailed scope for each Work Package is available.

5.5.4 Quality Control Inspection Schedules

5.5.4.1 Inspection Components

The Construction QC System includes inspection activities associated with the following four major Inspection Components as defined in Section 5.4.3.1:

- 4) Equipment
- 5) Environmental Conditions
- 6) Materials
- 7) Workmanship

These components will be addressed in the QC inspection procedures of each Fabricator’s QSM, as well as the QC inspection tables in each QC plan.

5.5.4.2 Inspection Attributes

Inspection Attributes are defined in Section 5.4.3.2. Inspection Attributes will be addressed in each Fabricator’s QSM. Each QC Plan will contain tables with specific Inspection Attributes (by Inspection Component) for the work activity being inspected; a preliminary sample inspection table can be found in Section 5.4.3.2.



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5.5.4.3 Lot and Sublot Sizes for Inspection Attributes

Lot and Sublot sizes for QC inspection will be included in each Fabricator's QSM. Lot and Sublot sizes for inspection of all Work Items will be provided in the inspection tables in the applicable QC Plan. Lot sizes for inspection of Fabricated Structural Items will generally not exceed 20 to 30 Sublots. The preliminary Lot and Sublot sizes for each Inspection Attribute are provided in Appendix V.

5.5.5 Quality Control Sampling and Testing Schedules

Preliminary Quality Control Sampling and Testing Schedules for Fabricated Structural Work Items are provided in Appendix V. The specific QC Sampling and Testing Schedules for all Work Items will be detailed in the applicable QC Plan.

5.5.5.1 Random Sampling

Random QC Sampling will be performed in accordance with each Fabricator's QSM and each QC Plan for Fabricated Structural Work Items. In the event that a Fabricator's QSM does not address Random Sampling at the plant, the QC Plan specific to that Fabricator's scope of work will outline the plant Random Sampling process.

5.5.5.2 Selective Sampling

Selective QC Sampling will be performed in accordance with each Fabricator's QSM and each QC Plan for Fabricated Structural Work Items.

5.5.5.3 Quality Characteristics Tested for QC

The Quality Characteristics to be tested for Quality Control will be identified in each Fabricator's QSM and each QC Plan for Fabricated Structural Work Items.

5.5.5.4 Lot and Sublot Sizes for QC Sampling and Testing

The Lot and Sublot sizes for Quality Control testing will be identified in each Fabricator's QSM and each QC Plan for Fabricated Structural Work Items.

5.5.6 Quality Control Documentation

Quality Control documentation will be handled in accordance with QMP Sections 3, 5.3.8, and 5.3.9.



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5.5.6.1 Standard QC Report Forms

The most current versions of Standard NETTCP Inspection Report Forms (IRFs) and Test Report Forms (TRFs) will be used if available; if a NETTCP IRF or TRF does not currently exist for a specific Inspection Attribute or Testing Quality Characteristic, the Fabricator or the Construction QC Manager will develop an appropriate IRF and/or TRF for the applicable Work Item(s). All QC Forms which are specifically designed for the Fabricator's use will be included in the Fabricator's QSM.

5.5.6.2 QC Inspection Records

Fabricators' QC Inspection Records will be maintained at the Fabrication Plant and copies will be provided to the DB Entity for review and transmittal to MassDOT. Inspection Records for all on-site QC inspection of Fabricated Structural Work Items will be maintained in SPS's project folder in the applicable QC Record Book per Section 5.3.9.2. All IRFs will address the four Inspection Components described in Section 5.4.3.1 and will include all Inspection Attributes applicable to QC of a particular Work Item.

5.5.6.3 QC Sampling and Testing Records

Fabricators' QC Sampling and Testing Records will be maintained at the Fabrication Plants and copies will be provided to the DB Entity for review and transmittal to MassDOT. Inspection Records for any on-site QC sampling and testing of Fabricated Structural Work Items will be maintained in SPS's Project Folder in the applicable QC Record Book per Section 5.3.9.2.

If a Test Result or Conformance Measure from a Fabricator Inspection (as described in Section 5.5.6.2) is given a "fail" status, it will be addressed/corrected in accordance with Section 3.7 and its pertinent sub-section(s).

5.5.6.4 QC Record Books

All QC records for Fabricated Structural Work Items will be placed in the appropriate QC Record Book in SPS's Project Folder. The Record Books will be organized to store all QC documentation as identified in Section 5.3.9.2. All Fabricator QC records will be added to the appropriate Record Book once received and reviewed by the Construction QC Manager.

5.5.7 Quality Control Data Analysis

QC Data Analysis provides a powerful tool for QC Personnel to confirm whether a fabrication process is "in control," and to determine the measured quality level of materials. The Construction QC Manager will be responsible for obtaining and coordinating all QC Data analysis.



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5.5.7.1 Conformance Measures Applied to QC Inspection Data

QC Inspection results/data for all Fabricated Structural Items will be evaluated in a timely manner so that any corrective action may be taken as soon as possible. Each Inspection Attribute will be evaluated using “Pass/Fail” as the Conformance Measure, which will be documented on the IRFs.

5.5.7.2 Quality Measures and Quality Limits

The Quality Measures and Quality Limits to be used with QC testing data will be identified in each Fabricator’s QSM and each QC Plan for Fabricated Structural Work Items.

If a Conformance Measure from a Fabricator Inspection or Test Result is given a “fail” status it will be addressed/corrected in accordance with Section 3.7 and its pertinent sub-section(s).

5.5.7.3 Control Charts

Control Charts will be maintained for specific Quality Characteristics identified in each Fabricator’s QSM and each QC Plan per Section 5.3.10.1.

5.5.7.4 Quality Level Analysis

Running QLA will be performed and tracked for specific Quality Characteristics in accordance with each Fabricator’s QSM and each QC Plan per Section 5.3.10.2.

5.6 Quality Control of Standard Manufactured Items

Standard Manufactured items are routinely mass-produced by a prequalified Manufacturer under highly controlled and largely automated manufacturing conditions. The items are stable and have little or no potential for alteration under proper transportation from the Manufacturer. These items typically arrive at the site in a solid, finished state and require installation by the Construction Production Personnel. On-site field QC inspection (and QC testing, if necessary) will be performed for all Standard Manufactured Items upon receipt, during storage, and during and after installation to ensure that the final installed product meets all quality requirements.

All Standard Manufactured Materials used on the project will be on the MassDOT Qualified Products List when available, and will be accompanied by a Certificate of Compliance, Mill Certification, Independent Test Report, and/or applicable sample as required per the RMS 360. If a Standard Manufactured Material for a specific use is not available on the MassDOT Qualified Products List, then approval will be sought and received prior to use of said material.



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5.6.1 Applicable Standard Manufactured Work Items

Anticipated Standard Manufactured items on this project include, but are not limited to:

- Steel Reinforcement (Rebar)
- Bituminous Dampproofing (Coating)
- PVC Waterstop
- Stay-in-Place (SIP) Forms
- Fiber Expansion Joint Board
- Cork Expansion Joint Board
- PVC Drain Pipe
- FRE Conduit
- PVC Conduit
- RCP Drain Pipe
- Precast Concrete Utility Structures (Drainage, Electrical and Signal)
- Steel Frames and Grates
- Geotextile Fabrics
- Electric Wire and Cable
- Binders and Cements
- Traffic Markings (Paint and Thermoplastic Epoxy)
- Guardrail and Appurtenances
- CCTV Camera and Equipment
- Bricks, Block, and Mortar Mixes

5.6.2 Manufacturer Quality System Manuals

All Manufacturers of Standard Manufactured Materials are requested to provide their own QSM which outlines minimum information using the QSM format and outline contained in AASHTO R38 – Section 5.2.1, or a similar format and outline that has previously been used and accepted by MassDOT. All Manufacturers shall perform QC inspections, sampling and testing in accordance with their QSM. The Manufacturer's QSM will be transmitted to MassDOT for their use and information upon request.

5.6.3 Project Site QC Inspection and Testing

5.6.3.1 Material Receipt and Certificate of Compliance

All Standard Manufactured Materials shall be delivered to the Project Site with a MassDOT acceptable standard Certificate of Compliance (CoC). The CoC will be accompanied by a copy of all Manufacturer QC Inspection and Test Results for the corresponding Lot of material.

Receiving inspection begins when a Standard Manufactured Item arrives on the jobsite and ends when the material has satisfactorily passed through receiving inspection and has been released for installation as a conforming material. This activity includes an inspection of the material as it is received, review of Manufacturer QC inspection and testing reports, Certificates of Compliance, and any other documents required by the Contract.

Upon completion of receiving QC inspection activities, the QC Inspector/Technician will document that all items have been inspected, checked, and verified for completeness on a Standard Manufactured Materials Receipt Inspection Report Form (MRIR); a sample MRIR is included in Appendix III.



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Material that is discovered during the receiving inspection to not meet the requirements of the contract documents, or to have insufficient paperwork, will be controlled and documented as a non-conforming material in accordance with Section 3.7 and its pertinent sub-section(s); open items will be tracked until fully resolved.

Receiving QC documentation will be uploaded to the project SharePoint site and submitted monthly as required by MassDOT. Material identified as not meeting the contract documents will not be incorporated into the work.

5.6.3.2 Random & Selective QC Inspection and Testing

The Construction QC Manager will direct the QC Team of Inspectors and Technicians on field inspection procedures for all Standard Manufactured Materials. On-site field QC inspection will be performed during storage, during installation, and following installation to ensure that all Standard Manufactured items are in conformance with the plans and specifications of the project. The Construction QC Manager will ensure timely documentation and corrective action, including removal and replacement, when any Standard Manufactured items are found to be damaged or otherwise deficient.

5.6.4 Quality Control Documentation

Quality Control documentation will be handled in accordance with QMP Sections 3, 5.3.8, and 5.3.9.

5.6.4.1 Manufacturer QC Report Forms

All Manufacturers are required to use their own Test Report Forms (TRFs) and Inspection Report Forms (IRFs). All QC Forms which are specifically designed for the Standard Manufacturer's use will be included in the Manufacturer's QSM.

5.6.4.2 Project QC Team Inspection Report Forms

The QC Team, under the direction of the Construction QC Manager, will document all inspection activities for Standard Manufactured Items conducted upon delivery, during storage, and throughout installation on Materials Receiving Inspection Report Forms (MRIRs). If custom receiving inspection report forms are required for any Standard Manufactured Items, these will be developed by the Construction QC Manager in consultation with the QC Administrator and included with the applicable QC Plan(s).

5.6.4.3 QC Record Books

All QC Records for Standard Manufactured items, including Certificates of Compliance, Materials Receipt Inspection Reports, Standard Manufactured Materials Inspection Report Forms, and Test Report Forms, will be placed in the applicable QC Record Book, which will be maintained in SPS's project folder and organized to store all of the QC documentation in accordance with Section 5.3.9.2.



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5.6.5 Quality Control Data Analysis

5.6.5.1 Conformance Measures Applied to QC Inspection Data

The Conformance Measure(s) used by Manufacturers to evaluate their QC inspection results during the manufacturing process will be in accordance with their QSM.

All on-site QC inspection results for Standard Manufactured Materials will be evaluated in a timely manner so that any corrective action may be taken as soon as possible. Each Inspection Attribute will be evaluated using “Pass/Fail” as the Conformance Measure, which will be documented on the applicable MRIRs and SMM IRFs.

5.6.5.2 Quality Measures and Quality Limits

The Quality Measures and Quality Limits to be used with Quality Control testing data will be identified in each Manufacturer’s QSM.

5.6.5.3 Control Charts

Control Charts will be maintained for the specific Quality Characteristics identified in each Manufacturer’s QSM per Section 5.3.10.1.

5.6.5.4 Quality Level Analysis

Running QLA will be performed and tracked for specific Quality Characteristics in accordance with each Manufacturer’s QSM per Section 5.3.10.2.

5.7 Quality Control Laboratory Accreditation and Qualification

5.7.1 QC Laboratories Testing Project Produced Materials

Testing of Project Produced Materials, with the exception of materials tested at Producer Laboratories, will occur at the AASHTO Accredited Laboratory identified below:

- ATC Group Services
40 Strafello Road
Avon, MA 02322

Testing of Hot Mix Asphalt Work Items will be performed by the HMA contractor’s NETTCP Qualified Laboratory.

Producer laboratories that perform QC testing of Project Produced Materials at the production facility will be AASHTO accredited or qualified through the NETTCP Laboratory Qualification Program. Only qualified/certified personnel will perform QC testing.



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5.7.2 QC Laboratories Testing Fabricated Structural Materials

All laboratories performing QC testing of Fabricated Structural Materials will be certified to perform the specific QC testing required for the fabricated item(s) by an appropriate Laboratory Accreditation Program or Laboratory Qualification Program that meets the requirements of AASHTO R38, or another program acceptable to MassDOT. Only qualified/certified personnel will perform QC testing. If there is any concern, a qualified member of the DB Entity will visit the Fabricator(s) to ensure that their QC Laboratories are in compliance with their approved QSM.

There are currently no certified labs for testing reinforcing steel. In accordance with MassDOT Specifications, mill certifications, mill test reports, and coating reports (if necessary) will be provided for all reinforcing steel, and samples will be provided to MassDOT Research & Materials for acceptance testing.

5.7.3 QC Laboratories Testing Standard Manufactured Materials

All laboratories performing QC testing of Standard Manufactured Materials will be certified to perform the specific QC testing required for the manufactured items through an appropriate Laboratory Accreditation Program or Laboratory Qualification Program in accordance with AASHTO R38 or their approved QSM.

5.8 Quality Control Personnel Qualification/Certification

5.8.1 QC Personnel Inspecting or Testing Project Produced Items

All QC personnel performing inspection, sampling and testing of Project Produced Materials will be certified for the appropriate type of work through NETTCP. QC personnel will possess the specific certification(s) directly relevant to each item/material being inspected, sampled, or tested, identified below:

- Soils & Aggregate
- Hot Mix Asphalt
- Concrete
- Drilled Shaft
- Driven Pile

5.8.2 QC Personnel Inspecting or Testing Fabricated Structural Items

All QC personnel performing inspection, sampling and testing of Fabricated Structural Materials will be certified through applicable national or regional certification programs (e.g. AWS, PCI) relevant to the work they will be performing.



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5.8.3 QC Personnel Inspecting or Testing Standard Manufactured Items

All QC personnel performing inspection, sampling and testing of Standard Manufactured Materials will be qualified through appropriate QC personnel qualification or certification programs in accordance with AASHTO R 38.

All QC personnel performing on-site QC inspections will be qualified through an appropriate qualification program relevant to the inspection they will be performing.

5.9 Mock-Ups and Control Sections

Mockups and Control Sections will be provided for those items identified in RFP Volume II, Section 2.12, and as may be required in the Project Special Provisions.

5.9.1 Applicable Work Items

- Mock-up Sections:
 - o Granite-faced Precast Pier Wall Panels (if utilized)
- Control Sections:
 - o HMA Pavement Control Strip

5.9.2 QC Procedures for Mock-ups

A mock-up is a sample of a specific item of work large enough to represent the finished product (full-size when feasible), used by MassDOT for review and approval of finishes, material aesthetic elements, coordination and compatibility, etc. A mock-up is prepared well in advance of the contract Work Item(s), but shall not be incorporated into the final work. At this time, a mock-up is anticipated to be provided for the following Work Item:

- Granite-faced Precast Wall Pier Sections (if utilized)

5.9.3 QC Procedures for Control Sections

Control Sections are similar to Mock-ups, with the key distinction being that if the project schedule allows, and if the control section has been approved by MassDOT, the control section may be incorporated into the final work.

Control Sections are anticipated on the following Work Items:

- HMA Pavement Control Strip

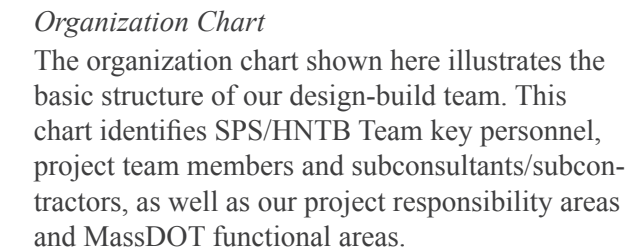
HMA Control Strips will be performed in accordance with MassDOT HMA Specification Section 450.66.

Appendix I

Organization Chart and Tables

1. DB Entity Project Team Organization Chart
2. NETTCP Quality Assurance Technologist Certificates
3. Submittal Distribution Matrix

- Project Management
- Quality Control
- Environmental Compliance
- Design-Build Interface/Coordination
- Project Design
- Project Construction



Project Manager
Matt McCue 

Design Manager/Construction
Phase Design Services
Manager
John Smith, PE 



Deputy Design
Manager
Matt D'Angelo, PE



Lead Structural Engineer
Mike Beintum, PE



Environmental
Compliance/
Permitting Manager
Evan Watson, PE



QC Administrator
Eric Cederholm, PE



Design QC Manager
Bill Edberg,
PhD, PE



Construction
Manager
Jon Dyer



Construction QC
Manager
Dan Jolda, NETTCPOAT



Construction
Superintendent
Matt St. Cyr

NorthEast Transportation Training and Certification Program



This is to certify that

Eric Cederholm

has successfully completed the

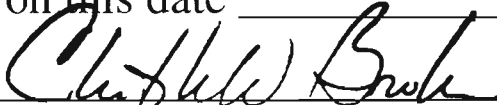


Quality Assurance Technologist Certification
Course and Examination

932

Certification Number

Given on this date July 25, 2018



Authorized NETTCP Signature

has successfully completed the

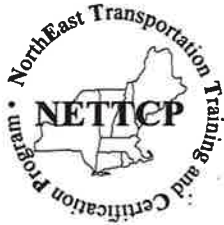
879

Given on this date April 19, 2018

in this date 1
Charles Brock

Authorized NETTCP Signature

NorthEast Transportation Training and Certification Program



This is to certify that

Daniel Jolda

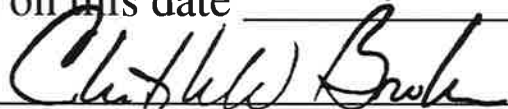
has successfully completed the

Quality Assurance Technologist Certification
Course and Examination

437

Certification Number

Given on this date July 25, 2018



Authorized NETTCP Signature

NorthEast Transportation Training and Certification Program



This is to certify that

Devon Wilton

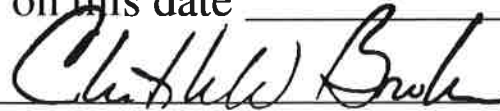
has successfully completed the

Quality Assurance Technologist Certification
Course and Examination

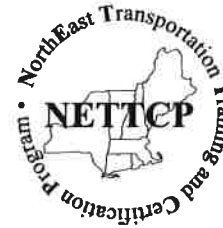
938

Certification Number

Given on this date July 25, 2018



Authorized NETTCP Signature



I-495 Haverhill Bridge Replacement NB & SB Over Merrimack River - Submittal Distribution List																																							
Revision 1 2018.07.10							FHWA			District Projects			District Construction					Boston													City Haverhill								
	Contract / RFP Section	District Office Attn: Paul Maloy	MassDOT DB PM Murthy Kolla	Resident Engineer Frank Welch	Owner's Design Consultant - AECOM	Owner's Representative Eric Botterman	FHWA Construction Quality Engineer	FHWA Bridge Engineer ^{1A}	FHWA Area Engineer ^{1B}	Projects	Traffic	D.U./C.E	DME /DQE	Assistant Construction Engineer	Area Engineer	Bridge Engineer	Project Scheduling & Cost Analysis - Keville	Public Relations	Construction	Highway/Civil	Bridge	Research & Materials	Metals Control	Construction Environmental Compliance	Construction Environmental Compliance	Construction Environmental Compliance	Construction Environmental Compliance	Construction Environmental Compliance	Traffic Data Collection	Landscape Section	Hydraulics	Geotech	Boston Traffic	Pavement Management	City Haverhill	Total CD	Total HC (Full Size)	Total HC (Half Size)	
Project Submittals/Deliverables																																							
Project Management																																							
Project Schedule (Baseline Schedule and Monthly Schedule updates)		9.0	E(I)	E(I)	E(I), 1F	E(I)	E(I)						E(I)	E(I)	E(I)		E(R)	E(I)	E(R)						E(I)											0	1	0	
Project Management Plan		1.1.3	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(R)	E(R)	E(R)				E(I)			E(R), 1F	E(R)												0	3	1	
Quality Management Plan		2.5	E(I)	E(I)	E(I), 1F	E(R)	E(I)	E(R), 1F					E(R), 1F	E(R)	E(R)				E(I)				E(R), 1F	E(R)												0	5	1	
Contingency Plan		10.21	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(R)	E(R)				E(I)													E(I)			0	1	0		
Public Participation Plan, Project Webpage		1.3.1	E(I)	E(I)	E(I), 1F	E(I)	E(I)							E(R)	E(R)	E(R)		E(R), 1F																		0	2	1	
Environmental																																							
Environmental Permits / Amendment Submittals		5.0	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)												0	1	1	
Hazardous Materials Management Plan		5.6.5	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)		E(R)		E(R)								0	1	0	
Groundwater and Soil Management Plan		5.7	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)		E(R)		E(R)								0	1	0	
Management of Invasive Species Plan		5.6.6	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(I)						E(R), 2F						0	3	0	
Health & Safety Plan		5.8	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)										E(R)		E(R)		E(R)								0	1	0
SWPPP Plan		5.3.4	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)		E(R)		E(R)								0	2	0	
Lead Containment Plan		1.1.7	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)		E(R)		E(R)								0	1	0	
Dust Control Plan		5.6.2	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)		E(R)		E(R)								0	1	0	
Noise Control Plan		5.6.3	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(I)												0	1	0	
Environmental Monitoring Plan		1.1.7	E(I)	E(I)	E(I), 1F	E(R)	E(I)							E(I)	E(I)									E(R)		E(R)		E(R)								0	1	0	
Storm Water Management Plan		4.13.6	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(I), CD, 1F, 1H	E(R), 1F			E(I)	E(I)					E(I)	E(R), 1H				E(R)		E(R)		E(R)			E(I), 1H				1	3	3	
Design																																							
Early Release for Construction Submittals - Highway ³		4.6	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(R), CD, 1F, 1H	E(R), 1F			E(I)	E(I)		E(I)			E(R), 1H			E(I)							E(I), 1H			E(R)		E(R)		1	3	3
Early Release for Construction Submittals - Traffic		4.6	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(R), CD, 1F, 1H		E(R)		E(I)	E(I)		E(I)		E(I)					E(I)									E(R), 1H				1	2	2
Early Release for Construction Submittals - Structures		4.6	E(I)	E(I)	E(I), 1F	E(R), 1F	E(I)		E(R), CD, 1F, 1H	E(I)	E(I), 1H			E(I)	E(I)	E(R), 1H	E(I)					E(I), 1F, 1H	E(I)	E(I)								E(R)				1	4	4	
Early Release for Construction Submittals - Foundations		4.6	E(I)	E(I)	E(I), 1F	E(R), 1F	E(I)		E(R), CD, 1F, 1H	E(I)	E(I)			E(I)	E(I)	E(R), 1H	E(I)					E(I), 1F, 1H	E(I)	E(I)								E(R)				1	4	3	
Bridge Sketch Plans		4.5	E(I)	E(I)	E(I), 1F	E(R), 1F	E(I)		E(R), CD, 1F, 1H	E(I)	E(I), 1H			E(I)	E(I)	E(R), 1H						E(I), 1F, 1H										E(R)				1	4	4	
Revised DER		4.5.4.2	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(R), CD, 1F, 1H	E(R), 1F	E(R)		E(I)	E(I)				E(I)			E(R), 1F			E(I)								E(I)			1	4	1	
Highway Plans (75% & 100%) ³		4.8	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(R), CD, 1F, 1H	E(R), 1F, 1H	E(R)		E(I)	E(I)				E(I)	E(R), 1H				E(I)		E(R)				E(I), 1H			E(R)	E(R), 1H	E(R)		1	3	5
Landscape Plans (75% & 100%)		4.16	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I), CD, 1F, 1H	E(I), 1F, 1H				E(I)	E(I)																						1	5	2
Bridge 1st and 2nd Structural Submissions ²		4.1	E(I)	E(I)	E(I), 1F	E(R), 1F	E(I)		E(R), CD, 1F, 1H	E(I)	E(I)			E(I)	E(I)	E(R), 1H				E(I)			E(I), 1F, 1H	E(I)													1	4	3
Utility Plans per Engineering Directive E-11-003			E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(R), 1F	E(R)	E(R), 1H																									0	2	1
Geotechnical Report		4.11	E(I)	E(I)	E(I), 1F	E(R), 1F	E(I)		E(R), CD, 1F	E(I)						E(I)			E(I)																		1	3	0
Hydraulic Report		4.12	E(I)	E(I)	E(I), 1F	E(R), 1F	E(I)		E(R), CD, 1F	E(I)	E(I)					E(I)																					1	4	0
Stormwater Management Plans/Hydrologic Report		4.13	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(I), CD, 1F	E(R), 1F											E(R), 1F				E(R), 2F		E(R)	E(R)								1	6	0
Pavement Design Report		4.8.4	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(I)	E(I), CD, 1F	E(R), 1F											E(R), 1F													E(R)		1	4	0
Special Provisions (from ERC, Design submittals, etc.)		1.1.7	E(I)	E(I)	E(I), 1F	E(R)	E(I)		E(R), 1F	E(R), CD, 1F	E(R), 1F	E(R)	E(R), 1F			E(R), 1F			E(I)	E(R), 1F	E(I), 1F	E(R), 1F	E(R)	E(R)					E(R), 1F	E(R), 1F		E(R)	E(R), 1F	E(R)		1	12	0	
Construction																																							
Proposed Work Plan for approval of non-standard work hours		1.1.7	E(I), 1F	E(I)	E(I), 1F	E(R)	E(I)							E(R)	E(R)		E(I)		E(I)		E(I)															0	2	0	
Bathymetric Survey		4.8.1	E(I)		E(I)	E(R)	E(I)							E(I)																						0	0	0	
Construction Staging Plan		1.1.7	E(I), 1F	E(I)	E(I), 1F	E(R)	E(I)	E(I)	E(I)		E(R)			E(R)	E(R)				E(I)														E(R), 1H			0	2	1	



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Appendix II

Design Quality Control Forms

1. General Quality Procedure Forms

Procedure No.	Procedure Title	Revision No.	Effective Date
CQP 1.01 Form 1	Quality Control Checklist	0	06/15/18
CQP 1.02 Form 1	Early Release for Construction (ERC) Checklist	0	06/15/18
CQP 2.01 Form 1	Critical Item List / Matrix	0	06/15/18



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**Form CQP 1.01-1
Quality Control Checklist**

Submittal No.: _____

Submittal: _____

SPS has reviewed this submittal for compliance with the contract documents and for coordination with applicable disciplines and trades. Quality Control documentation provided for this submittal indicates that the Design Quality Control process was completed.

Construction QC Manager Review

_____ Signature Construction QC Manager	_____ Print Name	_____ Date
---	---------------------	---------------

QC Administrator Certification

- Submittal package addresses all prior review comments.
- Design has been checked in accordance with the QMP.
- Relevant QC Plans & Construction Procedures to be submitted 45 days prior to start of relevant construction in accordance with the requirements of the RFP.
- All State, Local, Environmental, & Utility permits & approvals required for the early release construction have been obtained.

Yes

N/A

☐☐☐☐☐☐☐☐

Comments (as needed):

Signature
QC Administrator

Print Name

Date

*MassDOT Project NO. 605306
Haverhill – Bridge Replacement, Br. No. H-12-039,
Interstate 495 (NB & SB) over Merrimack River*



New England, Inc.



**Form CQP 1.02-1
Early Release for Construction (ERC) Checklist**

Submittal No.: _____

ERC Package: _____

ITEM CHECKLIST		
<u>Item</u>	<u>Included</u>	<u>Comments</u>
Design Plans (for Review & Approval)		
Design Calculations (for Review & Approval)		
Design Report (for Review & Approval)		
Specification Special Provisions (For Review & Approval)		
QC Administrator Certification		
Governmental & Utility Owner Approvals		
Environmental Approvals		
Work Plan		
Early Start Activity Schedule (For Information Only)		
Electronic Files		
Construction QC Plans		
RMS 360		

Prepared By: _____

Date: _____

*MassDOT Project NO. 605306
Haverhill – Bridge Replacement, Br. No. H-12-039,
Interstate 495 (NB & SB) over Merrimack River*

HAVERHILL DESIGN-BUILD

I-495 Over Merrimack River

MassDOT Project No. 605306 / SPS Job No. 469

07/05/18

CQP 2.01-1: CRITICAL ITEMS LIST

Critical Material Suppliers

[illegible]

Critical Subcontractors

Critical Subcontractors						Contract	Contract		
No.	Item / Description	Contractor	Contract Device	Responsibility	By When	Mailed Out	Returned	Comments	Misc.
1									
2									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Insurance Status - Upcoming Subcontractors

Insurance Status - Upcoming Subcontractors							
Priority	Subcontractor	Expected Date On Site	Policy Expiration	Contract Executed (Y/N)		Comments	
1							
2							
3							
4							
5							



New England, Inc.



2. Design Quality Procedures and Forms

Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
DQP 1.01	Preparation and Revision of Design Quality Procedures	0	6/15/18
DQP 1.02	Design Document Control System	0	6/15/18
DQP 1.03	Software Validation	0	6/15/18
DQP 1.04	Design Quality Control Process Review	0	6/15/18
DQP 1.05 Form 1	DQCM Submittal Review Memorandum	0	6/15/18
DQP 1.05 Form 2	DQCM Submittal Review Checklist	0	6/15/18
DQP 1.06	Design Directives	0	6/15/18
DQP 1.06 Form 1	Design Directive Log	0	6/15/18
DQP 1.07	Notice of Design Change	0	6/15/18
DQP 1.07 Form 1	Notice of Design Change	0	6/15/18
DQP 1.07 Form 2	Notice of Design Change Log	0	6/15/18
DQP 1.08 Form 1	Corrective and Preventative Action Process (CAP)	0	6/15/18
DQP 1.09	Designer Pre-AFC Design Change	0	6/15/18
DQP 1.09 Form 1	Pre-AFC Design Change Memorandum	0	6/15/18
DQP 1.09 Form 2	Pre-AFC Design Change Memorandum Log	0	6/15/18
DQP 2.01	Checking of Calculations	0	6/15/18
DQP 2.01 Figure 1	QC Color Code	0	6/15/18
DQP 2.01 Form 1	Level 1 Check Print Sign-Off Sheet	0	6/15/18
DQP 2.02	Checking of Drawings	0	6/15/18
DQP 2.03	Checking of Input to Computer Programs	0	6/15/18
DQP 2.04	Checking of Calculations Utilizing Independent Design Checks	0	6/15/18
DQP 2.05	Checking of Studies or Report-Type Documents	0	6/15/18

* Forms are provided with each DQP as noted. Alternative forms may be substituted with approval of the Quality Control Administrator.



New England, Inc.



Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
DQP 2.05 Form 1	Review Memorandum - Studies, Report Documents, and Supplemental Specifications	0	6/15/18
DQP 2.06	CADD Quality Control Audits	0	6/15/18
DQP 2.06 Form 1	CADD Quality Control Audit Review Memorandum	0	6/15/18
DQP 2.06 Form 2	CADD Quality Control Audit Checklist	0	6/15/18
DQP 2.06 Form 3	CADD Quality Control Review Log	0	6/15/18
DQP 2.07	Checking of Supplemental Specifications	0	6/15/18
DQP 2.08	Review of Documents Prepared by Others	0	6/15/18
DQP 2.09	Design Quality Control Reviews	0	6/15/18
DQP 2.09 Form 1	Comment Disposition Form	0	6/15/18
DQP 2.09 Form 2	Certification of Conformance for Design Submittal – Permanent Work	0	6/15/18
DQP 2.09 Form 3	Certification of Conformance for Approved for Construction (AFC)	0	6/15/18
DQP 2.09 Form 4	Certification of Conformance for Construction Engineering Design Submittal	0	6/15/18
DQP 2.09 Form 5	Certification of Conformance for Construction Engineering Design Submittal	0	6/15/18
DQP 2.10	Interdisciplinary Reviews	0	6/15/18
DQP 2.10 Form 1	Interdisciplinary / Senior Technical Review Memorandum	0	6/15/18
DQP 2.11	Environmental Compliance Design Reviews	0	6/15/18
DQP 2.11 Form 1	Environmental Compliance Review Memorandum	0	6/15/18
DQP 2.12	Constructability Reviews (CR)	0	6/15/18
DQP 2.13	Color Codes	0	6/15/18
DQP 2.14	Visual Check	0	6/15/18
DQP 2.14 Form 1	Visual Check Sign-Off Sheet	0	6/15/18
DQP 2.15	Senior Technical Review	0	6/15/18



New England, Inc.



Procedure/Form No.	Procedure/Form Title	Revision No.	Effective Date
DQP 2.16 Form 1	Deliverable Quality Matrix	4	1/16/19
DQP 3.01	Field Design Services	0	6/15/18
DQP 3.01 Form 1	Field Design Change Log	0	6/15/18
DQP 3.01 Form 2	Request for Information Log	0	6/15/18
DQP 3.02	Shop Drawing Reviews	0	6/15/18
DQP 3.02 Form 1	Shop Drawing Submission Log	0	6/15/18
DQP 3.02 Form 2	Shop Drawing Review Memorandum	0	6/15/18
DQP 3.03	Preparation of Record Drawings	0	6/15/18
DQP 3.03 Form 1	Record Drawing Review Memorandum	0	6/15/18

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Design Document Control System	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-1.01
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

The purpose is to define the procedures and format requirements for developing new DQP's and for modifying existing DQP's as required to improve the design quality control processes.

2.0 SCOPE

The Design Quality Procedures provide uniformity and standardization of the design activities on the project. As conditions arise during the project, it will be necessary to develop new DQP's to address certain conditions, or existing DQP's will need to be modified to improve the quality processes.

3.0 RESPONSIBILITIES

- 3.1 The primary responsibility for determining the need for new DQP's or modification of an existing DQP's rests with the Design Quality Control Manager (DQCM). The DQCM with assistance from the Design Manager will determine the necessary requirements for the document and distribution.
- 3.2 All DQP's will be approved by the DQCM with the concurrence of SPS New England, Inc., Quality Control Administrator and MassDOT.

4.0 PROCEDURE

- 4.1 The DQM will make a determination if a revision to an existing DQP or new DQP is required. The procedure number will be assigned by the DQM using the following general classifications:

DQP Group 1 - General and Administrative
 DQP Group 2 - Planning and Design
 DQP Group 3 - Post Design

Font for DQP's shall be Arial Narrow 12.

- 4.2 Preparation of a new DQP will generally follow the outline given below:

1.0 Purpose - Provide justification statement for the proposed DQP

2.0 Scope - Describe conditions or situations where the procedure is applicable

3.0 Responsibilities - Describe which individuals will administer this procedure

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Design Document Control System		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-1.01
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

4.0 Procedure - This section describes in detail the actions or methods to be used to achieve the intent of the procedure. The section should include ample exhibits, figures and checklists as required to concisely explain the intent of the procedure.

5.0 Quality Control Records - List the documents that must be retained as "Quality Control Records".

6.0 Documents and Forms - List reference documents and required forms to be used with this procedure.

7.0 Revision History - Provides a log of modifications to a DQP.

4.3 Revisions to Existing DQP's

4.3.1 The DQCM will make the determination if an existing DQP should be revised.

4.3.2 Modifications to the existing DQP document shall be made by striking through existing text rather than deleting it, and by adding new text.

4.3.3 Revisions to the document shall be clearly described in the Revision History log.

4.3.4 Revisions to Existing DQP's shall be approved by the DQCM and QC Administrator, and accepted by MassDOT.

5.0 QUALITY CONTROL RECORDS

None.

6.0 DOCUMENTS AND FORMS

Quality Management Plan

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 HNTB		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 6
Title: Design Document Control System		Effective date: 5/21/18	Revision Number: 0	Procedure number: DQP-1.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

1.0 PURPOSE

To define the procedures and requirements for design document control relative to the Quality Control process, including internal and external file requirements.

2.0 SCOPE

This DQP establishes documentation naming requirements, storage and transmittal procedures for the design team within the file directory system. This document describes those procedures and the storage requirements for Quality documents. This DQP also applies to design subconsultants on the project.

3.0 RESPONSIBILITIES

- 3.1 SPS New England's Document Control Manager (DCM) is responsible for the overall implementation and conformance of documents being published and activities tracked within SharePoint system.
- 3.2 HNTB's Design Document Control Manager is responsible for document storage within the project file directory stored on HNTB's server. HNTB will manage a Share point site that stores all the project control documents.
- 3.3 The Design Manager is responsible for implementing this procedure and making the final determination on file naming and readiness to post/publish documents submitted by the Responsible Engineer to SharePoint system. Within the design team, the Design Manager is responsible for ensuring that files are located properly in the file directory system.
- 3.4 The Responsible Engineer has the primary responsibility for overseeing the preparation of a documentation package for posting/publishing and naming in accordance with the project standards as defined for the project.
- 3.5 In general, all working CADD drawing files shall reside on HNTB's server in the PMwork directory.
- 3.6 Design QC Manager shall periodically review the design document control system for conformance to the standard operating procedure.

4.0 PROCEDURE

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Title: Design Document Control System	Effective date: 5/21/18	Revision Number: 0	Procedure number: DQP-1.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

4.1 General

- 4.1.1 Maintaining a consistent approach to document naming, storage/posting timing and locations of files allows the design team to successfully deliver on the Haverhill Bridge Replacement Project. All project design files and quality documents shall be stored on HNTB's server until the end of the project. Project control standards are stored on the HNTB SharePoint site for this project.
- 4.1.2 To the extent possible, naming conventions on HNTB's server shall conform to SharePoint system naming conventions contained in this DQP. This includes all project correspondence, reports and other files that are generated by the design team. If there isn't a naming convention for a particular element of work, contact the Design Manager and they will coordinate with the SharePoint Document Control Manager to determine procedures.
- 4.1.3 Drawing files shall be consistently named and stored within HNTB's server. CADD drawings shall follow the naming convention provided in the MassDOT Plans Standards. HNTB's server shall be the working directory for all CADD files.

4.2

4.2.3 Design and Design Management – Post Award (PA) is the primary working directory for the designers. Project information will generally be stored by discipline within subdirectories. All design, calculations, reports, drawings, etc. pertaining to a particular discipline will be stored here. In general, consultants will have read/write privileges within their discipline and may have read privileges for others. Additional folders located within the **PA** folder are outlined later in this document.

4.2.3.1 PA Folders

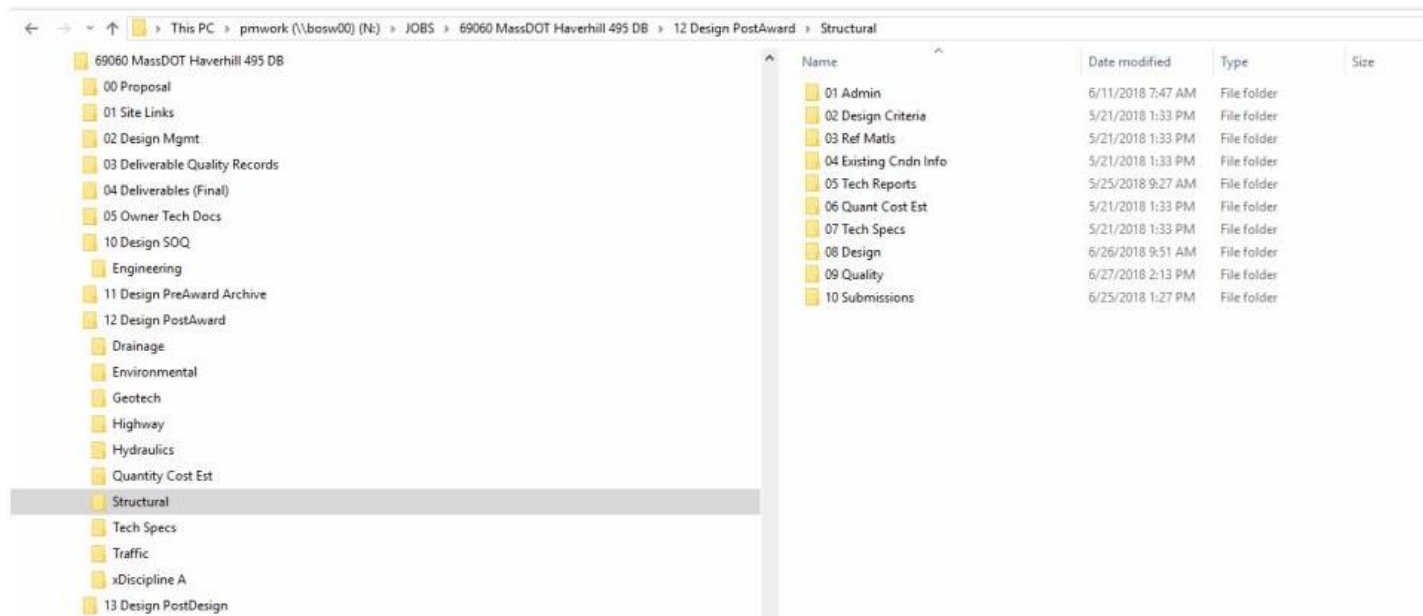
4.2.3.1.1 The **CADD** folder contains reference files, base mapping, DTM information, etc. that will be used by the entire Design Team. All project CADD files will be stored in this folder. The Project CADD Manager will manage the information stored in this folder.

4.2.3.1.2 Engineering is a storage folder for all of the discipline sub-folders where quality and submittal information will be stored.

4.2.3.2 Segment Folders located in HNTB's pmwork server - Within each Segment folder, there are multiple folders for use.

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The “Bridge” folder is shown for illustration. Note that this folder is sub-divided into major subfolders for “Quality” and “Submittals” with each containing folders for each bridge on the project.



4.2.3.2.1 Calculations folders will be provided under each bridge submittal folder.

4.2.3.2.2 Meeting Minutes/Correspondence is for the storage of discipline-specific correspondence including meeting minutes, project-related email, memoranda etc. Formal submittal of reports, plans, and specifications will be transmitted through the SharePoint System.

4.2.3.2.3 Submittals – The milestone submittals will be stored in each bridge folder. The structural drawings will be sub-divided into several additional submittals. This folder will be used to store copies of the drawings (.pdf format with all references copied in) that are distributed to SPS New England, Inc. for the various milestone submittals. Additional documents that may eventually be needed for the submittal will also go here. The **As-Built (Record) Plans** will also contain the Certification from

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Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

the Designer that the work element is constructed according to plan (and/or FDC's, NCR's, NCE and NDC).

4.2.3.2.4 Design Calculations folders will contain the discipline computations including pdf's of hand calculations, and computer program input and output files.

4.2.3.2.5 Specifications folders are for storage of all project technical specifications and reports generated by the discipline design team.

4.2.3.2.6 Quality folders contain all of the quality documents related to the discipline design deliverable including checked calculations, specifications, reports, drawing checking prints, checklists and QC Process documentation.

4.3 SharePoint

SharePoint is HNTB's document control tool for the Haverhill Bridge Replacement Project. It is a web-based tool containing all project information. The HNTB website can be accessed at: <https://db.hntb.com/projects/69060/Lists/overview/AllItems.aspx>, with a job specific name of Haverhill DB. All deliverables will be posted to MassDOT SharePoint using the folders described here. Project team members are required to be trained in the use of SharePoint, by a member of the design team. Members of the design team that will be using Tracked Activities for deliverables will require additional training on the process for tracking documents.

4.4 Electronic File Naming Convention

The following file naming format will be used for all electronically stored documents stored in the DB Entity's files:

xxx.yyyy.mm.dd.<description of subject matter>.nnn

where: yyyy = year
 mm = month
 dd = day

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nnn = Author's initials

& where: xxx = 3 letter code for type of document

LTR:	Letter
INV:	Invoice
REQ:	Requisition
EWO:	Extra Work Order
RFI:	Request for Information
MIN:	Meeting Minutes
SCH:	Schedule
SUB:	Submittal
POR:	Purchase Order
COC:	Certificate of Compliance
EST:	Pay Estimate
BID:	Bid Document
INS:	Insurance Certificate
SUC:	Subcontract
CON:	Contract with Owner
SUP:	Suppliers Agreement
CER:	Certified Payrolls
SPC:	Specifications
DWG:	Drawings
PIC:	Photos
QUO:	Subcontractor/Supplier Quotation
PER:	Pay Estimate Reports
DEL:	Delivery Slips
DIG:	Dig-Safe Tickets
QMP:	Quality Management Plan
QCP:	Quality Control Plan
QCD:	Quality Control Documentation (General)
DQC:	Design Quality Control
CQC:	Construction Quality Control
COR:	Misc. Correspondence
EML:	Email
FAX:	Fax
CAL:	Calculations
QCA:	Quality Control Administrator
QSM:	Quality System Manual
ERC:	Early Release Construction
NCR:	Non-Conformance Report
PCO:	Project Change Order

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CADD File Naming Convention

See MassDOT CADD Standards for naming conventions.

In the event that a Responsible Engineer finds a file or deliverable not on the Naming Convention, the Design Manager shall be notified. The Design Manager will work with the Document Control Manager to determine if a new element is to be added to the Naming Convention or if the file name used by the Responsible Engineer is acceptable.

5.0 QUALITY CONTROL RECORDS

Not applicable to this DQP.

6.0 DOCUMENTS AND FORMS

Design Document Control SOP

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 3
Title: Software Validation	Effective date: 5/21/2018	Revision number: 0	Procedure number: DQP-1.03
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

The purpose is to verify the accuracy and applicability of design engineering software for use on this project.

2.0 SCOPE

Engineering design and analysis software used on this project shall be validated for accuracy and applicability in accordance with this DQP. Third-party commercial design software with certification documentation shall be considered as validated. General purpose spreadsheet templates shall be validated in accordance with the procedures presented herein.

3.0 RESPONSIBILITIES

- 3.1 The Design Manager is responsible for implementing this procedure and making the final determination on the acceptability of engineering software based on the documentation submitted by the Responsible Engineer.
- 3.2 The Responsible Engineer has the primary responsibility for overseeing the preparation of a documentation package on a proposed software package for use on the project.
- 3.3 The Design Quality Control Manager is responsible for verification that this procedure is implemented in accordance with this DQP.

4.0 PROCEDURE

- 4.1 When it is determined that a first-time usage of software or a new application is required for engineering calculations, the software program or software application is to be validated and documented as follows:
 - 4.1.1 Commercially available programs which come with verification documentation are acceptable.
 - 4.1.2 A hand calculation with the same formulation or a parallel technique must be documented and checked in accordance with DQP 2.01.

Note: In order to provide effective and efficient verification, checked calculations from a previous project or the input and output from a validated program may be substituted for original hand calculations.

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- 4.1.3 The same input and assumptions used in the hand calculations are formatted and input into the software package to verify accuracy. Program input is to be checked in accordance with DQP 2.03.
- 4.1.4 The program output is compared to the results of the hand calculation with each corresponding answer annotated as equivalent values. Differences which are not obviously accountable to rounding are to be explained on the output sheet.
- 4.1.5 Complete documentation of the verification shall include fully-checked calculations, checked program input; printout of program when available, annotated output printout and a brief description of the processes followed shall be submitted to the Document Control file.
- 4.2 This software validation procedure, when performed by the Responsible Engineer or designee, will become an acceptable verification.
- 4.3 Updated computer programs shall be re-validated by running the updated programs and comparing the output to that of the previously validated version of the program, following the procedures outlined in this procedure.
- 4.4 Subconsultants to the Design Engineer who use software in the performance of their contracted planning and design work must meet the same requirements for software verification.
- 4.5 The person performing Software Validation shall be a qualified professional, experienced in the type of work to which he is assigned, and shall be responsible for coordination of the design reviews and ensuring that all individuals in the process are qualified for the work being performed.
- 4.6 Third-party commercial design software with certification documentation shall be exempt from this validation procedure.
- 4.7 Validation of design software may be performed by comparison of results from a previously accepted software package.

5.0 QUALITY CONTROL RECORDS

Software verification packages shall be considered as quality documents and shall be retained in accordance with the Document Control System (DQP 1.02).

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6.0 DOCUMENTS AND FORMS

Design Quality Procedure DQP 1.02 Design Document Control System
Design Quality Procedure DQP 2.01 Checking of Calculations
Design Quality Procedure DQP 2.03 Checking of Input

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Myles Kuchas	Approved by: -	Page: 1 of 3
Title: Design Quality Control Process Review	Effective date: 9/20/2018	Revision number: 0	Procedure number: DQP-1.04
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

The purpose of this procedure is to define the roles, responsibilities, and process for conducting Design Quality Control Process Review (DQCPR) of project deliverables. The purpose of DQCPR is to ensure that the deliverable has been processed in accordance with the Quality Management Plan (QMP), and to ensure that all required checks and reviews have been completed, and comments resolved and verified (including the existence and proper filing of required records) prior to submittal of the deliverable to the client

2.0 SCOPE

This procedure shall apply to all project deliverables being submitted to a client, inclusive of subconsultant deliverables.

All planned quality check and review activities, in accordance with the Client Deliverable Quality Matrix, prepared in accordance with HNTB QMP Procedure QP 01, Quality Planning, shall have been completed, and all comments resolved and verified prior to completion of Design Quality Control Process Review. All previous quality check and review activities shall have been scheduled to allow completion and resolution before Design Quality Control Process Review, and sufficient time shall be allotted for an effective Design Quality Control Process Review. Design Quality Control Process Review shall occur on all deliverables prior to submission to the client.

3.0 RESPONSIBILITIES

3.1 Design Manager (DM) – The DM shall be responsible for:

- 3.1.1 Ensuring that production and required quality check and review activities are completed in accordance with the project schedule and the Client Deliverable Quality Matrix
- 3.1.2 Ensuring that all required quality check and review activities have been completed, and comments resolved and verified prior to submission for Design Quality Control Process Review.

3.2 Task Lead – The Task Lead shall be responsible for:

- 3.2.1 Ensuring all other required quality checks and reviews have been completed in accordance with the Client Deliverable Quality Matrix.
- 3.2.2 Submitting deliverables and link to or location of quality check and review records to the DQCM for Design Quality Control Process Review.
- 3.2.3 Responding to and resolving comments made by DQCM.
- 3.2.4 Resubmitting revised deliverables or other evidence of conformance with the QMP to the DQCM for verification, when necessary.

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Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

3.3 Design Quality Control Manager (DQCM) – The DQCM shall be responsible for:

- 3.3.1 Reviewing the Client Deliverable Quality Matrix to identify the required quality checks and reviews that should be completed for the deliverable.
- 3.3.2 Verifying through review of completed quality check and review records that required quality checks and reviews have been completed, and all comments resolved and verified.
- 3.3.3 Verifying subconsultant quality records that subconsultant deliverables have been checked and reviewed in accordance with the QMP.
- 3.3.4 Documenting the results of Design Quality Control Process Review and providing those results to the DM or Task Lead.
- 3.3.5 Verifying that nonconformances have been addressed, when necessary.
- 3.3.6 Certifying that deliverables have been processed in accordance with the QMP and that required quality checks and reviews have been performed.
- 3.3.7 Maintaining records of Design Quality Control Process Review.

4.0 PROCEDURE

- 4.1 The DM and/or Task Leads shall verify that all required quality checks and reviews have been completed in accordance with the Client Deliverable Quality Matrix prior to submission for Design Quality Control Process Review, including deliverables prepared by other HNTB offices and subconsultants.
 - 4.1.1 If not, the DM and/or Task Leads shall work with other HNTB offices, subconsultants, and applicable reviewers to ensure these checks and reviews are completed prior to Design Quality Control Process Review.
- 4.2 The DM or Task Lead shall provide the deliverable, along with links to or locations of corresponding quality check and review records, to the DQCM for Design Quality Control Process Review by the Start Date in the Client Deliverable Quality Matrix.
- 4.3 The DQCM shall review the Client Deliverable Quality Matrix to determine the required quality checks and reviews that should have been completed for the deliverable. The DQCM shall note the required checks and reviews on Form DQP 1.05-2.
- 4.4 The DQCM shall verify through review of required quality checks and review records that all the required checks and reviews occurred, that all required reviewers participated (in the case of Interdisciplinary Review), and that all comments resulting from such reviews were responded to, resolved, and verified.
 - 4.4.1 The DQCM shall also verify that all quality check and review records have been maintained in the appropriate filing location in accordance with the QMP and check off on the Form 1.05-2 checklist.

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Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

- 4.5 The DQCM shall document the results of the Design Quality Control Process Review on Forms DQP 1.05-1 and DQP 1.05-2 and provide the results to the DM or Task Lead.
- 4.6 If there were instances of nonconformance with the QMP requirements or the Client Deliverable Quality Matrix, the DM or Task Lead shall determine the cause of the nonconformance and shall resolve the nonconformance and provide the necessary evidence to the DQCM for verification.
 - 4.6.1 The DM and DQCM shall determine, based upon the nature of the nonconformance and the scope of the remedy, if additional quality check or reviews should be repeated prior to resubmittal for Design Quality Control Process Review.
 - 4.6.2 The DQCM shall review provided evidence to verify the resolution of nonconformances and shall note verification on Form DQP 1.05-1.
- 4.7 Deliverables shall not be submitted to clients without successful completion of the Design Quality Control Process Review.
- 4.8 The DQCM shall fill out Forms 1.05-1 and 1.05-2, and sign form 2.09-2 before the deliverable may be submitted. A copy of all three forms must be attached to the deliverable for the submission.
- 4.9 The DQCM shall ensure that all Design Quality Control Process Review records are maintained as quality records in accordance with the QMP.

5.0 DOCUMENTS AND FORMS

Forms DQP 1.05-1, DQP 1.05-2, DQP 2.09-2

6.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



FORM DQP 1.05-1
DQCM Submittal Review Memorandum

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title: _____

QC Review Findings:

Summarize findings here.

Print Name

Signature (Design QC Manager)

Date



FORM DQP 1.05-2

DESIGN QUALITY CONTROL MANAGER (DQCM) SUBMITTAL REVIEW CHECKLIST

Client Name : Massachusetts Department of TransportationJob Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Submittal Package: _____

Submittal Type: ☐ Report or Study ☐ Specifications
☐ Plans ☐ Other (specify) _____

AUDIT ITEM	METHOD OF VERIFICATION	CONFORMS		
		YES	NO*	N/A
1. Were calculation check prints available for review?	Physical or electronic document review			
2. Were calculations checked prior to plan checking?	Verify dates			
3. Were check prints of studies or reports available for review?	Physical or electronic document review			
4. Was independent check of structural elements completed prior to final plan submittal?	Verify dates			
5. Are checking procedures for plans, studies or reports being followed?	DQP 2.02, 2.05			
6. Are checking prints properly signed and dated?	DQP 2.01, 2.02, 2.03			
7. Is checker independent from designer?	DQP 2.01, 2.02, 2.03			
8. Have quality documents been stored in accordance with DDCS?	DQP 1.02			
9. Have constructability and interdisciplinary reviews been completed?	Electronic document review			
10. Have comments/design changes been incorporated per DQP's?	DQMP Sect. 6.9.3 and DQP's			
11. Has Environmental Compliance review been completed?	DQP 2.11			
12. Was an internal CADD audit conducted prior to posting to ProjWise?	DQP 2.06			
13. Are check prints of specifications available?	Physical or electronic document review			

* Provide explanation for non-conforming items.

Print Name _____

Signature (Design Quality Control Manager) _____

Date _____

Form DQP 1.05-2

 HNTB	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Design Directives	Effective date: 5/21/2018	Revision number: 0	Procedure number: DQP-1.06
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish a procedure for SPS New England, Inc. and the design team to administer design changes from MassDOT due to criteria modifications, design basis changes or other factors.

2.0 SCOPE

This procedure applies to situations where MassDOT desires to modify the project design criteria, or design basis after execution of the Design-Build Agreement. MassDOT may issue Design Directives (called Owner-Directed Change) prior to or after Approved for Construction (AFC) plan submittals.

3.0 RESPONSIBILITIES

- 3.1 SPS New England, Inc. Design Coordination Manager is responsible for notifying the Design Manager that a Design Directive has been received.
- 3.2 The Design Manager is responsible for transmitting the Design Directive to the appropriate Discipline Manager.
- 3.3 The Discipline Managers and Responsible Engineers shall be responsible for incorporating the Design Directive into the construction documents.

4.0 PROCEDURE

- 4.1 SPS New England, Inc. Design Coordination Manager will transmit the Design Directive to the Design Manager through SPS New England's Sharepoint system for processing.
- 4.2 The Design Manager shall submit the Design Directive to the DDCM who will assign a Design Directive number starting with 001 (or a W/M-assigned number may be used). The Design Directive Log (Form DQP 1.06-1) will be used to record Design Directive information. An alternative log form may be used with approval of the Design Manager and Design QC Manager.
- 4.3 The DDCM will forward the Design Directive to the appropriate Discipline Manager(s) for processing.
- 4.4 The Discipline Manager(s) will evaluate the directive and coordinate with the Responsible Engineers to incorporate the requested changes.

5.0 QUALITY CONTROL RECORDS

Form DQP 1.06-1 and Design Directives will be maintained as quality documents.

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Design Directives		Effective date: 5/21/2018	Revision number: 0	Procedure number: DQP-1.06
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

6.0 DOCUMENTS AND FORMS

Form DQP 1.06-1 Design Directive Log

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



FORM DQP 1.06-1
DESIGN DIRECTIVE LOG

DD Number	Affected Discipline(s)	Issued Date	Received Date	Description

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Notice of Design Change	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-1.07
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish the method of providing an advance Notice of Design Change (NDC) to design documents after the design package has been issued as Approved for Construction (AFC) and provide a notification to the Design Coordination Manager (DCM) and QC Administrator of the required change.

2.0 SCOPE

After it has been determined by HNTB or subconsultants that a change is required to the Design Document packages previously classified as AFC and issued to the field, a quick method is required to notify the QC Administrator that the change is forthcoming to minimize, or prevent re-work.

3.0 RESPONSIBILITIES

The Discipline Manager, or appointee, will notify the Design Manager and DQCM of a required design change to the AFC package.

The Design Manager and DQCM will notify the DCM within 24 hours of discovering the need for an NDC.

The Design Manager and DQCM are responsible for assuring adherence to this procedure.

The QC Administrator shall contact MassDOT within 24 hours of notification of the need for an NDC.

4.0 PROCEDURE

In the cases where emergency conditions could exist, such as unsafe or hazardous conditions, or possible cessation of work, HNTB will notify the QC Administrator immediately who then must contact MassDOT to advise of the conditions and prepare instructions for the Contractor. Oral instructions to the QC Administrator and/or the Contractor must be documented in writing within 24 hours of their issuance. Copies of the Notice of Design Change are sent to MassDOT.

An NDC is prepared after it is determined that there is an omission, or change, required to an AFC plan sheet. The NDC is issued as follows:

- 4.1 After notifying the Design Manager of the design change, the Discipline Manager, or appointee, obtains an NDC number from the HNTB Document Control Manager or appointee. The HNTB Document Control Manager maintains the issued Notices of Design Change Log Form DQP 1.07-2, and NDC's will be a tracked activity within ProjectWise.

 HNTB		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Notice of Design Change		Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-1.07
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

The NDC number starts at 001 and runs sequentially without regard to discipline or section. The Discipline Manager or appointee fills out the NDC Form DQP 1.07-1.

- 4.2 Through the NDC Form DQP 1.07-1, the Discipline Manager notifies the Design Manager of the solution and the timeline to receive the revised plan documents for transmittal to the DCM. The time required to provide revised plans due to a NDC will depend on the amount of re-design and reviews required and is estimated and shown on the Notice of Design Change form. The Design-Build Coordinator will discuss with the Design Manager and the changes required and solutions that could minimize the effect on the construction operations.
- 4.3 After review and approval, the Design Manager will review the NDC and forward to the HNTB Document Control Manager for submission to SPS New England, Inc. The Discipline Manager makes the design change to the affected Design Document, including the coordination, and preparation.
- 4.4 Changes to Design Documents undergo the same rigorous quality checks as the original design, and this documentation must be included with the final submission. The Design QC Manager determines if the change requires the completion of a design review and constructability review prior to final release of the revised documents.

5.0 QUALITY CONTROL RECORDS

Forms DQP 1.07-1 and 1.07-2 shall be maintained as quality documents.

6.0 DOCUMENTS AND FORMS

Form DQP 1.07-1 Notice of Design Change Form
Form DQP 1.07-2 Notice of Design Change Log

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



**FORM DQP 1.07-1
NOTICE OF DESIGN CHANGE**

Initiated by:		Phone:	
Drawing Package Title:			
AFC Date of Drawings:			
Stationing:			
Description of Change: (note area that should not be constructed until plans are reissued)			
HNTB Discussed with Design-Build Coordinator:	Names		
	Date		
Drawings or Technical Provisions to be revised: (list each sheet)			

Other Documents Affected by this Change:		
Revised Drawings or Specifications will be AFC'd by:		
		Date
Attachments:	Yes	☐ list:
	No	☐

Form DQP 1.07-1 Notice of Design Change Form





FORM DQP 1.08-1
CORRECTIVE AND PREVENTATIVE ACTION PROCESS (CAP)

To be completed by the Design QC Manager:

CAP Control No.	CAP Title:
CAP Assignee Name:	Discipline Manager:

To be completed by the Originator:

Originator Name:	Originator Location:
Submittal Date:	
Area(s) Involved:	
Problem Description:	

To be completed by the CAP Assignee:

Cause:
Corrective Action Plan:

To be completed by the Design QC Manager:

Verification of Effectiveness:

This CAP is closed and no further action is necessary.

cc: CAP Assignee
Design Manager
Design QC Manager
Design Document Control
Discipline Manager

Design QC Manager

Date

Design Manager

Date

Form DQP 1.08-1

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Designer Pre-AFC Design Change	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-1.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish the procedure for the Design Team leadership to officially notify the project design team about a change in design basis or methodology prior to Approved for Construction (AFC) plan submittal. This procedure may also be employed to notify design personnel of a design clarification or general procedural requirement.

2.0 SCOPE

After it has been determined by HNTB or its subconsultants that a change is required to a Design Document package that has not been submitted to SPS New England, Inc. as "Approved for Construction", this procedure will be utilized to document the required change and to notify the appropriate design personnel so re-design effort is minimized. The Pre-AFC Design Change Memorandum (PDCM) will be recorded and logged by the Document Control Engineer (DCE).

3.0 RESPONSIBILITIES

The Discipline Manager, or appointee, will notify the Design Manager that a PDCM will be submitted to the Design Team.

The Discipline Manager or appointee shall be responsible for preparation of the PDCM.

The DCE shall be responsible for distribution and logging of the PDCM.

The Design Manager and Design QC Manager are responsible for assuring adherence to this procedure.

4.0 PROCEDURE

A PDCM is prepared after it is determined that a design revision, clarification or general procedure change is required prior to an AFC plan submittal. The PDCM is issued as follows:

- 4.1 After notifying the Design Manager of the need for a PDCM, the Discipline Manager, or appointee, obtains a PDCM number from the DDCM or appointee. The DCE maintains the issued Pre-AFC Design Change Memorandum Log Form DQP 1.09-2. The PDCM number starts at 001 and runs sequentially without regard to discipline or section. The Discipline Manager or appointee fills out the PDCM Form DQP 1.09-1.

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Designer Pre-AFC Design Change		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-1.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

- 4.2 Through the PDCM Form DQP 1.09-1, the Discipline Manager notifies the Design Manager of the pending change (or clarification), reasons for the PDCM and provides an estimate of effort and time required to incorporate the changes into the design.
- 4.3 After review and approval, the Design Manager will forward the PDCM to the DCE for submission to appropriate design personnel. The PDCM may be forwarded to SPS New England's Design Coordination Manager as necessary for processing. SPS New England's Project Manager or designee will be responsible for final approval of the PDCM.
- 4.4 The Discipline Manager shall coordinate all changes to the design documents in accordance with the requirements for checking design calculations and plans using the same rigorous QC check as the original design, and this documentation must be included with the final submission.
- 4.5 The Design Manager is responsible for coordinating scope, schedule and fee changes with SPS New England, Inc. and MassDOT.

5.0 QUALITY CONTROL RECORDS

Forms 1.09-1 and 1.09-2 will be retained as quality documents.

6.0 DOCUMENTS AND FORMS

Form DQP 1.09-1 Pre-AFC Design Change Memorandum
Form DQP 1.09-2 Pre-AFC DCM Log

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



New England, Inc.



FORM DQP 1.09-1
PRE-AFC DESIGN CHANGE MEMORANDUM

Initiated by:		Phone:	
Drawing Package Title:			
Date :			
Stationing:			
Design Change Description of Change/Clarification:	☐ Design Clarification ☐		
Design Staff to be Notified:	Names		
	Date		
Drawings or Technical Provisions to be revised: (list each sheet)			
Other Documents Affected by this Change:			
Attachments:	Yes	☐ list:	
	No	☐	

Form DQP 1.09-1 Pre-AFC Design Change Memorandum Form

6/06/18

REV. 0



New England, Inc.



FORM DQP 1.09-2
PRE-AFC DESIGN CHANGE MEMORANDUM LOG

DCM Number	Discipline	Issued Date	Change	Clarification	Description	Out of Scope Change *

* MassDOT Notification required

 	Prepared by: Myles Kuchas	Approved by: -	Page: 1 of 3
Title: Checking of Calculations	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.01
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide guidelines for preparation and checking of engineering calculations. The purpose of discipline QC check is to perform:

- **Conformance Check** to ensure the project deliverables meet the basis of design/design criteria, including any design changes;
- **Accuracy Check** to ensure that design outputs are correct, that calculations and reports do not contain mathematical inconsistencies, and that information on drawings is consistent with the results of calculations and reports;
- **Scope Check** to ensure the completeness of the deliverables, meaning that all necessary components are included (i.e. drawings, specifications, reports, estimates, etc.), and that the deliverables are consistent with the level of completeness required for the phase (e.g. 60%).

2.0 SCOPE

This procedure applies to all hand calculations and single-use spreadsheet calculations, which are the basis for study and design documents. A Level 1A 100% Document Check process will be used for checking design calculations associated with 75% and AFC (Final Plan) submittals.

All calculations are to be performed on standard HNTB or comparable calculation sheets. All information is to be printed, title boxes filled in completely, initials used in the sign-off blocks, pages numbered, sketches used as required to clarify the calculations, and all assumptions, references, units, and conclusions are to be clearly stated. For multi-sheet calculations, the sheet number should indicate the total number of sheets used. The originals and Check Prints of all hand calculations are to be indexed and stored by the Project Engineer or a designee.

3.0 RESPONSIBILITIES

Discipline Manager - Confirms that the personnel assigned to the project are capable of performing the analysis or calculations required. Appoints a designee to assemble and maintain the original calculations for the project in orderly fashion.

Project Engineers (Originators) - Use standard HNTB or comparable calculation sheets. Present all calculations in a neat and logical manner that is conducive to checking. Provide the calculations to the Checker in a timely fashion.

Checkers - The Checker will be an individual having qualifications necessary to perform duties. The Checker thoroughly checks the calculations for assumptions, mandated parameters, references, given values and formulas, omissions, and correctness of arithmetic. The Checker is responsible for asking

 	Prepared by: Myles Kuchas	Approved by: -	Page: 2 of 3
Title: Checking of Calculations	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.01
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

questions of the Originator in areas that are not clear or seeking technical advice if unsure of any particular element of the calculation. The Checker must be independent from the production of the design document being checked.

4.0 PROCEDURES – LEVEL 1A 100% DOCUMENT CHECK (REFER TO FORM DQP 2.03 FOR LEVEL 1B)

- 4.1 When a calculation or series of calculations have been completed and deemed ready for checking, the Originator makes a PDF of the original document. The Originator prints the Level 1 Check Print Sign-Off Sheet (Form DQP 2.01-1) with "Level 1A" checked in the appropriate box, signs, and scans the form to PDF. The PDF covered by the sign-off sheet will become the official Check Print and is considered a Quality Control Document. The Originator then delivers the Check Print to the Checker for checking. (Note: if calculations are checked by more than one Checker, a separate Level 1 Check Print Sign-Off Sheet shall be used for each.)
- 4.2 The Checker checks the entire document, highlighting each line of calculations in yellow if checked as correct, or marking in red all corrections. Upon completion, the Checker initials and dates each page of the Check Print in the "checked by" block for hand calculations, and on the first sheet of spreadsheet calculations and computer output. Checker may make notes in black or pencil.
- 4.3 The Backchecker (Originator) backchecks the Checker's marks on the Check Print and updates the original calculations as required. To document the backchecking process on the Check Print, the Backchecker:
 - 4.3.1 Check marks in green each of the Checker's red-marked corrections if in agreement.
 - 4.3.2 Crosses out and writes "STET" in green each of the Checker's red-marked changes that both the Originator and the Checker agree should not be changed. The Backchecker should not obliterate the Checker's marks.
- 4.4 As the original set of calculations is updated to reflect the Checker's comments, all red-marked corrections are encircled in blue by the Updater to indicate that the latest information is incorporated on the original document.

Note: *The Backchecker (Originator) and Checker should resolve differences encountered during the checking process so that comments are not repeated. If the two individuals cannot achieve*

 	Prepared by: Myles Kuchas	Approved by: -	Page: 3 of 3
Title: Checking of Calculations	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.01
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

resolution, the Project Discipline Leader or appointee should be requested to resolve the differences.

- 4.5 The Validator (Checker), acting as the verifier, examines the original calculation sheets to verify that the agreed-to corrections shown on the Check Print have been incorporated, highlighting all red corrections on the Check Print with bold yellow to indicate proper incorporation. After verification is complete, the Checker initials and dates each page of the original hand calculations in the "checked by" block, or on the first sheet of spreadsheet calculations and computer output.

After each step of the aforementioned checking process, the Originator and Checker will certify their activity by signing the Level 1 Check Print Sign-Off Sheet. The original calculation and Check Print in pdf format will be returned to the Project Engineer who will upload to the appropriate quality folder.

5.0 QUALITY CONTROL RECORDS

Form DQP 2.01-1 and checking prints of calculations will be retained as quality control records in pdf format.

6.0 DOCUMENTS AND FORMS

DQP 2.03	Checking of Input to Computer Programs
Form DQP 2.01-1	Level 1 Check Print Sign-Off Sheet
Figure DQP 2.01-1	QC Color Code

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

**FIGURE DQP 2.01-1
QC COLOR CODE**

Originate: (Originator)	Printed or copied reports, calculations, drawings, or other similar original. Not printed in Red, Yellow, Blue or Green.
Check: (Checker) Editorial comments should be in pencil	Yellow for correct: Yellow is used for correct items. Red for corrections, additions or deletions: r Corections, ^ Additions or ~~Deletions~~ changes
Backcheck: (Originator)	Green check mark for agreement: r Corections, ^ Green ~~STET~~ and cross out when it is agreed that no change should be made: stet changes
Update: (Originator or Updater)	Blue encirclement when updated: r Corections,
Validate: (Checker)	Yellow over red, green and blue to indicate that the item was updated correctly: r Corections, stet changes
	Additions or ~~Deletions~~

Figure DQP 2.01-1



**FORM DQP 2.01-1
LEVEL 1 CHECK PRINT SIGN-OFF SHEET**

Client Name: **Massachusetts Department of Transportation**

Job Title: **Haverhill Bridge Replacement – I 495 over Merrimack River**

Job Number: **69060**

Document Title: _____

Check Level (Mark One): ☐ 1A 100% Document Check

☐ 1B 100% Input Check (*When Pre-Validated Software is Used*)

Enter description below:

	Print Name	Signature	Date
☐ Originator	_____	_____	_____
☐ Checker	_____	_____	_____
☐ Backchecker	_____	_____	_____
☐ Updater	_____	_____	_____
☐ Validator	_____	_____	_____

Insert an "X" in the box to indicate a required QC activity.

 	Prepared by: Myles Kuchas	Approved by: -	Page: 1 of 5
Title: Checking of Drawings	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

The purpose of this procedure is to define the roles, responsibilities, and process for the detailed discipline specific QC check of drawings for the project deliverables. The purpose of discipline QC check is to perform:

- **Conformance Check** to ensure the project deliverables meet the basis of design/design criteria, including any design changes;
- **Accuracy Check** to ensure that design outputs are correct, that calculations and reports do not contain mathematical inconsistencies, and that information on drawings is consistent with the results of calculations and reports;
- **Scope Check** to ensure the completeness of the deliverables, meaning that all necessary components are included (i.e. drawings, specifications, reports, estimates, etc.), and that the deliverables are consistent with the level of completeness required for the phase (e.g. 60%); and
- **Style Check** to ensure that project deliverables have been prepared in accordance with specified appearance requirements (e.g. in accordance with the CADD Manual, etc.), and use of language requirements.

2.0 SCOPE

This procedure shall apply to the discipline QC check of all drawing project deliverables prior to submission to a client. This procedure applies to the discipline QC check of drawings, specifications, calculations (including quantities and construction cost estimates), reports, studies, etc. All deliverables, regardless of milestone or phase, shall undergo Discipline QC Check with checks being commensurate with the level of detail available for the milestone or phase of the deliverable being checked. While this procedure does not formally apply to interim or working drafts, it is important to note that interim day-to-day QC checking is essential throughout the design process to maintain project schedules and avoid rework.

The checking of drawings, like any other checking, requires a minimum of two individuals: a Checker/Validator and an Originator/Backchecker/Updater. The Level 1A 100% Document Check process for drawings will be implemented as described herein.

Timely checking of drawings is important for efficient performance. A drawing used as a base by several disciplines should be checked and corrected before further additions are made; this will eliminate the need to check and correct the same items on subsequent drawings. Drawing files will be kept in the project folder in the 03 Deliverable Quality Records folder.

 	Prepared by: Myles Kuchas	Approved by: -	Page: 2 of 5
Title: Checking of Drawings	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

3.0 RESPONSIBILITIES

The Discipline Manager is responsible for the implementation of this procedure for all project drawings and check prints.

The Originator of the work on a drawing has the primary responsibility for accuracy and adequacy. It is not intended that the Originator rely upon the checking system to complete the drawing. The Originator of each document is responsible for making the Check Print, attaching a Level 1 Check Print Sign-Off Sheet (Form DQP 2.01-1), and dating it, following that Check Print through the checking process, and obtaining the required sign-offs.

Checkers are responsible for checking the drawings independent of the Originator. Checkers are qualified individuals who are familiar with the design and project requirements but did not prepare the drawing. The checking will include verifying that Standard Details and any other details that are identified as mandatory are incorporated into the drawings.

4.0 PROCEDURE - LEVEL 1A 100% DOCUMENT CHECK for Final Drawings

4.1 Completing the Drawing

As each drawing is completed in final format and deemed ready for checking, the Originator prints out a clean set of drawings and attaches the Level 1 Check Print Sign-Off Sheet DQP 2.01-1. The Originator adds a Check Print Stamp to each page or page range that the originator has created, signs and dates the Check Print stamp, and submits to the Checker. If the Originator is responsible for creating a series of sheets in a row, the Originator may stamp the first page and provide the range of applicable pages in the provided spot on the stamp.

4.2 Checking

The Checker checks the Check Print of the drawing for technical adequacy and conformance to any applicable standards and format, and performs specific accuracy checks required for that type of drawing. Checking activity is recorded directly on the Check Print.

The Checker is responsible for verifying that the drawing is consistent with the corresponding calculations, and signing off that those calculations have been properly checked. In order to document the checking process, the Checker highlights in yellow on the Check Print every line found to be correct, and marks in red all corrections, additions, or deletions. The Checker must verify that Standard Details and any other details that are identified as mandatory are incorporated into the drawings. At conclusion of the 100% Document

 	Prepared by: Myles Kuchas	Approved by: -	Page: 3 of 5
Title: Checking of Drawings	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

Check, every text line or callout on the drawing should be either highlighted in yellow or marked in red, indicating that the check performed considers 100% of the document.

NOTE: Comments or instructions shall be written in black. The Checker signs and dates the Level One Sign-Off Sheet upon completion of the checking. If a plan set has multiple Checkers, the Level 1 form may be notated to refer to individual sheets for the names of Checkers, Backcheckers, etc.

In the case where no corrections, additions or deletions are found, there is no need for backchecking or further signatures on the Check Print stamp. The Check Print and original drawing, signed in the appropriate checked block, should be returned to the Originator for uploading to ProjectWise.

4.3 Backchecking

The Backchecker, who is typically the Originator, reviews the Checker's corrections on the Check Print. To document the backchecking process on the Check Print, the Backchecker:

- 4.3.1 Check marks in green each of the Checker's red-marked corrections if in agreement.
- 4.3.2 Crosses out and writes "STET" in green each of the Checker's red-marked changes that both the Originator and the Checker agree should not be changed. The Backchecker should not obliterate the Checker's marks.

NOTE: The Backchecker and Checker should resolve differences encountered during the checking process so that comments are not repeated. If the two individuals cannot achieve resolution, the appropriate Discipline Manager or appointee should resolve the differences. The Backchecker signs and dates the Level One Sign-Off Sheet.

4.4 Correcting the Drawing Original

Correction of the Drawing Original can be done by the Originator or Backchecker, or by a third-party CADD technician. When updating the Drawing Original to incorporate the Check Print corrections, the Updater (engineer, draftsman, or CADD technician) reviews the drawing Check Print for those corrections checked in green by the Backchecker, and no other corrections. As each correction is incorporated, the Updater encircles in blue each green-checked correction on the Check Print. Upon completion of updating, and if the drawing is produced in CADD, the Updater will make a new print of the drawing and submit it with the Check Print to the Validator. The Updater signs and dates the Level One Sign-Off Sheet.

 SPS New England, Inc. 	Prepared by: Myles Kuchas	Approved by: -	Page: 4 of 5
Title: Checking of Drawings	Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

4.5 Verifying the Corrected Check Print

The Validator compares the updated print and the Check Print to verify that the agreed-to corrections have been incorporated without error. If the corrections are not made or are erroneous, the Check Print with penciled instructions is returned to the Updater. The Validator highlights all red corrections with yellow to indicate proper incorporation. The Validator signs and dates the Check Print stamp. After the corrections have been verified, the CADD technician places the initials of the Checker in the “checked by” block on the title block of the drawing.

4.6 Disposition of the Checked Drawing

Prior to submission, the completed original (or CADD file) is put under the control of the Design Document Control Manager in order to prevent further changes in the drawing that could invalidate the checking which has been done. The original Check Prints are scanned in color and uploaded to ProjectWise in the designated quality folder. The Originator releases the checked drawing to other disciplines to use as a baseline for their input, or to the client.

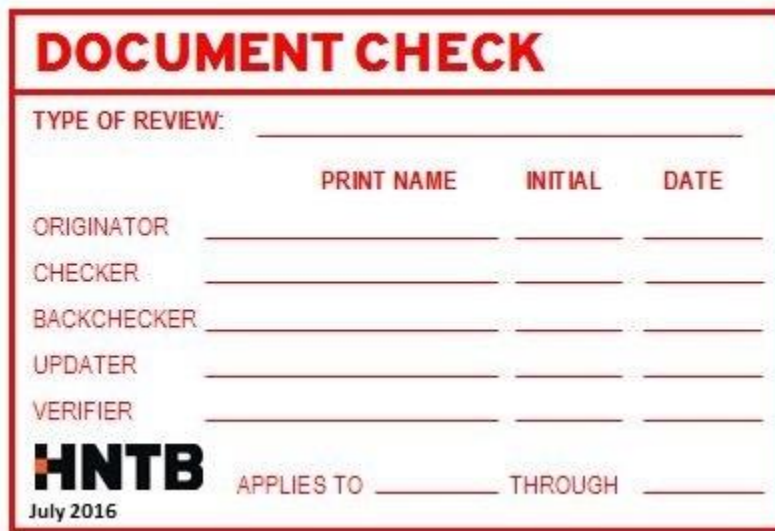
4.7 Incorporation of Design Review Comments

After the Originator and Discipline Managers have agreed to the comments that will be incorporated into the design drawings following a resolution meeting with either SPS New England, Inc. and/or MassDOT, the Originator will print out a clean set of comment drawings for another Level 1 check. This Level 1 check need only entail checking of the changes made to the document.

 		Prepared by: Myles Kuchas	Approved by: -	Page: 5 of 5
Title: Checking of Drawings		Effective date: 5/31/2018	Revision number: 0	Procedure number: DQP-2.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

4.8 Check Print Stamp

The following stamp shall be placed on each drawing prior to initiating the checking process. The progress of the checking process shall be recorded promptly by each participant and dated.



DOCUMENT CHECK

TYPE OF REVIEW: _____

	PRINT NAME	INITIAL	DATE
ORIGINATOR	_____	_____	_____
CHECKER	_____	_____	_____
BACKCHECKER	_____	_____	_____
UPDATER	_____	_____	_____
VERIFIER	_____	_____	_____

HNTB July 2016 APPLIES TO _____ THROUGH _____

Sample Stamp

5.0 QUALITY CONTROL RECORDS

Form DQP 2.01-1 and all check prints shall be retained as quality control records in pdf format.

6.0 DOCUMENTS AND FORMS

Form DQP 2.01-1 Level 1 Check Print Sign-Off Sheet
Figure DQP 2.01-1 QC Color Code

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 4
Title: Checking of Input to Computer Programs	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.03
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide for systematic checking of computerized design calculations and CADD to minimize the possibility of input errors.

2.0 SCOPE

This procedure is to be used for checking input data for computer programs implemented for analysis, design or CADD, and for spreadsheet programs. A Level 1B 100% Input Check process will be used for checking input data. Another method of checking input that is acceptable is to conduct a hand calculation of the formulas and check the output according to DQP 2.01.

3.0 RESPONSIBILITIES

Discipline Leader must provide training to ensure that project staff has sufficient experience in using the software on the Project.

Originators must provide the input documents and other associated data to the Checkers in a timely and complete manner so that the checking can be quick and thorough and occur before design drawings are created.

Checkers shall mark up the input completely in yellow if it is correct and red if in error.

4.0 PROCEDURE – LEVEL 1B 100% INPUT CHECK

4.1 Non-Interactive Programming

When any computer program is run for analysis, design or CADD, the input and output sheets must also be printed out at the same time. For spreadsheet programs, the Originator makes a Check Print copy of the input and output for checking. For non-local (batch) programs, the Originator makes a Check Print copy of the input for checking. The Originator attaches the Level 1 Check Print Sign-Off Sheet (Form DQP 2.01-1) on the top of the Check Print. Level 1B will be marked in the applicable box, indicating that the input data for the program is to be fully checked. The Originator signs and dates the Level 1 Check Print Sign-Off Sheet, and provides it to the Checker.

The Checker checks the input data, highlighting the input in **yellow**, if determined to be correct, and marking in **red** for all corrections. The input for non-local input may be documented, copied, and checked prior to forwarding for batch processing. The output will be reviewed for overall

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reasonableness. Upon completion, the Checker signs and dates each page of the Check Print. The Backchecker (Originator) backchecks the Checker's marks and either reruns the program, or calculates and pen-in the correct values in the output, as appropriate. To document the backchecking process on the Check Print, the Backchecker:

- 4.1.1 Check marks in **green** each of the Checker's red-marked corrections if in agreement.
- 4.1.2 Crosses out and writes "STET" in **green** each of the Checker's red-marked changes that both the Originator and the Checker agree should not be changed. The Backchecker should not obliterate the Checker's marks.
- 4.1.3 As corrections are made to the program input to reflect the Checker's comments, all red-marked corrections are encircled in **blue** to indicate that the latest information is incorporated into the program.

The Validator (Checker) verifies that all the agreed-to corrections have been incorporated, highlighting all red corrections with bold yellow to indicate proper incorporation.

If the program is rerun, a new and complete Check Print will be created and labeled Check Print 2, 3, 4, etc. Checking of the new input will follow the steps discussed above. The previous input/output sheets will be marked "Superseded" and dated. All superseded input sheets will be retained in the project files as Quality Documents. The previous output sheets, if separate from the input sheets, can be destroyed.

After each of the above-discussed checking processes has taken place, those responsible will indicate their actions on the Level 1 Check Print Sign-Off Sheet. New Level 1 Check Print Sign-Off Sheets may be required to document subsequent iterations of runs. When required, the previous Level 1 Sign-Off Sheet will be marked "Superseded" and dated.

The final computer program output and Check Print will be returned to the Originator, who copies and uploads to the appropriate QC folder on ProjectWise.

4.2 Interactive Programming

Checking of Interactive programs used for analysis, design and CADD where input data is not identifiable from resultant output data, due to print formatting of the printout, will be checked as follows:

The Originator makes a Check Print copy of the input and output for checking. The Originator attaches the Level 1 Check Print Sign-Off Sheet on the top of the Check Print. Level 1B will be marked in the applicable

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box, indicating that the input data for the program is to be fully checked. The Originator signs and dates the Level 1 Check Print Sign-Off Sheet, and provides it to the Checker.

The Checker, familiar with the interactive program, checks the input data by creating a new electronic file. When prompted interactively as the new electronic file is developed, original input responses determined by the Checker to be correct from the Check Print will be input. Corrected input will also be used as determined to be appropriate by the Checker. Upon completion of the interactive input using the Checker's corrections as necessary, output of the new file will be compared against the Check Print to verify the final outcome. Resultant output determined to be substantially similar may be considered adequate, and no further revisions required. Resultant output determined to be significantly different than the original file will require further quality control measures. The Checker will highlight on the Check Print the input data in **yellow** if determined to be correct, and mark in **red** all corrections. Upon completion, the Checker signs and dates each page of the Check Print in **red**.

The Backchecker (Originator) backchecks the Checker's marks and reruns the program. To document the backchecking process on the Check Print, the Backchecker:

- 4.2.1 Check marks in green each of the Checker's red-marked corrections if in agreement. As corrections are made to the program input to reflect the Checker's comments, all red-marked corrections are encircled in blue to indicate that the latest information is incorporated into the program.
- 4.2.2 Crosses out and writes "STET" in green each of the Checker's red-marked changes that both the Originator and the Checker agree should not be changed. The Backchecker should not obliterate the Checker's marks.

If the program is rerun, a new and complete Check Print will be created and labeled Check Print 2, 3, 4 etc.

Rechecking of the new input will follow the steps discussed above. The Validator (Checker) verifies that all the agreed-to corrections have been incorporated as follows:

- 4.2.3 On the previous Check Print, the Validator highlights all red corrections with bold **yellow** to indicate proper incorporation.
- 4.2.4 On the new Check Print, the Validator highlights all input in bold **yellow** indicating proper incorporation.
- 4.2.5 The previous input/output sheets will be marked "Superseded" and dated. All superseded input sheets will be retained in the project files as Quality Documents.

After each of the above-discussed checking processes has taken place, those responsible will indicate their

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actions on the Level 1 Check Print Sign-Off Sheet. New Level 1 Check Print Sign-Off Sheets may be required to document subsequent iterations of runs. When required, the previous Level 1 Sign-Off Sheet will be marked "Superseded" and dated.

The final computer program output and Check Print will be returned to the Originator, who will store both documents together in the project files. Both documents will be color scanned and uploaded to the QC folder on ProjectWise.

Note: *In cases of composite designs where there is a combination of both input and manual engineering done for a specific task, the quality checks will follow that particular DQP. For instance, work done in InRoads will follow DQP 2.03 but incorporation of output for drawings will follow the checking procedures of DQP 2.01.*

5.0 QUALITY CONTROL RECORDS

Form DQP 2.01-1 and the check print of program input shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Software Validation, DQP 1.03

Form DQP 2.01-1 Level 1 Check Print Sign-Off Sheet

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 7
Title: Checking of Calculations Utilizing Independent Design Checks	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.04
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide standards and procedures for Independent Checking. Independent Design Checks conducted by the Design QC Team, as required by the contract and as stipulated herein, will be for designs of permanent structural components and permanent structural components affected by major temporary conditions. Independent Design Checks conducted by the team for major temporary structural components is stipulated in the construction procedures in the QMP.

2.0 SCOPE

This procedure applies to the checking of design for permanent components and effects of temporary components on permanent components, performed independently from the original calculations. Similar procedures to be implemented for the independent checking of design for major temporary components as designed by the team are stipulated in the construction procedures in the QMP.

Independent Checks involve the complete verification of design elements and details to verify:

- Design Assessment
- Analytical Check

This check results in two complete sets of design calculations, i.e., the original set of calculations and the independent design set of calculations.

The original calculations and the Independent Check calculations are to be assembled in three-ring binders or bound form by the Project Engineer.

Independent design checks shall be performed on the following structural components:

- a. Bridge Superstructure
- b. Bridge Substructure

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DEFINITIONS

Permanent Structural Component is defined as any primary load carrying or non-redundant element of constructed work that is to remain in place at completion of Project. Examples include: bridge girders; bridge deck; abutment breastwall and footing; pier cap, columns, and footings; bridge retaining wall stem and footing.

3.0 RESPONSIBILITIES

Design QC Manager - Verifies that the HNTB Project personnel, including subconsultants, assigned to the project are capable of performing the independent analysis or calculations required.

Structures Discipline Manager - Assigns a Project Engineer to perform and assemble the original structural calculations, check calculations, drawings and check prints in an orderly fashion.

Project Engineer - Use standard calculation sheets. Present calculations in a neat and logical manner. Perform corrections and redesign as agreed to with the checker.

Independent QC Checkers - Must be HNTB or subconsultant project personnel who are independent of the design production team; do not present or investigate new or alternative design approaches; and are responsible for resolving discrepancies with the Designer and seeking technical advice if unsure of any particular element of the design.

4.0 PROCEDURE

All calculations for Independent Checks are to be done on standard calculation sheets and using approved computer programs. Each sheet is to be identified as "Independent Check Calculations." Information is to be printed, title boxes filled in completely, initials used in the sign-off blocks, pages numbered, sketches used as required to clarify the calculations, and assumptions, references, units and conclusions are to be clearly stated.

When a project reaches a stage of completion where Independent Checking can begin, the Project Engineer shall assemble the following material:

- Sign and attach the Level 1 Check Print Sign-Off Sheet (Form DQP 2.01-1) to the top of the

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calculations with “Level 1A” checked in the appropriate box. Calculations will be identified as the primary design package for the component.

- Design Criteria, Project standards, and memoranda as established by the master agreement and flow downs.
- A copy of the basic computer model for substructure and superstructure elements with supporting calculations.
- Draft technical provisions

The Responsible Engineer will verify that the Originator signs or initials on each calculation sheet, and then will deliver all materials to the Checker to commence the procedure herein.

4.1 Design Assessment - To verify the general compliance with the requirements of the Contract, taking proposed methods of construction into consideration, the Design Assessment will be conducted by reviewing the following:

- MassDOT Bridge Design Manual
- Assumptions and methods, including models, are consistent with design input and accepted practices;
- Calculations are legible and verified by double-checks;
- Calculations are in accordance with the design task protocol;
- Calculations are traceable to the originator, signed, and dated with revisions;
- Input data is identified and has been taken from reviewed and accepted sources;
- Compliance with the basic project configuration, values, and forward compatibility;
- Correct and consistent dimensions;
- Conformance with standard drafting practices;
- Compliance with design decisions and deviations approvals;
- Conformance with MassDOT applicable codes and standards; and
- Comments to the latest check prints have been incorporated into the completed drawing.

4.1.1 The Checker shall review the Design Criteria and check the drawing General Notes for conformance with the Project Standards using the process as defined in DQP 2.02– Checking of Drawings.

4.1.2 The Checker shall review the general plans and typical sections for any obvious omissions, conflicts, incompatible structural framing or other major component features.

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Constructability review comments shall be reviewed for incorporation into design.

- 4.1.3 The Checker shall verify through review that appropriate codes, standards, design methodology, materials, fatigue category, interface requirements, and computer software has been utilized.
 - 4.1.4 As appropriate, the Checker shall verify that maintenance and durability factors are considered, and hydrologic factors have been incorporated.
 - 4.1.5 For loading conditions as prescribed directly by codes and design guides, the Checker will review that the appropriate values have been identified for use.
 - 4.1.6 Upon conclusion of the Design Assessment, the Checker will attach, complete, and sign the Review Memorandum Form DQP 2.05-1.
 - 4.1.7 In the event discrepancies are noted in the review, the Checker will communicate to the Design Originator the nature of the discrepancies. When it has been mutually agreed that discrepancies will affect the design, the Checker will immediately stop further checking processes and return the design back to the Design Originator for revision. This action will be noted on the Review Memorandum.
- 4.2 Analytical Check-** To verify the structural adequacy and integrity of critical structural members, the Analytical Check will be conducted by generating a complete and separate set of calculations free of any influence of the original design document.
- 4.2.1 The Checker completely recalculates the geometric layout. Use of independent computer programs is acceptable practice as long as the program has been verified according to DQP 1.03. These calculations shall be documented in the same manner as original calculations to indicate that checks were made.

Note: Independent design check of components shall not be started until full resolution of the Design Assessment and completion of Item 4.2.1. Any discrepancies must be resolved with the Originator. If revisions are necessary, the Design Originator will revise the design and details before the Checker proceeds.

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4.2.2 Independent calculations should include the following items:

- Design Assumptions
- Material properties
- Member properties
- Load Analysis (including foundation loads)
- Structural boundary conditions (including bearing and shear key design checks)

4.2.3 When performing independent design checks, the calculations can be prepared with computer programs in accordance with DQP 1.03 or by long hand.

4.2.4 Upon conclusion of the Independent Design Check, the Checker will attach the Level 1 Check Print Sign-Off Sheet (Form DQP 2.01-1) with "Level 1A" checked in the appropriate box. The Checker will clearly label the sign-off sheet as "Independent Design Check," include title, date and name associated with the original design package and for which the attached independent design check has been performed. The Checker will sign as the originator of the Independent Design Check document.

4.2.5 The Checker will evaluate the results of the independent design for adequacy as compared to the original design document prepared in full by the Design Originator.

4.2.6 In the event inadequacies are noted, the Checker will communicate to the Design Originator the nature of the inadequacies. With mutual agreement between the Checker and Design Originator, nature of inadequacies will be categorized as either round-off tolerances deemed acceptable with standard of care, or will be categorized as potential critical error.

4.2.7 For discrepancies determined to be round-off, a statement of resolution initialed and dated by both the Design Originator and Checker will be placed with or on the Checker's independent design calculations. Resolution is considered achieved with no further action is required.

4.2.8 For discrepancies determined to be a potential critical error, the Design Originator will review the independent design calculations to determine source of discrepancy. When a

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Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

determination has been made that an error exists in the original design, the Design Originator will revise the original document. Upon completion, the Design Originator and Checker will concurrently review the revised results. When results are consistent, the Checker will sign off on the original design calculations as Checker of the document.

4.2.9 In the event that the revised original calculation yield a differing result from the independent design, the Checker will comparatively review the revised original calculations against the independent design to determine source of discrepancy. Errors found in the independent design calculations will be corrected. Upon final concurrence of the results of both original and independent designs, the Checker will sign off on the original design calculations as Checker of the document.

4.2.10 After successful resolution of independent design checking, the Checker will sign off on the Level 1 Check Print Sign-Off Sheet attached to the original document. Documents will be returned to the Responsible Engineer, who will store both documents together in the project files, and scan in color for uploading to ProjectWise and SharePoint.

Associated drawings will be checked in accordance with DQP 2.02. The supplemental specifications will be checked for conflicts and omissions in accordance with DQP 2.07 as appropriate.

5.0 QUALITY CONTROL RECORDS

All forms and independent calculations (hand calculations, computer input and output, and post-processing calculations) will be retained as quality control records.

Form DQP 2.01-1 Level 1 Check Print Sign-Off Sheet

Form DQP 2.05-1 Review Memorandum – Studies and Report Documents

6.0 DOCUMENTS AND FORMS

DQP 1.03 Software Validation

DQP 2.02 Checking of Drawings

DQP 2.07 Checking of Supplemental Specifications

Form DQP 2.01-1 Level 1 Check Print Sign-Off Sheet

Form DQP 2.05-1 Review Memorandum – Studies and Report Documents

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7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Checking of Studies or Report-Type Documents	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.05
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide guidelines for checking of studies or report-type documents prepared by HNTB and others.

2.0 SCOPE

This procedure applies to all studies, technical reports, technical memoranda, or procedures required to be provided to a client. Administrative/progress reports are not included in this procedure.

All drawings, tables and calculations included in or appended to such documents are to be checked per DQP 2.01 or DQP 2.02, as applicable.

3.0 RESPONSIBILITIES

The Discipline Manager must designate the scope and reviewers for the document along with keeping the documentation for the review.

Checkers shall perform the review in accordance with their designated scope, document their comments on the Review Print, and sign and date the Review Memorandum, Form DQP 2.05-1.

4.0 PROCEDURES – Level 2 REVIEW

Formal review of study or report-type documents will be performed at least twice during the project;

- First, after assembly of all data into a preliminary document and prior to the first Design Review of the preliminary document.
- Second, after the preliminary document has been reviewed and all comments have been addressed. If there are no comments, the report stands as complete.

Note: *Additional interim reviews and the need for further reviews because of client comments on the final submission shall be at the discretion of the Discipline Manager.*

In general, review comments on the Review Print shall be made in red ink. Check prints of figures, calculations or tables shall use the color scheme specified by the specific DQP.

Both reviews are to be initiated by the Discipline Manager after all inputs have been compiled into a single document.

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On the top of the document Review Print, the Originator attaches the Review Memorandum DQP 2.05-1 on which he or she lists the reviewers for each discipline.

Each reviewer is responsible for reviewing his or her own discipline to verify clarity, conformance with requirements, and professional policies and content after typing and editing, and to read those parts of the document that interface with the discipline, assuring that there are no conflicts.

Note: *It is recommended that only one document Review Print be circulated for each review to minimize duplication or conflicting comments. However, when time constraints or distance considerations dictate, more than one document may be used.*

The Originator or a designee, upon receipt of the completed Review Print, must backcheck and address each of the corrections.

In the event of disagreements between the Originator and the Checker(s), the Discipline Manager shall make the final determination on resolution.

The completed Review Print, along with any Check Prints of drawings or calculations, shall be color scanned and uploaded to ProjectWise.

5.0 QUALITY CONTROL RECORDS

Form DQP 2.05-1 and check prints of all documents, figures and tables shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

DQP 2.01 Checking of Calculations
DQP 2.02 Checking of Drawings

Form DQP 2.05-1 Review Memorandum – Studies and Report Documents

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



FORM DQP 2.05-1

REVIEW MEMORANDUM - STUDIES, REPORT DOCUMENTS AND SUPPLEMENTAL SPECIFICATIONS

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title: _____

Review Lead: _____ Date: _____

Review Team Member(s):

Review Team Findings:

Summarize findings here. Attached to document checking print.

Print Name

Signature (Checker) (Review Lead)

Date

Print Name

Signature (Backchecker/Orginator)

Date

Form DQP 2.05-1

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Title: CADD Quality Control Audits	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.06
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish an audit procedure to verify that production groups are preparing and performing quality control checks on CADD design documents in accordance with HNTB's CADD Standards Manual, MassDOT CADD Standards and MassDOT Project CADD Procedure Manual.

2.0 SCOPE

This procedure will provide an audit process to verify that quality control procedures are in-place and are being employed in the preparation of CADD design documents on the project. In general, this procedure will focus on document formatting, layering, font usage etc. for consistency with the standards described above.

Other procedures (DQP 2.01, 2.02, and 2.03 etc.) herein will be used to verify CADD document technical content.

3.0 RESPONSIBILITIES

CADD Manager -- The CADD Manager (or designee) will conduct discipline CADD audits for at least two submittals in accordance with the procedures herein and will report the overall results of the audit using the CADD Audit Review Memorandum, Form DQP 2.06-1 and Form DQP 2.06-2. The audit records will be maintained by the CADD Manager using the CADD Audit Log, Form DQP 2.06-3, and a copy of the audit will be distributed to the Design QC Manager.

Discipline Leads -- The Discipline Leads are responsible for implementation of the project CADD and quality control procedures in the development of the design CADD documents.

Design QC Manager -- Will verify that CADD Audits are performed for each submittal.

4.0 PROCEDURES

4.1 The Discipline Leads will notify the CADD Manager at least one week prior to a package submittal and provide a ProjectWise link to the CADD files. The CADD Manager will perform an electronic audit of the CADD files for conformance to the project CADD standards. This audit will involve reviewing the content of the ProjectWise CADD subdirectory used by the design office and evaluating a representative number of files in accordance with Form DQP 2.06-2 and the project CADD Standards. A list of the files reviewed shall be listed on Form DQP 2.06-3. Non-conforming CADD details shall be copied and attached to Form DQP 2.06-2 with notations describing reasons for non-compliance.

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4.2 If discrepancies are found, the CADD Manager shall document the deficiencies on Form DQP 2.06-3 and recommend a corrective action. The CADD Manager shall denote on Form DQP 2.06-1 if the corrective action must be completed prior to submittal, or if it can be delayed until a future submittal. The audit details shall be recorded on the CADD Audit Log, Form DQP 2.06-3.

4.3 The CADD Manager will submit a copy of the audit forms to the Discipline Leads, the Responsible Engineer and the Design QC Manager, and will schedule an audit resolution meeting if required.

4.4 Upon receiving of the audit documentation, the Discipline Leads will acknowledge receipt by signing Form DQP 2.06-1 and returning a copy to the CADD Manager. If required by the CADD Manager, the corrective actions shall be completed prior to package submission. An audit resolution meeting may be held with the CADD Manager, Discipline Leads and the DQCM to develop an action plan and schedule for corrective action and follow-up.

4.5 The CADD Manager will conduct a follow-up audit at an agreed-upon date to verify that the deficiencies have been corrected. The CADD Audit Log will be updated to reflect closure of the audit findings.

4.6 The CADD Manager shall notify via email the Responsible Engineer, Design QC Manager and Design Manager if the package is certified for submission.

5.0 QUALITY CONTROL DOCUMENTS

Forms DQP 2.06-1, 2.06-2 and 2.06-3 shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Project CADD Standards Manual

MassDOT CADD Standards

CADD Audit Review Memorandum, Form DQP 2.06-1

CADD Audit Checklist, Form DQP 2.06-2

CADD Audit Log, Form DQP 2.06-3

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



New England, Inc.



FORM DQP 2.06-1

CADD QUALITY CONTROL AUDIT REVIEW MEMORANDUM

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title: _____

Review Lead: _____ Date: _____

Review Team Member(s):

Review Team Findings:

Summarize findings here. Attach to checklist.

Print Name

Signature (Checker) (CADD Manager)

Date

Form DQP 2.06-1



NewEngland, Inc.



FORM DQP 2.06-2
CADD QUALITY CONTROL AUDIT CHECKLIST

DISCIPLINE / FIRM AUDITED AREA:			DATE(S) OF AUDIT:		
CADD MANAGER:			AUDIT:		
AUDIT ITEM	REFERENCE	COMMENT/ACTION REQUIRED	CONFORMS		
			YES	NO	N/A
1. Are correct file names being used for base files and plans sheet files?	Project CADD Procedure Guide				
2. Do the CADD plans have proper layering?	Project CADD Procedure Guide				
3. Are font sizes and styles correct?	Project CADD Procedure Guide				
4. Are the sheet sizes and borders correct?	Project CADD Procedure Guide				
5. Are correct reference files being used?	Project CADD Procedure Guide				
6. Are the plans stored in the correct directories with no duplication of files?	Project CADD Procedure Guide				
7. Are correct symbols being used, e.g. north arrow, dimension styles and correct working units?	Project CADD Procedure Guide				
8. Are correct section and detail symbols used?	Project CADD Procedure Guide				
9. Is the project information correct?	Project CADD Procedure				

	Guide				
--	-------	--	--	--	--

10. Is terminology correct in general notes?	Project CADD Procedure Guide				
--	------------------------------	--	--	--	--

Form DQP 2.06-2

Print Name: _____ Signature: _____ Date: _____
(CADD Manager)

6/24/13

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Checking of Supplemental Specifications	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.07
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide guidelines for the checking of text documents: Supplemental Specifications.

2.0 SCOPE

This procedure applies to all final documents provided to the client for construction or procurement. A Level 2 Document Check process will be used.

3.0 RESPONSIBILITIES

The Discipline Manager/Responsible Engineer is responsible for implementing this procedure for specifications and/or special provisions.

The Originator of the work on a document has the primary responsibility for accuracy and adequacy. It is not intended that the Originator rely upon the checking system to find and correct mistakes. The Originator of each document is responsible for making the Check Print, following that Check Print through the checking process, and obtaining the required signature from the Checker.

Checkers are responsible for checking the documents, independent of the Originator.

4.0 PROCEDURES

4.1 Formal review of Supplemental Specifications will be performed at least two times during the project;

- First, after assembly of all data into a preliminary document and prior to the first Design Review of the preliminary document.
- Second, after the preliminary document has been reviewed and all comments have been addressed. If there are no comments, the report stands as complete.

Note: *Additional interim reviews and the need for further reviews because of client comments on the final submission shall be at the discretion of the Design QC Manager.*

4.2 Both reviews are to be initiated by the Discipline Manager after the documents have been prepared by the Originator.

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Checking of Supplemental Specifications	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.07
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

- 4.3 On the top of the document Review Print, the Originator attaches the Review Memorandum DQP 2.05-1 on which he or she lists the reviewers for each discipline.
- 4.4 The Originator or a designee, upon receipt of the completed Review Print, must backcheck and address each of the corrections.
- 4.5 The completed Review Print is uploaded to ProjectWise.

5.0 QUALITY CONTROL RECORDS

Form DQP 2.05-1 and Review Print of the document shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Form DQP 2.05-1 Review Memorandum – Studies and Report Documents

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 HNTB	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Quality Control Review of Documents Prepared by Others	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.08
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide guidelines for checking of documents prepared by authorized sources other than the design team, transmitted to the design team, and subsequently used for further development and use.

2.0 SCOPE

This procedure applies to documents prepared by others, which are to be used in part or in whole by HNTB for design development. These documents may originate from MassDOT, SPS New England, Inc., subconsultants, or other agencies.

3.0 RESPONSIBILITIES

The Discipline Manager must define the scope of the check based on the nature of the document under consideration, and designate qualified Checker(s) to perform the level of check necessary to proceed with further development of design, drawings, or reports.

The Checker must have qualifications necessary to check the document. The Checker is to carry out an evaluation of the document in accordance with the defined scope of review, after which will document all comments and exceptions.

4.0 PROCEDURE – LEVEL 2 REVIEWS

On the top of the document to be reviewed, the Originator attaches the Review Memorandum DQP 2.05-1 on which he or she lists the Checkers of the document. A PDF is made of the original document for use as a Review Print.

The Checker evaluates the Review Print for overall conformity with the requirements of the Project. Areas of review, depending upon the defined scope of review, may include clarity of text message, design assumptions, mandated parameters, references, formulas, and omissions, as applicable. The Checker is responsible for enumerating issues that are not clear, or inappropriate. The Checker will mark up the Review Print. The Checker will report his/her findings on the Review Memorandum, Form DQP 2.05-1 for documents or DQP 2.01-1 for plans and will sign the Review Print copy of the document.

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Quality Control Review of Documents Prepared by Others	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.08
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

The Checker will forward the Review Print and review memorandum to the DQCM for filing as a quality document in ProjectWise and for transmittal to the Originator of the document.

Comments generated by the review should be reconciled with the Document Originator through a standard comment resolution meeting process between the Checker and Originator.

5.0 QUALITY CONTROL RECORDS

Form DQP 2.05-1, DQP 2.01-1 and Review Print of document shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Checking of Studies or Report-Type Documents, DQP 2.05
Checking of Plans, DQP 2.02

Form DQP 2.05-1 Review Memorandum – Studies and Report Documents
Form DQP 2.01-1 Review of Plans

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 5
Title: Design Quality Control Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish the sequence and responsibilities for the Design Reviews of documents for review and comment by MassDOT.

2.0 SCOPE

This procedure applies to all submittals including reports, and plan submittals to MassDOT from 75% Design through the AFC Submittal to SPS New England, Inc. Procedures for internal reviews (constructability, interdisciplinary and environmental compliance) are provided in other DQP's.

3.0 RESPONSIBILITIES

The Design QC Manager is responsible for overall implementation of this procedure including setting the schedule for the Design Reviews occurring throughout the project based on the deliverable schedule. In the event the schedule changes, the Design QC Manager will modify the Design Review schedule and notify HNTB and its subconsultants.

The Design QC Manager is responsible for overseeing distribution, through Document Control, of the design review packages to the Reviewers and collecting and disseminating review comments.

The Discipline Manager (Responsible Engineer) will confirm comment resolution and final disposition, and verify comments are incorporated or addressed in the subsequent packages. The document control system will log each submittal correspondence for tracking purposes. A hard copy of the submittal package will also be hand delivered to the designated SPS New England, Inc. appointee and Design QC Manager.

4.0 PROCEDURE

4.1 Reviews for Permanent Design Submittals

4.1.1 Review Coordination - Prior to each formal Design Review, the Design QC Manager will coordinate reviews with HNTB's Design Production QC Team. The Design Production QC Team will conduct technical reviews of the major structural, electrical, civil, geotechnical and architectural submissions. The Design Production QC Team will be composed of HNTB staff with the appropriate discipline experience who is not directly involved with the original development of the item, element or phase being checked. This team will review the following:

- Critically evaluate design assumptions,
- Verify appropriateness of design criteria,

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 5
Title: Design Quality Control Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

- Confirm compliance with design criteria,
- Verify the reliability and applicability of the software programs used,
- Verify suitability of proposed details,
- Identify uncommon practices and suggest alternates,
- Identify missing calculations that should have been performed, and
- Review submittal for the degree of completeness required for the particular phase of work.

The DQCM or DDQCM will also review each submittal for conformance to the DQMP requirements in accordance with DQP 1.04. The Design QC Team will document their findings on Form DQP 1.05-1 and Form DQP 1.05-2.

4.1.2 Sketch Plan Review - When the proposed design concept of a particular structure is changed substantially from the BTC, revised sketch plans will be submitted. The submittal documents, plans and design checklist, will be certified by the Responsible Engineer, Design QC Manager and the Design Manager with Form 2.09-2 and will be formally submitted to MassDOT by SPS New England, Inc. The Reviewers will record comments on Form DQP 2.09-1 Comment Deposition Form or MassDOT's equivalent comment form. Comments will be transmitted back to SPS New England, Inc. which will transmit them to the Design QC Manager. A Comment Resolution Meeting with MassDOT may be scheduled as necessary to resolve all comments. Some comments may not be applicable to the Sketch Plans but may need to be addressed in the Final Design submittal.

4.1.3 Over-the-Shoulder Review (OTS) - Informal OTS's will be used as requested by MassDOT, SPS New England, Inc. or HNTB to provide detailed discussions of specific design concerns, code and manual interpretations, update of design status and review of draft plan sets for work in the final design stage of the project. The purposes of the OTS are to provide meaningful feedback on all deliverables prior to a formal plan submission and avoid surprises during the review cycle. Per RFP requirements, at least one OTS is required prior to the 75% review. The reviews are performed by the Design Team, SPS New England, Inc. or by any other entities having contractual jurisdiction over design packages. The OTS may on pre-determined dates communicated to the parties or as requested.

The design documents to be reviewed will typically be status sets of ongoing design work in roll format or sketches and will be unchecked by HNTB or its subconsultants. The purpose of these reviews is to extract informal comments about the status sets and is no way meant to solicit formal comments in hard copy format. The OTS will be documented using Form DQP 2.09-1 or an alternative documentation method approved by the Design QC Manager. A list of

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 3 of 5
Title: Design Quality Control Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

meeting attendees will be included in the meeting documentation. Advance sets of plans may be distributed at the discretion of the Discipline Manager.

4.1.4 75% Plan Reviews - 75% Design Reviews will be conducted upon completion of final design calculations and further development of design details. The submittal documents shall incorporate revisions from prior reviews, special provisions, checked calculations and quality forms. The submittal will be certified by the Responsible Engineer, Design QC Manager and the Design Manager with Form DQP 2.09-2 and will be formally submitted to MassDOT by SPS New England, Inc.

The Reviewers will record comments on Form DQP 2.09-1 Comment Deposition Form or Bluebeam comments log. Comments will be transmitted back to SPS New England, Inc. which will transmit them to the Design QC Manager. A Comment Resolution Meeting with MassDOT may be scheduled as necessary to resolve all comments. The Discipline Manager or designee shall incorporate the agreed-upon comments into the design documents. A formal review presentation by the Responsible Engineer may be conducted at the Comment Resolution Meeting at the request of MassDOT.

4.1.5 Final (100%) Design Submittal - Prior to each final submittal of the Approved for Construction package, the Design QC Manager will conduct a final completeness review to ensure that all quality control, project, and scope requirements are met. He will prepare the review set by:

- 4.1.4a Verifying that all comments received throughout the design review process have been properly addressed and incorporated into the drawings.
- 4.1.4b Printing all document originals, with signatures or initials in the appropriate boxes as drawn, designed, and checked.
- 4.1.4c Once the Design Final Package Review is completed, verifying all requirements are met, the Discipline Manager shall sign the Certificate of Conformance in Form DQP 2.09-3.
- 4.1.4d Distributing the entire deliverable package to the Design Document Control Manager.

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 4 of 5
Title: Design Quality Control Reviews		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

The formal AFC plan review will apply to formal submittal of final plans, following all informal reviews, checking, QC activities and QC review by the Design QC Team. The Reviews will complete the Form DQP 2.09-1 or equivalent and submit it to SPS New England, Inc. who will transmit it to the Design QC Manager through the document control system. A formal review presentation by the Responsible Engineer may be conducted at the Comment Resolution Meeting at the request of MassDOT.

4.1.6 Approved for Construction Submittal - Following MassDOT and FHWA written acceptance of a final design submittal, the DB Entity shall submit the Design Documents designated as "Approved for Construction" within 30 days. All plans, specification and reports shall be signed and sealed by the Professional Engineer registered in the Commonwealth of Massachusetts who is the Responsible Engineer. A written statement (certification form) shall accompany this submittal confirming compliance with all RFP and DB Contract requirements.

4.2 Reviews for Construction Engineering Design Submittals

4.2.1 General - The Design-Builder's construction engineering consultants (CE consultant) shall have a formal Design Quality Control Plan (DQCP) in place. Temporary works submittals shall be prepared in accordance with the design quality control procedures defined in their DQCP.

4.2.2 Certification by CE Consultant - For each CE Consultant design submittal to MassDOT, the CE consultant shall certify that their design has been prepared in accordance with the provisions of their DQCP. Form DQP 2.09-4 shall be used to provide this certification. This form will be signed by the CE consultant's QC Coordinator, Responsible Engineer and Design Manager. The CE Consultant shall provide a signed Form DQP 2.09-4 and a copy of the CE consultant's DQCP to the Design QC Manager for verification that the DQCP procedures have been followed.

4.2.3 DQCP Procedure Certification - Upon verification that the CE consultant has met the minimum requirements for quality control, the Design QC Manager will sign Form DQP 2.09-5, certifying DQCP compliance.

5.0 QUALITY CONTROL RECORDS

Quality control records to be retained include Forms DQP 1.05-1, 1.05-2, 2.09-1, 2.09-2, 2.09-3, 2.09-4, 2.09-5 and minutes from OTS Reviews.

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 5 of 5
Title: Design Quality Control Reviews		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.09
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

6.0 DOCUMENTS AND FORMS

Form DQP 1.05-1	Quality Control Coordinator Submittal Review Memorandum
Form DQP 1.05-2	Quality Control Coordinator Review Checklist
Form DQP 2.09-1	Comment Disposition Form (or MassDOT's equivalent form)
Form DQP 2.09-2	Certification of Conformance - Permanent Works
Form DQP 2.09-3	Certification of Conformance (AFC Submittal)
Form DQP 2.09-4	Certification of Conformance - Construction Engineering Design Submittals
Form DQP 2.09-5	Certification of QMP Conformance - Construction Engineering Design Submittals

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



Form DQP 2.09-1
Comment Disposition Form

[illegible]

Comment Type
X = Contract Requirement Not Met
Y = Customary Practice Not Met
Z = Preference

Status Code

A = Accept Comment B = Dismiss Comment
C = Clarify/Resolve Prior to Next Submittal
D = Comment Forwarded to Relevant Designer for Resolution

1 OF 2

DESIGN REVIEW COMMENT AND RESOLUTION FORM

MASSDOT PROJECT NO. 69060 (DESIGN - BUILD)

Haverhill Bridge Replacement Project- Haverhill, MA

Submittal Type: PLANS/CALCULATIONS/ESTIMATES/SPECIAL PROVISIONS/REPORT



Date: _____

Submittal #:

Rev #

Submittal Title:

RCR #

Reviewer							Designer			
NO.	Reviewing Agency & Section	Reviewer Initials	Page/ Sheet/ Item #	Reference	Review Comment	DB Initial Action	DB RESPONSE	Response Date	Response & Action by Initials	QC Review Initial



**FORM DQP 2.09-2
CERTIFICATION OF CONFORMANCE**

**Certification of Conformance
for
Design Submittal - Permanent Works**

QC Statement

Upon examination of the documents of this - submittal, we confirm the following:

- The Design Quality Control process was completed and meets the minimum requirements identified in the Quality Management Plan,
- The submittal documents complies with applicable design standards, legal requirements and environmental conditions to the extent known, and
- Adequate site investigations, right-of-way requirements, and constructability evaluations have been performed to verify concept conformance to project design standards.

Submittal Package: ENTER SUBMITTAL NAME HERE

Submittal Review

Design Conformance

Print Name

Print Name

Signature
Responsible Engineer

Date

Signature
Design Manager

Date

Design Quality Control

Print Name

Signature
Design QC Manager

Date

Form DQP 2.09-2

6/06/2018

FORM REV 0



**FORM DQP 2.09-3
CERTIFICATION OF CONFORMANCE**

Approved for Construction (AFC) Certification of Compliance

QC Statement

Upon examination of the documents of this Final Design submittal, we confirm the following:

- The Design Quality Control process was completed and meets the minimum requirements identified in the Quality Management Plan,
- Constructability, Discipline, Interdisciplinary and Environmental Compliance Reviews were conducted, documented, and comments incorporated or resolved,
- Design concepts and parameters represented in the 75% Design Submittals have been verified, and
- This submittal meets the requirements for project quality in accordance with the Technical Provisions and is thereby approved for construction.

Submittal Package: _____

Submittal Review

Design Conformance

Print Name

Print Name

Signature
Responsible Engineer

Date

Signature
Design Manager

Date

Design Quality Control

Print Name

Signature
Design QC Manager

Date



FORM DQP 2.09-4
CERTIFICATION OF CONFORMANCE

Certification of Conformance
for
Construction Engineering Design Submittal

QC Statement

Upon examination of the documents of this _____ submittal, we confirm the following:

- The Design Quality Control process was completed and meets the minimum requirements identified in our Design Quality Control Plan,
- The submittal documents comply with applicable design standards, legal requirements and environmental conditions to the extent known,
- All design models and applicable calculation inputs and outputs have been checked for correctness, accuracy, and model compatibility (including units and unit consistency), and
- Adequate site investigations, right-of-way requirements, and constructability evaluations have been performed to verify concept conformance to project design standards.

Submittal Package: _____

Submittal Review

Design Conformance

Print Name

Print Name

Signature
Responsible Engineer

Date

Signature
Construction Engineering Design
Manager

Date

Design Quality Control

Print Name

Construction Engineering Firm Name

Signature
Quality Control Coordinator

Date

Form DQP 2.09-4



**FORM DQP 2.09-5
CERTIFICATION OF CONFORMANCE**

**Certification of Conformance
for
Construction Engineering Design Submittal**

QC Statement

Upon examination of the quality documents provided for this _____ submittal, we confirm the following:

- The Quality Control documentation provided for this submittal indicates that the Design Quality Control process was completed and confirmed by the appropriate parties listed on Form DQP 2.09-4 in accordance with the minimum quality control procedures defined in Section 10.17 of the Quality Management Plan.

The QMP Procedure Conformance Review does not review the submittal documents for compliance with applicable design standards, legal requirements and environmental conditions, or any other purpose.

Submittal Package: _____

QMP Procedure Conformance Review

Print Name

Signature
Design QC Manager

Date

Form DQP 2.09-5

 	Prepared by: Myles Kuchas	Approved by:	Page: 1 of 2
Title: Interdisciplinary Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.10
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide guidelines for the internal coordination of documents among different disciplines and to ensure that each deliverable is reviewed by the Responsible Engineer and senior engineers for interdisciplinary reviews.

2.0 SCOPE

This procedure applies to all deliverable packages and is conducted prior to submittals to MassDOT as follows:

Interdisciplinary Reviews (IDR): Formal design reviews conducted prior to each submittal by associated technical disciplines to confirm coordination among disciplines and to minimize interferences.

3.0 RESPONSIBILITIES

The Design Manager must designate qualified reviewer(s) to perform the level of interdisciplinary review necessary to proceed with further development of design, drawings, or reports.

The Reviewer is an HNTB employee or subconsultant, having qualifications necessary to review the document. The Reviewer is to carry out an evaluation of the document in accordance with the defined scope of review, after which will document all comments and exceptions.

4.0 PROCEDURE

Interdisciplinary Reviews are planned, scheduled and conducted on all contract deliverables in accordance with the Design Process Flow Chart shown on Figure 4.3 in the QMP. These review procedures apply to all documents that involve more than one discipline, or which require technical scrutiny, as determined by the Design Manager. The Responsible Engineer is responsible for assembling and distributing the review packages and a list of reviewers to the DQCM. The DQCM will set up a Bluebeam session and invite the required reviewers.

The designated Reviewers are responsible for completing the review in accordance with this procedure to ensure:

- Compatibility between disciplines,
- Completeness and suitability of design,
- Adherence to requirements and sound engineering practice, and
- Interferences or potential problems with design or construction are identified.

 	Prepared by: Myles Kuchas	Approved by:	Page: 2 of 2
Title: Interdisciplinary Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.10
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

The designated Interdisciplinary Reviewer(s) *thoroughly reviews the document(s) with respect to his or her responsibilities. Each reviewer will have a separate document. Reviews will be performed concurrently, not sequentially. The Reviewer may record comments in the Bluebeam session created for the IDR.*

Alternatively, IDR's may be documented by OTS meeting minutes provided that similar comment resolution procedures are employed.

The Responsible Engineer then reviews the comments of the Interdisciplinary Reviewers and consults with the reviewers to resolve any differences where there are comments that are in disagreement. They review the document for compatibility with project functional and technical requirements, and for adherence to contractual requirements and professional standards.

The Responsible Engineer reviews the review comments in the Bluebeam session to ensure their compatibility with one another. The Responsible Engineer or his designee shall incorporate the agreed upon comments in the design documents. Changes will be marked and checked per DQP 2.02 and DQP 2.07. Final certification for the AFC submittal by the Discipline Manager (Responsible Engineer) will be made with Form DQP 2.09-3.

5.0 QUALITY CONTROL RECORDS

Form DQP 2.10-1, Form DQP 2.09-3 review documents and review summary from the Bluebeam session shall be retained as quantity control records.

6.0 DOCUMENTS AND FORMS

DQP 2.02 Checking of Drawings

DQP 2.07 Checking of Supplemental Specification

Form DQP 2.10-1 Interdisciplinary Memorandum

Form DQP 2.09-3 Certification of Conformance

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



FORM DQP 2.10-1

INTERDISCIPLINARY/SENIOR TECHNICAL REVIEW MEMORANDUM

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title: _____

Review Lead: _____ Date: _____

Review Team Member(s):

Review Team Findings:

Summarize findings here. Attach to Comment Resolution form.

Print Name

Signature (Reviewer) (Review Lead)

Date

Form DQP 2.10-1



FORM DQP 2.10-2

INDEPENDENT REVIEW MEMORANDUM

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title: _____

Review Lead: _____ Date: _____

Review Team Member(s):

Review Team Findings:

Summarize findings here. Attach to Comment Resolution form.

Print Name

Signature (Checker) (Review Lead)

Date

Form DQP 2.10-1

 NewEngland, Inc.				Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Environmental Compliance Design Reviews		Effective date: 5/31/18		Revision number: 0		Procedure number: DQP-2.11
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River						

1.0 PURPOSE

To provide guidelines for checking environmental compliance of design drawings and documents, and to verify adherence to the requirements of all environmental commitments on the project.

2.0 SCOPE

This procedure applies to all design deliverables.

3.0 RESPONSIBILITIES

The Design Manager or designee is responsible for overall implementation of this procedure including setting the schedule for the Environmental Compliance Design Reviews occurring throughout the project based on the deliverable schedule. In the event the schedule changes, the Design Manager will modify the Design Review schedule and notify HNTB and its subconsultants.

The Environmental Compliance Manager or designee is responsible for the review of the design packages for environmental compliance, comment resolution and verification that comments are incorporated or addressed in the subsequent packages.

The Responsible Engineer is responsible to submitting the review documents to the Environmental Compliance Manager in a timely manner.

4.0 PROCEDURE

Prior to each Design Review, the Environmental Compliance Manager (or designee) will perform an independent Environmental Compliance Review (ECR) of all Design Review documents for compliance with the following:

- Project Environmental Documentation, and
- Local Mitigation Commitments

ECR's will generally be conducted in accordance with the schedule shown in the Design Flowchart (Figure 4.3). However, interim reviews may be conducted at the discretion of the Environmental Coordinator.

The Responsible Engineer shall provide the review documents to the Environmental Compliance Manager. The Environmental Compliance Manager shall review the documents, using the Environmental Compliance Review Memorandum (Form DQP 2.11-1) to certify that the Design Review documents are ready. Review

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Environmental Compliance Design Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.11
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

comments shall be tracked using the IDR Bluebeam Session. As necessary, the Environmental Compliance Manager may attach additional comments to the form. If the review documents are not in compliance, requiring correction, subsequent ECR's will be required until compliance is achieved. Generally, the ECR's will be conducted concurrently with Disciplinary, Interdisciplinary, and Constructability Reviews, or as determined necessary by the Environmental Compliance Manager.

5.0 QUALITY CONTROL RECORDS

Forms DQP 2.11-1, checklists and review comments shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Form DQP 2.11-1 Environmental Compliance Review Memorandum
Environmental Compliance and Mitigation Plan

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



FORM DQP 2.11-1
ENVIRONMENTAL COMPLIANCE REVIEW MEMORANDUM

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 overerrimack River

Project Number: 69060

Document Title: _____

Review Lead: _____ Date: _____

Review Team Member(s):

Review Findings:

Summarize findings here. Attach compliance checklists and comment resolution form.

Print Name Signature (Environmental Compliance Manager) Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Constructability Reviews (CR)	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.12
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish the procedure and responsibilities for the constructability review of documents to coordinate and review construction issues and their impact on the design prior to construction.

2.0 SCOPE

This procedure applies to all deliverable packages and is conducted at least twice prior to submittal of the final design.

3.0 RESPONSIBILITIES

The Responsible Engineer is responsible for initiating this review with SPS New England, Inc. personnel, and for collecting and consolidating comments and for resolving comments. It is SPS New England's responsibility to identify potential interferences in the reviews and provide consistent and timely reviews of the packages.

4.0 PROCEDURE

The Constructability Review (CR) procedure applies to all drawings and specifications originated by the Design Team. CR's will be conducted on all deliverable packages and on other agreed upon submittal packages during the design phase of the project as shown in the Design Flowchart (Figure 4.3) in the QMP. The Responsible Engineer is responsible for overall implementation of this review procedure and assigning the Originator responsible for coordinating the review.

The Constructability Reviewers assigned to perform a CR are responsible for completing the review of the design package in accordance with this procedure through written comments on Form DQP 2.09-1 or review plan sets addressing the following:

- Information shown is adequate for the intended use,
- Construction sequence and maintenance of traffic (MOT) are achievable,
- Adequate site access exists and any restrictions have been addressed,
- Constructability Reviewers shall also identify and assess potential interferences and conflicts between construction disciplines, and
- Contract Safety and Security Requirements.

In accordance with the established review schedule, the Constructability Reviewer returns the completed Comment Disposition Forms or Bluebeam summary log to the Design Manager or appointee. The

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Constructability Reviews (CR)		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.12
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

Responsible Engineer is responsible for collecting and consolidating review comments, and resolving comments.

After collecting and consolidating review comments, the Responsible Engineer reviews each comment, and after conferring with the original designer(s) and others, as appropriate, enters a response to the comment and assigns the appropriate "code" as defined on the form in the column immediately to the left of the response. When all comments have been addressed in accordance with the established review schedule, the entire comment set is reproduced and provided to all Constructability Reviewers.

A Comment Resolution Meeting may be held to respond to the review comments to resolve all comments. The Responsible Engineer or designee shall incorporate the agreed-upon comments into the design documents.

5.0 QUALITY CONTROL RECORDS

Comment disposition forms (Form DQP 2.09-1), will be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Form DQP 2.09-1 Comment Disposition Form

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Myles Kuchas	Approved by: -	Page: 1 of 4
Title: Color Codes	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-2.13
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

The purpose of this procedure is to define the roles and colors to be utilized for electronic or hard copy quality check or review of project deliverables.

2.0 SCOPE

This procedure shall apply to all quality check or review activities performed on electronic or hardcopy CheckPrints of project deliverables, inclusive of plans, calculations, reports, specifications, etc.

2.0 ROLES AND RESPONSIBILITIES

- 3.1 Originator** – The Originator shall be responsible to prepare and submit the deliverable for checking.
- 3.2 Checker** - The Checker shall be responsible to check the deliverable and shall note correct items and items in error on the CheckPrint using the colors assigned below.
- 3.3 BackChecker** – The BackChecker (typically the Originator) shall be responsible to review the comments made the by Checker and document agreement or disagreement with Checker comments on the CheckPrint using the color assigned below.
- 3.4 Updater** – The Updater (may be the Originator) shall be responsible for making changes or corrections to the deliverable and for noting such corrections on the CheckPrint using the color assigned below.
- 3.5 Verifier** - The Verifier (usually the Checker, but cannot be the Updater) shall verify that all agreed upon corrections have been made, and for noting such verification on the CheckPrint using the color assigned below.

4.0 PROCEDURE

- 4.1** When project deliverables are submitted for quality check or review and these reviews are performed utilizing an electronic or hardcopy CheckPrint, the colors and markings shown in the below table shall apply to each of the identified roles in the quality check or review process: In addition when signing the hardcopy CheckPrint Stamp, each individual shall sign in the color assigned for their role. Note: When Check, BackCheck, Update and Verify are performed on a MS Word deliverable using Track Changes, adherence to this particular color scheme is not required as MS Word Track Changes assigns a distinct color to each editor.



New England, Inc.



Prepared by:

Myles Kuchas

Approved by:

-

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Procedure number:

DQP-2.13

Applicability:

Haverhill Bridge Replacement – I 495 over Merrimack River

Color	Instructions	Checker	BackChecker	Updater	Verifier
Yellow	Highlight items that are correct Note: It is not mandatory for the Checker to highlight all correct items in Yellow, especially in the case of electronic review. But in the case where a sheet would otherwise have no markings, a Yellow diagonal slash across the sheet or a notation of no comments must be made to provide evidence of review.	♦			♦
Red	Line out incorrect items and show corrections/additions	♦			
Black	Written comments with initials, clouded	♦			
Green	Place a Check Mark next to Red items if in agreement Strikethrough Red items and write "STET" (meaning to disregard the change) if in disagreement		♦		
Blue	Circle Red and Green marks as items are updated or corrected			♦	

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An example of the use of these marking is shown below:

Originate: (Originator)	Printed or copied reports, calculations, drawings, or other similar original. Not printed in Red, Yellow, Blue or Green.
Check: (Checker)	Yellow is used for correct items. Red for corrections, additions or deletions.  Corections  Additions or ~~Deletions~~ changes
Backcheck: (Originator)	Green check mark for agreement.  Corections Green STET and cross out when it is agreed that no change should be made.  Additions or ~~Deletions~~ STET changes
Update: (Originator or Updater)	Blue circle when updated.  Corections
Verify: (Checker)	Yellow over red, green and blue to indicate that the item was updated correctly.  Corections  Additions or ~~Deletions~~ STET changes

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5.0 QUALITY CONTROL RECORDS

5.1 CheckPrints (electronic or hardcopy)

 	Prepared by: Myles Kuchas	Approved by: -	Page: 1 of 3
Title: Visual Check	Effective date: 9/20/2018	Revision number: 0	Procedure number: DQP-2.14
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSES

The purpose of this procedure is to define the roles, responsibilities and process for conducting a final visual check of the actual deliverable being submitted to a client. The purpose of the Visual Check is to ensure that the project deliverable is complete, in the proper order, has been scanned, printed or converted (e.g. to .pdf) as intended, and is representative of the project deliverable that have been checked/reviewed, updated and verified in accordance with the Quality Management Plan (QMP).

2.0 SCOPE

This procedure shall apply to all project deliverables prior to the submittal to the client. All other quality checks and reviews assigned for the deliverable in accordance with the Deliverable Quality Matrix, with the exception of Design Quality Control Procedure Review, shall have been completed, comments resolved and verified prior to Visual Check.

3.0 RESPONSIBILITIES

3.1 Design Manager (DM) – The DM, or designee, shall be responsible for:

- 3.1.1 Verifying that all required quality checks and reviews have been completed, and comments resolved and verified.
- 3.1.2 Notifying CADD Manager, or other party responsible for final production of the deliverable, to scan, compile and print, or convert the project deliverable for Visual Check.

3.2 Task Lead – The Task Lead shall be responsible for:

- 3.2.1 Verifying that deliverables are complete, in the proper order, have been scanned, printed, plotted, or converted as intended, and are consistent with the electronic files that have been checked/reviewed, updated and verified in accordance with the QMP.
- 3.2.2 Recording the results of the Visual Check and providing to the CADD Manager or other responsible party for resolution.
- 3.2.3 Verifying that print/plot or conversion adjustments have been made.
- 3.2.4 Maintaining records of Visual Check.

3.3 CADD Manager or other party Responsible for production – The CADD Manager, or other party responsible for production of the deliverable, shall be responsible for:

- 3.3.1 Compiling the deliverable package.
- 3.3.2 Converting the deliverable package to the client required format
- 3.3.3 Scanning, printing or plotting a copy of the deliverable in the client required format.

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3.3.4 Making adjustments to printer/plotter, or electronic files to address issues identified during Visual Check.

4.0 PROCEDURE

- 4.1 The DM, or designee, shall verify that all required quality checks and reviews, in accordance with the Deliverable Quality Matrix have been completed, with the exception of Design Quality Control Process Review.
- 4.2 The DM shall notify the CADD Manager, or other party responsible for deliverable production, to compile the deliverable package and to scan, print/plot or convert it in accordance with client requirements in preparation for Visual Check. Visual Check shall commence by the Start Date in the Deliverable Quality Matrix.
- 4.3 The CADD Manager, or other party responsible for deliverable production, shall compile the deliverable and shall print/plot or convert the deliverable package in accordance with client requirements.
- 4.4 The Task Lead shall review the scanned, printed/plotted or converted deliverable to verify that the deliverable is complete, in the proper order, and has been scanned, printed/plotted or converted as intended. This review also includes verification that the scanned, printed/plotted deliverable is consistent with the electronic files which have been checked/reviewed, updated and verified in accordance with the QMP.
- 4.5 The Task Lead shall record the results of the Visual Check on Form DQP 2.14 and shall enter "No Comment" if no comments to provide evidence of review. Alternatively, the Task Lead may record results of the Visual Check on a hardcopy CheckPrint in accordance with Procedure DQP 2.13, Color Codes. If the Task Lead has no comments they may place a Yellow slash across the deliverable sheet to provide evidence of review.
- 4.6 If there are any issues noted, the CADD Manager, or other party responsible for deliverable production, shall make adjustments to the printer/plotter or converted electronic file and shall provide updated printed/plotted or electronic copies to the Task Lead for verification.
- 4.7 The Task Lead shall review the updated deliverable and shall record verification on Form DQP 2.14, or on the hardcopy CheckPrint in accordance with Procedure DQP 2.13, Color Codes. Visual Check shall be completed by the End Date in the Deliverable Quality Matrix, including the verification of any comments.
- 4.8 The task lead shall ensure that all Visual Check records are maintained as quality records in accordance with QMP.

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5.0 DOCUMENTS AND FORMS

Forms DQP 2.14

6.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



**FORM DQP 2.14-1
VISUAL CHECK SIGN-OFF SHEET**

Client Name: Massachusetts Department of Transportation
Job Title: Haverhill Bridge Replacement – I 495 over Merrimack River
Job Number: 69060
Document Title: _____

	Pages Checks	Print Name	Signature	Date
Checker 1	_____	_____	_____	_____
Checker 2	_____	_____	_____	_____

Note: A second Checker is not required for the Visual Check, but additional Checkers may be used.

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Title: Senior Technical Review	Effective date: 9/20/2018	Revision number: 0	Procedure number: DQP-2.15
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

The purpose of this procedure is to define the roles, responsibilities and process for conducting Senior Technical Review of project deliverables. The purpose of Senior Technical Review is to ensure that the design fulfills the intended use, meets the basis of design and/or approved design criteria, and that the design has been developed in accordance with applicable standards of HNTB professional practice. Senior Technical Reviews are conducted by subject matter experts in order to review high risk and complex project elements.

2.0 SCOPE

This procedure shall apply to the Senior Technical Review of project deliverables when required via the Client Deliverable Quality Matrix. Senior Technical Review shall apply to all submittals on the project. Submittals requiring a resubmittal don't have to have a second Senior Technical review. Senior Technical Reviews typically involve an independent review of project concepts, basis of design/design criteria, and design methodology. Senior Technical Reviews may also be applied to subconsultant deliverables when determined through the Quality Planning process and documented in the Client Deliverable Quality Matrix. Discipline QC Check shall be completed prior to engaging in Senior Technical Review.

3.0 RESPONSIBILITIES

3.1 Project Manager (PM) – The PM shall be responsible for:

- 3.1.1 Identifying, in concert with the DQCM and Task Leads, and potentially Divisional/National Practice/Market Sector Leads (PSL/MSL), those project elements that shall receive a Senior Technical Review and documenting those required reviews within the Client Deliverable Quality Matrix.
- 3.1.2 Determining, in concert with the DQCM, the format for performing Senior Technical Reviews, i.e. using Bluebeam, using hardcopy CheckPrints, or using a comment resolution form.

3.2 Task Lead – The Task Lead shall be responsible for:

- 3.2.1 Assisting the PM in making the determination as to the need for Senior Technical Review and in identifying qualified resources, consulting Divisional/National PSL/MSL when necessary.
- 3.2.2 Verifying that Discipline QC Check has been completed prior to engaging in Senior Technical Review.
- 3.2.3 Providing the design criteria and any approved design changes to the Senior Technical Reviewer.
- 3.2.4 Providing design deliverables to the Senior Technical Reviewer for review.

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- 3.2.5 Responding to and resolving comments made by Senior Technical Reviewers.
- 3.2.6 Resubmitting revised drawings or other design documents to the Senior Technical Reviewer for verification.
- 3.2.7 Maintaining records of Senior Technical Review.

3.3 Design Quality Control Manager (DQCM) – The DQCM shall be responsible for:

- 3.3.1 Assisting the PM in making the determination as to the need for Senior Technical Review.
- 3.3.2 Ensuring Senior Technical Reviewers are familiar with the format chosen and working with the Bluebeam Subject Matter Expert to provide training if Bluebeam is chosen.

4.0 PROCEDURES

- 4.1 The PM shall, in collaboration with the Task Leads and the DQCM, identify those critical design elements that require Senior Technical Review. Those required reviews shall be recorded within HNTB QMP Form QF 02, Client Deliverable Quality Matrix. Decisions to apply Senior Technical Reviews shall be dependent upon the nature of the project and design element, but are typically applied to bridge projects, projects with a design fee exceeding \$1M, and other projects judged to be complex or critical. Dependent upon project scope, previous successful experience of the local office on similar projects, client sensitivity, and project risk, the PM, DQCM, and Task Leads shall consult Divisional/National Practice and Market Sector Leads in the determination of Senior Technical Review (including the identification of appropriately qualified resources to perform those reviews).
- 4.2 The PM shall, in collaboration with the Task Leads, identify qualified resources to perform Senior Technical Reviews.
 - 4.2.1 Resources for Senior Technical Reviews and scheduled time shall have been accounted for within the Work Plan.
- 4.3 When required by the Client Deliverable Quality Matrix, the Task Lead shall verify that Discipline QC Check has been completed and then provide the Senior Technical Reviewer with the design deliverable to be checked (by the Start Date documented in the Client Deliverable Quality Matrix), inclusive of basis of design/design criteria and any approved design changes.
- 4.4 The Senior Technical Reviewer shall review the design deliverable with a focus on project concepts, basis of design/design criteria, design methodology, fitness of the design for its intended use, and verifying the design has been developed in accordance with applicable standards of professional practice.
- 4.5 The Senior Technical Reviewer shall document comments or errors identified with the design

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deliverable either via Bluebeam, via hardcopy CheckPrints, in accordance with Procedure DQP 2.13, Quality Check/Review Color Codes, using MS Word Track Changes (accompanied by Form DQP 2.10-1), or within Form DQP -2.09-1, Comment Disposition Form, and provide them to the Task Lead or Designer. If the Senior Technical Reviewer has no comments to make, he or she shall record "No Comments" within the Bluebeam file, or Form DQP 2.09-1 Comment Disposition Form, noted within MS Word Track Changes, or may make a diagonal yellow slash across the hardcopy CheckPrint, to provide evidence of the review. Note: If using Bluebeam for Senior Technical Review, the CheckPrint Stamp may be electronically incorporated to provide visible tracking of the review process at the discretion of the PM, DQCM, or Task Lead.

- 4.6 The Task Lead or Designer shall respond to all Senior Technical Review comments via Bluebeam, hardcopy CheckPrint in accordance with Procedure DQP 2.13, Quality Check/Review Color Codes, MS Word Track Changes, or Form DQP 2.09-1 Comment Disposition Form, and shall document agreement or disagreement (including rationale) with the comment and the planned resolution.
 - 4.6.1 If the Task Lead or Designer disagrees with the Senior Technical Reviewer, they shall discuss and come to a common resolution, obtaining the documented concurrence of the Senior Technical Reviewer. Remaining disputes shall be escalated to the PM and/or PSL/MSL.
- 4.7 The Task Lead or Designer shall ensure that agreed-upon revisions are made to the design deliverable and shall document via Bluebeam, hardcopy CheckPrint in accordance with Procedure DQP 2.13, Quality Check/Review Color Codes, MS Word Track Changes, Blue Beam summary PDF, or Form DQP 2.09-1 Comment Disposition Form, and provide the revised design deliverable to the Senior Technical Reviewer for verification.
- 4.8 The Senior Technical Reviewer, or other qualified independent reviewer designated by the Senior Technical Reviewer if the original reviewer is unavailable, shall verify that all agreed-upon revisions have been made to the design and shall document verification via Bluebeam, hardcopy CheckPrint in accordance with Procedure DQP 2.13, Quality Check/Review Color Codes, MS Word Track Changes, or Form DQP 2.09-1 Comment Resolution Form, including documenting concurrence with Disagree status.
 - 4.8.1 Senior Technical Review should be completed by the End Date documented in the Client Deliverable Quality Matrix, including the verification of all revisions.
- 4.9 The Senior Technical Reviewer shall prepare form Interdisciplinary/Senior Technical Review Memorandum DQP 2.10-1.
- 4.10 The Task Lead shall ensure that all Senior Technical Review records and form DQP 2.10-1 are maintained as quality records.

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5.0 Check Stamp

The following stamp shall be placed on each drawing prior to initiating the checking process. The progress of the checking process shall be recorded promptly by each participant and dated.

DOCUMENT CHECK			
TYPE OF REVIEW: _____			
	PRINT NAME	INITIAL	DATE
ORIGINATOR	_____	_____	_____
CHECKER	_____	_____	_____
BACKCHECKER	_____	_____	_____
UPDATER	_____	_____	_____
VERIFIER	_____	_____	_____
 July 2016		APPLIES TO _____ THROUGH _____	

Sample Stamp

6.0 QUALITY CONTROL RECORDS

Form DQP 2.10-1 and all check prints shall be retained as quality control records.

7.0 DOCUMENTS AND FORMS

Form DQP 2.10-1 Interdisciplinary / Senior Technical Review Memorandum
Procedure DQP 2.13 Color Codes

8.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 4
Title: Field Design Services	Effective date: 6/13/2018	Revision number: 0	Procedure number: DQP-3.01
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To establish the scope, responsibilities, procedures, and forms for processing field design services, including Field Design Changes (FDC), Non-Conformance Evaluations (NCE), and Requests for Information (RFI) by SPS New England, Inc. for the post-design phase of the Project.

2.0 SCOPE

Construction contracts, especially design-build contracts, often require field design changes to the original design of the project. Changes in site conditions, improvements to the original design, corrections to the original design, and preferred construction method/material proposals from the contractor are often viable reasons why the original design could require modification.

2.1 Field Design Changes

Field Design Changes (FDC) are requested by SPS New England, Inc. and issued by the Designer to document changes in design that occur during construction. Documentation is necessary to inform MassDOT, construction personnel, and the Design QC Team of field changes and to track field changes for the final record drawings. The Design Manager shall approve all Field Design changes.

2.2 Non-Conforming Work Evaluation

A Non-Conformance Report (NCR) by the Construction QC forces documents constructed work that does not meet the requirements set forth in the design-build contract. A Non-Conformance Evaluation (NCE) is a contractor-initiated request to prescribe an appropriate corrective action, or to evaluate the feasibility of a “no action” solution.

2.3 Requests for Information

The Request for Information (“RFI”) form used by SPS New England, Inc. will be generated through the SharePoint system. It will be used to document interpretations and clarifications of the plans and specifications, including input necessary to resolve discrepancies in, or conflicts among, plan dimensions, elevations and survey data.

3.0 RESPONSIBILITIES

The following briefly outlines the responsibilities of key personnel involved in field design services: SPS New England, Inc. personnel initiate field design services. At the construction level, the initiator may be an Area Construction Manager, or Project Engineer, or other authorized field operations representative.

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The initiator of the field design service is also responsible for verifying the performance of a constructability review (as applicable) during the process, accepting the completed field design form, and authorizing issued for construction (as applicable) by Construction QC.

Construction QC Manager determines, in conjunction with MassDOT and the Design Manager, whether a solution in a Non-Conformance Report may be approved for construction. If it is determined that a Change Order is also required; the Construction QC Manager will not sign the Non-Conformance Report form until the Change Order has been attached.

The Design Manager oversees a log of all field design services performed by design personnel, coordinates responses, and confirms that copies of incoming field design forms and completed field design forms are forwarded to SPS New England, Inc. document control.

4.0 PROCEDURE

Field design services communication is encouraged between SPS New England, Inc., HNTB, and MassDOT. It is imperative that continuing communication be maintained between field design staff and NHDOT so that MassDOT has the opportunity to react as appropriate. MassDOT personnel are expected to communicate their concerns with any field design issue in a timely manner after receipt of the field design change form so that their concerns can be addressed promptly.

Engineers responsible for performing field design services must be licensed professional engineers of appropriate experience, and design change plans, specifications, calculations, and reports shall be appropriately stamped, signed, and dated by the Engineer.

Field Design Changes - All FDCs will be documented on a contractor-provided FDC form, and assigned a unique number. All FDC's will be tracked using Form DQP 3.01-1 or equivalent logs. The FDC will then be forwarded to the HNTB Document Control Manager for further processing and final disposition. Changes to Design Documents undergo the same rigorous QC check as the original design including MassDOT and SPS New England, Inc. review, if required, and this documentation reviewed by the Design QC Manager. The Design QC Manager determines if the change requires the completion of a design review and constructability review prior to final release of the revised documents.

Non-Conformance Evaluation - The Contractor may request a Non-Conformance Evaluation (NCE) by the designer. The designer's evaluation has two key aspects: technical and contractual. The technical evaluation considers the reasonableness and acceptability of the proposed solution, consistent with good engineering practice. The contractual evaluation considers whether or not the proposed solution meets the requirements of the contract.

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If the non-conforming item meets functional requirements, the Design Manager may recommend acceptance of the non-conformance to MassDOT. MassDOT must approve the proposed resolution, and re-inspection and acceptance by a Quality Control Inspector closes the non-conformance issue. If acceptance is based on a price reduction, or any other condition, it will be noted in the NCE. See the QMP for additional information. Non-conformances are tracked on the NCR Log maintained by SPS New England, Inc.

Request for Information - The use of SPS New England, Inc. Request for Information form shall be limited to requesting interpretation or clarification of the plans or specifications and/or obtaining design acceptance of construction staging activities. An SPS New England, Inc. representative initiates the RFI form and submits to the HNTB Document Control Manager. The form is then directed to the HNTB Design Manager for response and distribution.

Design RFI's from MassDOT or other external agencies will be sent to SPS New England's document control manager who will submit the document to HNTB for response. The Design Document Control Manager shall maintain a log of the external design RFI's and the RFI documents as described herein.

The RFI form may also be used to obtain designer acceptance of removing surcharge, constructing next-stage fills, or other similar construction staging activities. Upon receipt and acceptance by SPS New England, Inc., the completed RFI form will be approved for construction through Construction QC. RFI's shall be approved by the Responsible Engineer. The Design Document Control Manager shall maintain a log of RFI's submitted by SPS New England, Inc. using Form DQP 3.01-2.

If the RFI response suggests a required change in the contract documents, the Design Manager will assign a unique Field Design Change (FDC) number and identify the scope and intent of the change. Responsible Engineers shall be the approving authority for RFI's.

5.0 QUALITY CONTROL RECORDS

FDC and RFI log forms (Form DQP 3.01-1 and 3.01-2), FDC documents and RFI documents shall be retained as quality control records. NCE documents will be also retained as quality control records.

6.0 DOCUMENTS AND FORMS

Form DQP 3.01-1
Form DQP 3.01-2

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7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

Form DQP 3.01-1
Field Design Change Log
(initiated by SPS New England, Inc.)

[illegible]

FORM DQP 3.01-2
REQUEST FOR INFORMATION LOG

[illegible]

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 5
Title: Shop Drawing Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-3.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide guidelines to HNTB personnel for processing and conducting Shop Drawing Reviews.

2.0 SCOPE

This procedure applies to all Shop Drawing Reviews received from SPS New England, Inc.

3.0 RESPONSIBILITIES

The Design Manager must define the scope of the review based on the nature of the document under consideration, and designate experienced reviewers with necessary relevant qualifications and experience in the review discipline.

The Design Document Control Manager (DDCM), or designee, is responsible for receiving all Construction Submittals from SPS New England, Inc. and logging into the HNTB Shop Drawing Submission Log, Form DQP 3.02-1. The Design Manager, or designee, is responsible for assigning it to the appropriate review area (discipline and/or design section), receiving the completed Construction Submittal back from the reviewer, checking that the Construction Submittal Form has been properly completed, and returning the completed Construction Submittal and related submittal documents as appropriate to SPS New England, Inc. through HNTB document control.

The assigned Construction Submittal Reviewer (CSR) is responsible for reviewing submittals as assigned by his/her supervisor. The CSR is to review the submittal for compliance with all applicable Contract requirements and note any discrepancies.

4.0 PROCEDURE

4.1 Receipt of Construction Submittal

The DDCM receives construction submittals from SPS New England, Inc. Each submittal consists of a Transmittal Form with the document with a unique shop drawing number. The Design Manager, or designee, will log in the Shop Drawing Submission Log, Form DQP 3.02-1.

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Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

4.2 Preliminary Review of Construction Submittals

The Design Manager will conduct a preliminary review of each Construction Submittal to ascertain the following:

- Verify submittal bears SPS New England, Inc. review stamp indicating submittal is appropriate for review.
- Verify submittal is an appropriate item for HNTB review.
- When submittal is developed from design conducted by the originator of the Construction Submittal and independent of the Design Documents, the submittal bears PE seal of the Construction Submittal Originator.
- Return submittals that are incomplete or that will generate obvious corrections by reviewer.
- Determine if submittal needs to be assigned to a reviewer and whom that reviewer is to be.
- Review submittal for compliance with specifications and plans when time and expertise permits an expedient review.
- If the review time frame set by SPS New England, Inc. cannot be met, he will so advise SPS New England along with the reason it cannot be met, and negotiate an achievable target date for completion.
- The Design Manager sends the review document to the Construction Submittal (CS) Review with clear direction as to the return date of the appropriate review documentation. Typically reviews are limited to 14 calendar days from receipt to HNTB Document Control.

4.3 Conduct Construction Submittal Review

The CS Reviewer:

- Uses one copy as the record copy for review.
- Evaluates the submittal for general conformance with the requirements of the Project and with the Design Documents.
- All shop drawing reviews will be compared to the latest design and specification documents. The latest submission date to SPS New England, Inc. of the design, and specifications, will be clearly written on the shop drawings.
- Marks review copy in yellow indicating what is found to be in conformance, and in red to indicate errors, omissions, or inconsistencies. The Reviewer compiles and transfers all comments to Form DQP 2.09-1 Comment Disposition Form and completes Form DQP 3.02-2 Review Memorandum.
- Reviewer uses one copy as the record copy for review and then transcribes comments to the remaining sets. The Shop Drawing Review stamp, Figure DQP 3.02-1, is applied to

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Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

the first sheet of each original report and all original sheets of shop drawings. The Shop Drawing Review stamp is not applied to submittals that are for comment only. The CS Reviewer identifies the review copy to be retained for record and returns all shop drawing review sets.



REVIEW

- ☐ APPROVED
- ☐ APPROVED AS NOTED
- ☐ AMEND AND RESUBMIT
- ☐ REJECTED - SEE REMARKS
- ☐ RESUBMIT UPON COORDINATION WITH RFC DOCUMENTS IF CHANGES HAVE OCCURRED AFTER THE DATE ON THIS REVIEW

Approval is only for general conformance with design concept and intent of Contract Documents. Contractor is solely responsible for verifying dimensions, for establishing fabrication processes, means, techniques, sequences and procedures of construction and for coordination of work of all trades.

BY:

DATE:

Figure 3.02-1 Shop Drawing Review Stamp

 	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 4 of 5
Title: Shop Drawing Reviews	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-3.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

4.4 Return of Construction Submittals

The Design Manager, or designee, reviews the submittal for satisfactory completion. The review copy is retained and a copy of the Form DQP 2.09-1 Comment Disposition Form for record. A transmittal is included with the remaining sets to be returned to SPS New England, Inc. for their release and distribution.

4.5 Conflicts with Design Documents

Construction Submittals reviewed and returned to SPS New England, Inc. for use on the project should not normally be in conflict with the Design Documents. Should such conflicts exist, it may be a result of the following:

- Conflicts may be an indication that the Shop Drawing's information is correct and the Reviewer has approved the document for use on the project. If such deviations are major, the designer will issue a Notice of Design Change and reissue the design drawings to address the conflicts. If the deviations are minor, then simply a note on the Shop Drawing Submittal document that the conflict shown is approved by the Reviewer will suffice.
- Conflicts may also be an indication that the reviewer has inadvertently overlooked the conflicting information. It is important in this situation to have the conflict resolved. Therefore, if a conflict of this nature is detected, resolution should be requested through a Field Design Change.

4.6 Early Start Shop Drawing Review

Review of construction submittals for early start construction work components follows the general procedures described above in Sections 4.3 through 4.4 with the following additional requirements:

- Figure 3.02-1 will be used to denote that the review pertains to Early Start construction documents.
- Fabricated items that do not comply with the approved re-checked shop drawings may be treated in accordance with the procedures for Non-Compliance Reporting (NCR).

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 5 of 5
Title: Shop Drawing Reviews		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-3.02
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

5.0 QUALITY CONTROL RECORDS

Forms DQP 2.09-1, 3.02-1 and 3.02-2 and copies of reviewed shop drawings shall be retained as quality control records.

6.0 DOCUMENTS AND FORMS

Form DQP 3.02-1 Shop Drawing Submission Log
Form DQP 3.02-2 Shop Drawing Review Memorandum

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date

[illegible]

SHOP DRAWING REVIEW MEMORANDUM

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title:

Review Findings:	Summarize findings here. Attached shop drawing check print.
------------------	---

Print Name

Signature (Checker)

Date _____

Print Name

Signature (Backchecker)

Date _____

 HNTB	Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 1 of 2
Title: Preparation of Record Drawings	Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-3.03
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River			

1.0 PURPOSE

To provide a uniform, orderly, efficient method for preparing record documents using recorded or surveyed data, certified by SPS New England, Inc. Construction Department, in accordance with the Contract Documents. Record documents for each Design Unit will be submitted to MassDOT at final completion of the Project.

2.0 SCOPE

This procedure establishes the process for preparing record documents based on field documentation provided by the SPS New England, Inc. construction team. This procedure also establishes the Quality Control process implemented by the Design QC Manager.

DEFINITION: Record Drawings – A document prepared for the purpose of reflecting all recorded and documented design changes/modifications of the fabricated, constructed, or installed work. The format of the record document may consist of any of the following: drawing, specification, special provisions and shop drawings.

3.0 RESPONSIBILITIES

The SPS New England, Inc. Field Project Engineer is responsible for managing and compiling all field documentation necessary to prepare record documents. Record information will be compiled on a continual basis, so that it reflects the actual construction as it progresses. The SPS New England, Inc. Field Project Engineer is responsible for the preparation of the record documents under the direction of the Construction QC Manager.

4.0 PROCEDURE

SPS New England, Inc. Field Project Engineer will compile reports documenting field data which deviates from the AFC Documents. Such documentation is prepared by the SPS New England, Inc. Construction staff, and may be in the form of Field Design Change Notices or Non-Conformance Reports, and can be generated from, among other sources, field survey, inspector's reports, and shop drawings. All field data will be certified by the Construction QC Manager, or his designee.

 		Prepared by: Ken Cadman	Approved by: Bill Clawson	Page: 2 of 2
Title: Preparation of Record Drawings		Effective date: 5/31/18	Revision number: 0	Procedure number: DQP-3.03
Applicability: Haverhill Bridge Replacement – I 495 over Merrimack River				

As field revision documentation becomes available, SPS New England, Inc. Field Project Engineer will promptly record the data on the construction documents. As the conclusion of the project, the Field Project Engineer will generate electronic files of the documents.

The Construction QC Manager, or his designee, will conduct a review of the drawings.

The Construction QC Manager will certify that the record documents reflect the recorded and documented design changes/modifications of the fabricated, constructed, or installed works.

The Construction QC Manager will schedule a Design Review with MassDOT. Upon resolution of all review comments, actionable review comments will be transmitted by the Construction QC Manager to the Document Control Manager for final disposition on the Form DQP 2.09-1 Comment Disposition Form or Blue Beam Comment Summary log in PDF format.

5.0 QUALITY CONTROL RECORDS

Forms DQP 2.09-1 and 3.03-1 and final record documents

6.0 DOCUMENTS AND FORMS

Construction Quality Control Plan
Form DQP 2.09-1 Comment Disposition Form
Form DQP 3.03-1 Drawing Review Memorandum

7.0 REVISION HISTORY

Rev. Number	Revision Description	Effective Date



FORM DQP 3.03-1
RECORD DRAWING REVIEW MEMORANDUM

Client Name : Massachusetts Department of Transportation

Job Title: Haverhill Bridge Replacement - I 495 over Merrimack River

Project Number: 69060

Document Title: _____

Review Findings:

Summarize findings here. Attached as-built drawing check prints.

Print Name Signature (Checker) Date

Print Name Signature (Backchecker) Date



New England, Inc.



Appendix III

Quality Control Inspection Report Forms

1. Construction Quality Procedure (CQP) Forms

Form No.	Form Title	Revision No.	Effective Date
CQP 1.03 Form 1	Construction QC Daily Report	0	6/15/18
CQP 1.04 Form 1	Example QC Inspection Report Forms (NETTCP)	0	6/15/18
CQP 1.05 Form 1	Material Receipt Inspection Report (MRIR) Form	0	6/15/18
CQP 2.02 Form 1	Work Instruction Procedure	0	6/15/18
CQP 2.03 Form 1	Pre-Excavation Checklist	0	6/15/18
CQP 2.04 Form 1	Concrete Pre-Placement Inspection Checklist	0	6/15/18
CQP 3.01 Form 1	Daily Job & Safety Briefing	0	6/15/18
CQP 3.02 Form 1	SPS New England Site Inspection Form	0	6/15/18
CQP 3.03 Form 1	SPS Hoisting Permit	0	6/15/18
CQP 4.01 Form 1	MassDOT Non-Conformance Report (SharePoint)	0	6/15/18
CQP 4.02 Form 1	Request for Information (SharePoint)	0	6/15/18

40 Strafello Drive, Unit: G
Avon, MA 02322
Office (508) 588-0886
Fax (508) 588-2414



149 Wayside Ave., Rear
W. Springfield, MA 01089
Office (413) 736-1870
Fax (413) 736-1872

CQP 1.03-1
DAILY FIELD REPORT

Client Name: _____

Date: _____

Project Name: _____

Report No.: _____

Temperature: _____

Weather: _____

A. Description of Work:	B. Location (Coordinates/Station): Material Lot/Sublot (if applicable):	Associated IRFs/TRFs:
C. Equipment and Personnel:		
D. Non-Compliance(s):		
E. Who informed of D above:		
F. Remarks:		

Respectfully submitted,

QC Inspector

North East Transportation Training & Certification Program

Inspection Report Form - HMA Milling

Contract #:										Pay Item #:										Date/Time:									
Project Description:										Pvmnt Course / HMA Mix:										Weather:									
Fed. Aid Project #:										HMA Lot Category: A B C										Lot #:									
Inspection Type:					QC	Acceptance	IA	Inspection Location:										Inspection Sublot #:											
Prime Contractor:										Paving Subcontractor:										HMA Producer:									

Environmental Conditions

Inlet & catch basin protection in place?	Yes	No	Proper sweeping equipment on site?	Yes	No
Milled surface free of millings and dust?	Yes	No	Temporary Transitions Installed?	Yes	No

Workmanship Measurements

[illegible]

Comments:

Inspected by:		Reviewed by:	
Certification #:		Certification #:	
Date:		Date:	
Results Conform with Requirements:	☐	Results Do Not Conform with Requirements:	☐

North East Transportation Training & Certification Program

Inspection Report Form - HMA Patching

Contract #:			Pay Item #:			Date/Time:		
Project Description:			Pvmnt Course / HMA Mix:			Weather:		
Fed. Aid Project #:			HMA Lot Category:			A	B	C
Inspection Type: QC Acceptance IA			Inspection Location:			Inspection Sublot #:		

Prime Contractor:	Paving Subcontractor:	HMA Producer:
-------------------	-----------------------	---------------

Environmental Conditions

Underlying Surface Sound:	Yes	No	Proper Moisture in Underlying Surface:	Yes	No
Thermometer Type/No.:			Existing Surface Temperature, °F:		
Calibration Source:			Air Temperature Low, °F:		
Calibration Date:			Air Temperature High, °F:		

Materials Requirements

Rubberized Asphalt Sealant Type:			Thermometer Type/No.:	Dial/
COC Test Data Included/Reviewed:	Yes	No	Calibration Date:	
Certificate of Compliance (COC) No.:			Calibration Source:	
Material Complies with Specifications:	Yes	No		

Workmanship Measurements

[illegible]

Comments:

Inspected by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Results Conform with Requirements: ☐	Results Do Not Conform with Requirements: ☐

North East Transportation Training & Certification Program

Inspection Report Form - Tack Coat Application

Contract #:			Pay Item #:			Date/Time:		
Project Description:			Pvmnt Course / HMA Mix:			Weather:		
Fed. Aid Project #:			HMA Lot Category:			A	B	C
Inspection Type:			QC	Acceptance	IA	Inspection Sublot #:		

Prime Contractor:	Paving Subcontractor:	HMA Producer:
-------------------	-----------------------	---------------

Environmental Conditions			
Underlying Surface Clean:	Yes	No	Proper Moisture in Underlying Surface:
Thermometer Type/No.:	Yes	No	Existing Surface Temperature, °F:
Calibration Source:			Air Temperature Low, °F:
Calibration Date:			Air Temperature High, °F:

Materials Requirements				
Asphalt Emulsion Type:			Thermometer Type/No.:	
Certificate of Compliance (COC) No.:			Calibration Source:	
COC Test Data Included/Reviewed:	Yes	No	Calibration Date:	
Material Complies with Specifications:	Yes	No		

[illegible]

Comments: _____

Inspected by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:

Results Conform with Requirements: ☐ Results Do Not Conform with Requiriements: ☐

North East Transportation Training & Certification Program

Inspection Report Form - HMA Delivery

Contract #:				Pay Item #:				Date/Time:			
Project Description:				Pvmnt Course / HMA Mix:				Weather:			
Fed. Aid Project #:				HMA Lot Category:				A	B	C	Lot #:
Inspection Type:		QC	Acceptance	IA	Inspection Location:				Inspection Sublot #:		
Prime Contractor:				Paving Subcontractor:				HMA Producer:			

Materials Requirements

Thermometer Type/No.:	Dial /	Target Temperature of Delivered Mix, °F:	
Calibration Source:		Allowable Range of Temperature $\pm$ °F:	
Calibration Date:		Required Test Frequency (Per QC Plan):	

[illegible][illegible]

Inspected by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Results Conform with Requirements: ☐	Results Do Not Conform with Requirements: ☐

North East Transportation Training & Certification Program

Inspection Report Form - HMA Joint Preparation

Contract #:	Pay Item #:	Date/Time:
Project Description:	Pvmnt Course / HMA Mix:	Weather:
Fed. Aid Project #:	HMA Lot Category: A B C	Lot #:
Inspection Type: QC Acceptance IA	Inspection Location:	Inspection Sublot #:

Prime Contractor:

Paving Subcontractor:

HMA Producer:

Environmental Conditions			
Underlying Surface Sound:	Yes No	Proper Moisture in Underlying Surface:	Yes No
Thermometer Type/No.:		Existing Surface Temperature, °F:	
Calibration Source:		Air Temperature Low, °F:	
Calibration Date:		Air Temperature High, °F:	

Materials Requirements			
Rubberized Asphalt Sealant Type:	Yes No	Thermometer Type/No.:	Yes No
COC Test Data Included/Reviewed:		Calibration Source/Date:	
Certificate of Compliance (COC) No.:			
Material Complies with Specifications:			

Workmanship Measurements														
Random Sample	Lane	Sublot #	Station	Offset	Joint Location & Alignment		Does the joint have vertical face?	Sealant Temperature	Rubberized Asphalt Sealant Application Rate, Target:					
					Is the joint in the right location?	Is the joint aligned with prior joints?		Target, °F:	Length of Joint, ft	Height of Joint, ft	Begin Volume, gal	End Volume, gal	Measured Application Rate, gal/s.y.	
								Measured, °F:						
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							
Yes No					Yes No	Yes No	Yes No							

Comments: _____

Inspected by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Results Conform with Requirements: ☐	Results Do Not Conform with Requirements: ☐

North East Transportation Training & Certification Program

Inspection Report Form - HMA Mat Placement

Contract #:				Pay Item #:			Date/Time:	
Project Description:				Pvmnt Course / HMA Mix:			Weather:	
Fed. Aid Project #:				HMA Lot Category:			Lot #:	
Inspection Type: QC Acceptance IA				Inspection Location:			Inspection Sublot #:	
Prime Contractor:				Paving Subcontractor:			HMA Producer:	

Environmental Conditions

Underlying Surface in good condition?	Yes	No	Proper Moisture in Underlying Surface:	Yes	No
Thermometer Type/No.:			Existing Surface Temperature, °F:		
Calibration Source:			Air Temperature Low, °F:		
Calibration Date:			Air Temperature High, °F:		

Workmanship Measurements

[illegible]

Comments:

Inspected by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:

Results Conform with Requirements: ☐Results Do Not Conform with Requirements: ☐

North East Transportation Training & Certification Program

Inspection Report Form - HMA Plant

Contract #:			Pay Item #:			Date/Time:		
Project Description:			Pvmnt Course / HMA Mix:			Weather:		
Fed. Aid Project #:			HMA Lot Category:			A	B	C
Inspection Type: QC Acceptance IA			Inspection Location:			Inspection Sublot #:		
Prime Contractor:			Paving Subcontractor:			HMA Producer:		

Materials Requirements			
PG Binder Type:			Thermometer Type/No.: Dial /
COC Test Data Included/Reviewed:	Yes	No	Calibration Source:
Certificate of Compliance (COC) No.:			Calibration Date:
Material Complies with Specifications:			Target Temperature of Mix, °F:
			Allowable Temperature range, ±°F:

[illegible]

Comments: _____

Inspected by:		Reviewed by:	
Certification #:		Certification #:	
Date:		Date:	
Results Conform with Requirements:	☐	Results Do Not Conform with Requirements:	☐



New England, Inc.

MATERIAL RECEIPT INSPECTION REPORT (MRIR) FORM

PROJECT :	Haverhill - Bridge Replacement, Br. No H-12-039, I-495 over Merrimack River		
CONTRACT NO. :	103045		
COMPANY :	SPS New England, Inc. ☐		
	Other: _____		
DATE:		MANUFACTURER/SUPPLIER:	
MATERIAL RECEIVED:			
DESCRIPTION:			

MATERIAL RECEIVED INSPECTION REQUIREMENTS

<i>Requirements</i>	<i>Conf.</i>	<i>Non</i>	<i>N/A</i>	<i>Comments</i>
PHYSICAL CONDITION				
PACKAGING				
CLEANLINESS				
IDENTIFICATION OR MARKINGS				

MANUFACTURER DOCUMENTATION

<i>Document</i>	<i>Rec'd</i>	<i>Not</i>	<i>N/A</i>	<i>Comments</i>
PACKING SLIP				
MATERIAL CERTIFICATION				
CERT. of COMPLIANCE				
TEST REPORTS				
INSTRUCTIONS				

Storage & Maintenance Requirements:	
--	--

Material Complies with Contract Requirements	Yes ☐	No ☐	
Comments:			

Contractor Receiving Representative:	Date:
---	--------------

WORK INSTRUCTION PROCEDURE

- ☐ **Review Estimate for Production Rates and Budgets**
- ☐ **Redo / Check Quantity Take-off, as necessary**
- ☐ **Copy and Read Plans and Specifications – Highlight and mark up, as necessary**
- ☐ **Identify Submittals Required and Status**
- ☐ **Identify Subcontractors and Material Suppliers, including Scope and Responsibilities**
- ☐ **Identify Source of Materials being supplied**
- ☐ **Temporary Construction Plans**
 - 1. Access
 - 2. Haul Roads
 - 3. Material Laydown
 - 4. Stockpile / Storage for Operation
- ☐ **Rigging Plans**
 - 1. Crane Size
 - 2. Crane Locations and Setup
 - 3. Rigging Selection
 - 4. Crane Pick Analysis
- ☐ **Sketches / Working Drawings**
 - 1. Sketch Shielding / False Work Drawings
 - 2. Sketch Form Drawings
 - 3. Sketch Shoring Drawings
 - 4. Demolition Sketches
 - 5. Excavation Sketches / Benches / Etc.
- ☐ **Work Instruction Narrative**
 - 1. Quantities
 - 2. Budget Manhour Factors
 - 3. Crew Size
 - 4. Step by Step – “How to Build the Work”
 - 5. Equipment List
 - 6. Small Tools and Supplies
 - 7. Permanent Materials
 - 8. Subcontractor List
- ☐ **RISK ANALYSIS – Hazard and Safety Requirements**
 - 1. Identify Potential Hazards, Precautions and Preventive Actions
 - 2. Identify Responsibility for Addressing Risks
 - a. Traffic and Pedestrian Management
 - b. Special Safety Issues
 - c. Railroad Issues
 - d. Right-of-Way Issues
 - e. Environmental Issues (SWPPP)
 - f. Utility Coordination
 - g. Adjacent Contracts (Conflicts)
 - h. Schedule Constraints, Milestones or Liquidated Damages
 - i. Political / Community Assessment
 - j. Long Lead Time Materials
 - k. Schedule Restraints or Prerequisites, if any, to Start the Work



Pre-Excavation Checklist

Contract #: _____ Author of Form: _____ Date: _____

Purpose of Excavation: _____ Location of Excavation: _____

Date/Location of Excavation marked on ground: _____

Date/Time of Contractors Notification to Dig Safe: _____

Dig Safe Ticket #/Expiration Date: _____

Date/Time of Contractors Notification to Utility Companies: _____

Date/Time of Contractors Notification to Public Works: _____

Vacuum Excavation: ☐ Yes ☐ No	Laborer spotting bucket: ☐ Yes ☐ No	Test Pit: ☐ Yes ☐ No
Hand Excavation: ☐ Yes ☐ No	S.U.E. Completed: ☐ Yes ☐ No	Machine Excavation: ☐ Yes ☐ No

Latest drawings with excavation crew: ☐ Yes ☐ No

Held Pre-work meeting with excavation crew to describe locations of utilities: ☐ Yes ☐ No

Abutting buildings checked internally to verify location of service connections: ☐ Yes ☐ No

Abutters notified of immediately adjacent impending work: ☐ Yes ☐ No

VERIFICATION OF UTILITIES (NOTE: UC=UTILITY COMPANY)

ON DWG		ON AS-BLT		MARK OUT		UC SHUTOFF		UC PRETEST		UC TOOLS		UTILITY COMPANY
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	REP. VERIFY (DATE)
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
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☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

All applicable drawings attached to this check list: ☐ Yes ☐ No

All abandoned services physically checked and cut by utility company: ☐ Yes ☐ No

Special utility or Public works instructions: _____

All applicable Utility Company representative info provided above: ☐ Yes ☐ No

Contractor Utility Coordinator Sign/date: _____

Signature of Approval: _____



Concrete Inspection & Pre-Placement Card

Date: _____ Project: _____ SPS Job No. _____

Date of Placement: _____ Time: (Start): _____ (Finish): _____ (Spread): _____

Location/Description/Structure: _____

Weather/Special Conditions: _____ Concrete Testing Conducted By: _____

Concrete Supplier: _____ Concrete Mix: _____

Concrete Order Quantity [CY/CM]: _____ (Actual Quantities Below)

Equipment: ☐ Bid-Well ☐ Shaker Screed ☐ Vibrators ☐ Concrete Bucket ☐ Conc. Pump – Size: _____ ☐ Other

Formwork Type: ☐ Versa ☐ Symons ☐ Wood ☐ Rental (Other) _____

Pre-Placement Inspection

Inspection Item	Checked	Remarks
Excavation & Subgrade Preparation		
Forms – Line & Grade Check		
Forms – Braced; Ready to Place		
Rebar – Qty. / Location / Installed Properly		
Rebar – Secure in Place & Clean		
Water Stops/Seals/Joints Installed Properly		
Utilities/Sleeves/Pipes/Penetrations Installed Properly		
Ground Wire		
Anchor Bolts/Rods/Embedment		
Forms Heated in Cold Weather		
Cold Weather Curing Precautions		
Clean-Up Inside Forms		
Method of Curing		
Concrete Wash-out Station		
Other (Identify)		

SURVEY CHECKED
PRE-PLACEMENT INSPECTION COMPLETE
OKAY TO PLACE CONCRETE:

(signature)



SPS New England, Inc.

Daily Job & Safety Briefing



Job Site Location:
Job Being Performed:
Site Safety Representative:

Date:
Superintendent/Foreman:

This daily briefing sheet is to be used at the start of each shift. The scope of work for the shift is to be reviewed and the associated hazards identified using the blocks below. All identified hazards must be controlled.

Has your crew stretched today? Y/N Will you stretch again during the day Y/N?
Are your drivers on the road after a long or night shift? Y/N

Current Mission To Zero Status: Hazards Associated with the Job

Chemicals	Electrical Hazards	Environmental	Fall Protection	Ladders	Mechanical/Equip	Work Over/Near Water
MSDS Book Present	Overhead Wires	Asbestos/Lead/Silica	Unprotected Hazards	Erected at Correct Angle	Back-up Alarms	Life Jackets present
Chemicals Labeled	Extension Cords	Confined Space	Aerial Lift Use	Secured / not using top rungs	Licensed Operator(s)	Throw Ropes
Spill Kit	Lock Out/Tag Out	Excavations	Fall Arrest Equip.	Inspected? Not damaged	Fire Extinguisher(s)	Appropriate Rescue Boat readily available
Eye Wash Station	GFCI Use	Extreme Heat/Cold (temps)	Horizontal Life Lines	Type 1A or 1AA	Maintenance Issues Reported	Oars, oar locks and life jackets
Proper labeling	Job Trailers	Pressurized Fluids/Gases	Rebar Caps	Three rungs above access Point	Guards in place & working	Ring Buoy every 200'
	Flash Potential		Slippery surfaces	Good Footing	Daily Inspections Completed	
	Static Charges		Three points of contact	One person at a time	Equipment Failure	
					Wheels chocked	

Other	PPE	Respiratory Protection	Scaffolding	Site Cleanliness	Hoisting	Trenching
CPR/First Aid Personnel	Safety Glasses	Correct filters	Set-Up & Use	Trip Hazards	Hoisting Permit Req'd	Trench Protected
Waste Materials	Vest	Engineering Controls	Handrails Installed	Trash	Tagged Rigging	Trench Boxes Inspected
Proper labeling	Footwear	Current fit tests	Full Decking	Signage	Demo plan at site	Water in Trench
Power tool use	Hearing Protection	Traffic Safety	Solid Base / Feet in place	Fire Hazards	Load Chart Reviewed	Access/Egress
Trailers loaded properly	Hard Hat	Traffic Controls	Not Overloaded	Fire extinguishers present	Travel path reviewed	Jackie's Law
Air hoses secured		Driving Conditions	Proper Access	Hot work Permits current	No one under a load	
Stay out of the line of fire		Moving/Shifting Loads			Rigged properly	

What is happening tomorrow?

HAVE WE CONSIDERED...

Work Procedures	People	Special Precautions
Isolation of Equipment	Worker Fatigue	Adjacent Structures
Adequate Grounding	Public Safety (Details)	Condition of Structures
Working Clearances	Pedestrian Controls	Weather Conditions
DIG SAFE	Other Utilities	Lighting Conditions
E 9-1-1 Protocol	Sub-Contractors	Terrain
Concrete Pumping/Air in the pump/Hose whip		Bodies of Water

NOTES:

Names of employees on site that have demonstrated the expected safe work habits:

Submit all briefing sheets to the Safety Department weekly

SPS New England Inc. Site Inspection Form

	Date: _____ Time: _____			Superintendent: _____
	Inspection Number: _____			Foreman: _____
	Job Number: _____			Inspection Conducted By: _____
	Project Name: _____			Scope of Work: _____ _____ _____ _____
	Project Location: _____			
	Project Executive: _____			
	Project Manager: _____			
Item		Pass	Fail	Comment
1	Site Safety Rep.	x		Name of Rep: _____
	Site Safety Rep on site.			
2	Fall Protection	x		
	Unprotected fall hazards, Aerial lift use, Use of personal fall arrest equipment, Horizontal life lines engineered, rescue plan			
3	Electrical Hazards	x		
	Overhead wires, Extension cords, tools, Lock out / tag out, GFCI use, Job Trailers			
4	Scaffolding	x		
	Erected correctly, Complete with handrails, Full decking, Solid base, Not overloaded, Proper access			
5	Ladders	x		
	Erected at the correct angle, Secured, Not damaged, Type 1A or 1AA, Three rungs above access point, Good Footing, One person at a time, Not carrying items while in use			
6	PPE use	x		
	Hard Hat, Safety Glasses, Vest, Footwear, Hearing Protection, Face Protection, Electrical Protection, Welding or Hot Work Protection			
7	Impalement Hazards	x		
	All rebar or impalement hazards protected or cut			
8	Equipment	x		
	Back up alarms, Licensed Operator, Fire Extinguisher, Demo Plans Available, Hoisting Permit, Maintenance issues, Rigging, Vehicle Conditions Including Current Inspection and Registration			
9	Site Cleanliness/Safety	x		
	Trip hazards, Garbage, Signage, Slopes, Pedestrian Access, Fire Extinguisher Locations / Inspections, Pre-Job Briefing Forms completed			
10	Work Over/Near Water	x		
	Life jackets, Throw ropes, Rescue boat, Ring Buoys			
11	Trenching	x		
	Trenches protected, Trench Boxes inspected, Water in trench, Access/Egress			
12	Chemicals	x		
	MSDS book present, Chemicals labeled, Spill kit, Eye wash station, Fuel storage-check hoses and containment, Hot Work Permit.			
13	Machine/ Tool Guarding	x		
	All guards are in place and working			
14	Respiratory Protection	x		
	Engineering controls are being used, Current fit tests, No facial hair			
15	Safety Meeting Conducted	Y	N	Topic: _____
Comments:				

SPS Hoisting Permit

Prior to any lift or work, the questions in section I of this permit must be reviewed by the Site Superintendent or Project Manager. If any of the questions from section I are answered yes, the permit must be completed. Section II must be completed by the Site Superintendent and approved by the Safety Manager or the Senior Vice President of Field Operations prior to the work commencing. **This permit is required regardless of the machine used for the work (Crane, Excavator, and Powered Industrial Truck). A pre-lift briefing will be conducted by the foreman at the work site immediately prior to the lift.**

If a lift is being performed by a subcontractor or vendor, they may use this form or provide a written lift plan to the Site Superintendent or Project Manager for review and approval.

Section I

To be completed by Site Superintendent or Project Manager. A yes answer to any of these questions will require the completion of section II.

- 1) Will any part of the crane, excavator, powered industrial truck, rigging or load come within 40' of energized electrical wires?
Yes ☐ No ☐ If yes, complete item 1 & 2 from section II.
- 2) Does the lift require more than one crane?
Yes ☐ No ☐ If yes, complete item 1 & 2 from section II.
- 3) Will any view of the crane, rigging or load be obstructed from the operator during the lift?
Yes ☐ No ☐ If yes, complete item 2 from section II.
- 4) Will the lift exceed 75% of the crane capacity as specified on its load chart?
Yes ☐ No ☐ If yes, complete item 2 from section II.
- 5) Will the travel path of the load include any area that is off the bridge profile?
Yes ☐ No ☐ If yes, complete item 2 from section II.

Section II

To be completed by Site Superintendent or Project Manager. Any lift requiring Action from this section will also require written approval from the Safety Manager prior to the start of work.

- 1) Submit drawings that indicate the location of the overhead wires, the equipment and the work area. All drawings shall include field measurements.
- 2) Provide detailed written instructions that define the scope of work, all hazards and what controls will be used to address each identified hazard.

_____	Project Manager	____/____/____
_____	Superintendent	____/____/____
_____	Safety Manager Approved / Disapproved	____/____/____
_____	Foreman	____/____/____
_____	Equipment Operator	____/____/____

All signatures are required prior to the start of work

SPS Hoisting Permit

Responsibilities:

Project Manager / Site Superintendent:

- Identifies instances when hoisting will be performed on site that will meet the criteria of section I.
- Provides drawings, pictures, and details regarding the lift to the Safety Manager for approval.
- Ensures that no lifting takes place until approval is received.
- If lift is to be performed by a sub-contractor or vendor, reviews the submitted lift plan for compliance with OSHA rules and SPS New England standards.
- Stops work when unsafe conditions exist.

Safety Manager:

- Reviews all submitted materials to determine if the proposed lift can be performed safely and in compliance with all applicable standards.
- Identifies any actions that will need to be taken to ensure the safe completion of the work.
- Creates Job Hazard Analysis if required.
- Stops work when unsafe conditions exist.

Foreman:

- Reviews completed hoisting permit and ensures that the lift is completed in accordance with the approved plan.
- Conducts a pre-lift meeting discussing the details of the lift immediately prior to the start of the work.
- Stops work when unsafe conditions exist.

Equipment Operator:

- Reviews completed hoisting permit for accuracy and safety. Ensures that the lift is completed in accordance with the approved plan.
- Has the **final** approval of any hoisting that takes place.
- **Stops** work when unsafe conditions exist.
- When a question arises regarding safety as it relates to hoisting, excavating or any other heavy equipment related safety matter, the operator of that equipment answers only to an officer of the corporation, starting with the Corporate Safety Manager and with free and unrestricted access to higher levels of management up to and including the Principals (CEO, president and Treasurer) of SPS new England Inc. The operator is empowered and expected to pursue this executive level of safety resolution without fear of retribution until he or she is professionally comfortable that the proposed hoisting or excavation operation is able to be performed safely.

Additional Guidance:

When using any machine other than a crane, hoisted loads shall not travel in a path that takes them over an area that is below the level of the machine such as off of a bridge deck profile unless no other travel path is available. This practice exposes the machine to a tipping hazard that would otherwise be eliminated when the load is directly over the ground.

Non-Conformance Report (NCR)

Initiation

NCR No:

NCR Date:

Contract Name:

Contract No:

Subcontractor/Fabricator's NCR Form
(.pdf)

 No file attached

Contractor:

Subcontractor/Fabricator:

Subject of NCR:

Location of Affected Component (ex. Pier 1):

☐ Is this NCR a Repeated issue?

☐ Is this NCR related to an Early Release for Fabrication
or Construction Action?

ERC Package Reference:

Contract Requirements:

Non-Conformance:

Referenced Drawing(s):

 No file attached

Referenced Spec(s):

 No file attached

Photos:

 No picture inserted

 No picture inserted

 No picture inserted

☐ I hereby acknowledge that I have initiated this NCR form,

Signature

Initiated Date

SELECT NCR TYPE

NCR Type:

If "Other", Please Specify:

If the NCR is being initiated by MassDOT, please use the button below to notify the DB Entity.

Proposed Disposition

Root Cause Identified (This is a mandatory field):

Action Taken to Prevent This Non-Conformance (This is a mandatory field):

Proposed Disposition (This is a mandatory field):

 No file attached

 No file attached

 No file attached

Proposed By:

Date:

Reviewed By: (Design Engineer)

Date:

Reviewed By: (Construction QC Manager)

Date:

Reviewed By: (QC Administrator)

Date:

Pictures, Attachments, as needed



No file attached



No file attached



No file attached

Additional Information Requested

Request:

Requested By:

Date:

Response:



No file attached



No file attached



No picture inserted

Response By:

Response Date:

MassDOT Reviews and Signoffs, as Required

Request Reviews:

☐ Bridge

Bridge Review:

Date:

☐ Construction

Construction Review:

Date:

☐ Metals

Metals Review:

Date:

☐ Preliminary Design

Preliminary Design Review:

Date:

☐ R&M	R&M Review:	Date:
☐ Geotech	Geotech Review:	Date:
	Please select the NCR Type below and click the corresponding button to send a notification that your review is complete.	

Final Disposition

Final Disposition:

 No file attached

 No file attached

 No file attached

NCR Disposition Status:

Select...

Other, Please Specify:

Authorized By:

Date:

MassDOT Representative

Field Verification of Corrective Action

Action Taken:

Select...

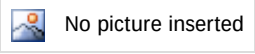
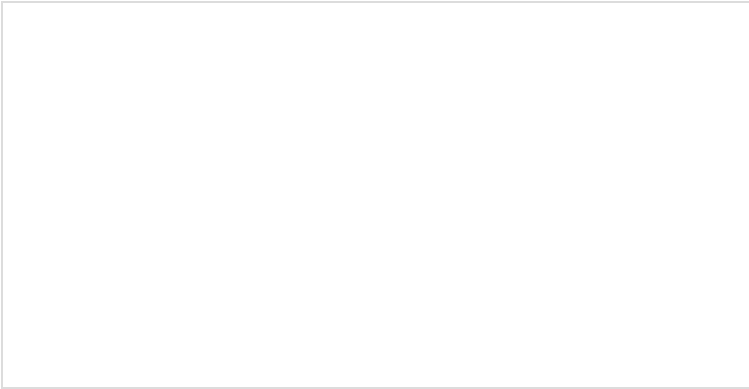
Action Date:

Other, Please Specify:

Corrective Action Taken:

 No file attached

 No file attached



Approval:

Date:

SPS NEW ENGLAND INC

Inspection Completion Date:

Inspection/Verification:

Approvals Needed:

Approval:

Date:

MassDOT Field Representative

Fabricator NCR Representative

Signoff Attachment



Final Signoff (MassDOT)

Approval:

Date:

MassDOT Representative



New England, Inc.



Appendix IV

Quality Control Test Report Forms

1. Quality Control Test Report Forms (TRFs)

Form No.	Form Title	Form Originator
D3665	Random Sampling Test Report	NETTCP
T27	Sieve Analysis Test Report	NETTCP
T27x4	Sieve Analysis Test Report	NETTCP
T119	PCC Slump, Air Content & Unit Mass Test Report	NETTCP
T22	PCC Field Test and Cylinder Strength Test Report	NETTCP
T96	Resistance to Degradation of Aggregate by Abrasion Test Report	NETTCP
PCCCVR	PCC Cover over Reinforcing Steel Test Report	NETTCP
FDT	Soils In-Place Density Test Report Form	ATC

NorthEast Transportation Training & Certification Program

Random Sampling Test Report (D3665)

Date/Time:	Lab/Location:	
Weather:	Date Rec'd #:	Random Sample: Yes No
Project:	Lab Login #:	Lot #:
Contract #:	Material ID:	Sublot #:
Contractor:	Material #:	Sample Location:
Pay Item #:	Sample #:	Station:
Source:	Sample Type: QC A-V IA DR Othe	Offset:
Plant Type:	Sampled By/Cert. #:	

Computer Generated Random Numbers									
Sublot Number	1st Random #	Designated Table Row (Random Number x 500)	2nd Random #	Designated Table Column (Random Number x 20)	Random # for Sampling Location	Sublot Size	Sampling Location within Sublot (Station, Time, or other)	Cumulativ e Sublot Total prior to Sample	Cumulative Sampling Location (Station, Time or other)

Comments:

Tested by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Test Results Within Engineering Limits:	YES ☐ NO ☐

NorthEast Transportation Training & Certification Program

Sieve Analysis Test Report (T 27, T 11 , T 255)

Date/Time:	Lab/Location:	
Weather:	Date Rec'd #:	Random Sample: Yes No
Project:	Lab Login #:	Lot #:
Contract #:	Material ID:	Sublot #:
Contractor:	Material #:	Sample Location:
Pay Item #:	Sample #:	Station:
Source:	Sample Type: QC A-V IA DR Other	Offset:
Plant Type:	Sampled By/Cert. #:	

Total Moisture Content by Drying (T 255) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;">Wet Mass(W):</td><td></td></tr> <tr><td>Original Dry Mass(D):</td><td></td></tr> <tr><td>Moisture Loss (W - D):</td><td></td></tr> <tr><td>% Moisture (100 x (W - D) / D):</td><td></td></tr> </table>	Wet Mass(W):		Original Dry Mass(D):		Moisture Loss (W - D):		% Moisture (100 x (W - D) / D):		Materials Finer than 75 µm Sieve by Washing (T 11) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 80%;">Dry Mass after wash (Dw):</td><td></td></tr> <tr><td>Mass of Fines lost by washing (D - Dw):</td><td></td></tr> <tr><td>% -75 µm Sieve (100 x (D - Dw)/D):</td><td></td></tr> </table>	Dry Mass after wash (Dw):		Mass of Fines lost by washing (D - Dw):		% -75 µm Sieve (100 x (D - Dw)/D):	
Wet Mass(W):															
Original Dry Mass(D):															
Moisture Loss (W - D):															
% Moisture (100 x (W - D) / D):															
Dry Mass after wash (Dw):															
Mass of Fines lost by washing (D - Dw):															
% -75 µm Sieve (100 x (D - Dw)/D):															

Sieve Analysis of Fine and Coarse Aggregates (T 27)								
Sieve	Mass per Sieve		% Retained per Sieve		% Passing		Specification %	
	Unwashed	Washed	Unwashed	Washed		Washed	Unwashed	Washed
Sieve, in. (mm)								
2 1/2 (63)								
2 (50)								
1 1/2 (37.5)								
1 (25)								
3/4 (19)								
1/2 (12.5)								
3/8 (9.5)								
#4 (4.75)								
#8 (2.36)								
#16 (1.18)								
#30 (600 µm)								
#50 (300 µm)								
#100 (150 µm)								
Pan								
Sub Total					Fineness Modulus (FM) = 			
Loss on Washing (D - Dw)								
Total								

Comments: _____

Tested by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Test Results Within Engineering Limits:	YES ☐ NO ☐

NorthEast Transportation Training & Certification Program

Sieve Analysis Test Report (T 27, T 11 , T 255)

Date/Time:	Lab/Location:				
Weather:	Date Rec'd #:	Random Sample: Yes			No
Project:	Lab Login #:	Lot #:			
Contract #:	Material ID:	Sublot #:			
Contractor:	Material #:	Sample Location:			
Pay Item #:	Sample #:	Station:			
Source:	Sample Type:	QC	A-V	IA	DR Other
Plant Type:	Sampled By/Cert. #:				

Material:	(T 255)	Wet Mass(W):	
Sample #:		Original Dry Mass(D):	
Source:		Moisture Loss (W - D):	
	% Moisture $(100 \times (W - D) / D)$:		
(T 11)	Dry Mass after wash (Dw):		
	Mass of Fines lost by washing (D - Dw):		
	% -75 μ m Sieve $(100 \times (D - Dw)/D)$:		
Sieve Analysis of Fine and Coarse Aggregates (T 27)			
Sieve	Mass	% Ret	% Pass
31.5 mm			
25 mm			
19 mm			
16 mm			
12.5 mm			
9.5 mm			
4.75 mm			
2.36 mm			
1.18 mm			
600 μ m			
300 μ m			
150 μ m			
75 μ m			
PAN			
Total			

Material:		(T 255)	Wet Mass(W):	
Sample #:			Original Dry Mass(D):	
Source:			Moisture Loss (W - D):	
			% Moisture $(100 \times (W - D) / D)$:	
(T 11)			Dry Mass after wash (Dw):	
			Mass of Fines lost by washing (D - Dw):	
			% -75 μ m Sieve $(100 \times (D - Dw)/D)$:	
Sieve Analysis of Fine and Coarse Aggregates (T 27)				
Sieve	Mass	% Ret	%Pass	Spec. %
31.5 mm				
25 mm				
19 mm				
16 mm				
12.5 mm				
9.5 mm				
4.75 mm				
2.36 mm				
1.18 mm				
600 μ m				
300 μ m				
150 μ m				
75 μ m				
PAN				
Total				

Material:	(T 255)	Wet Mass(W):	
Sample #:		Original Dry Mass(D):	
Source:		Moisture Loss (W - D):	
	% Moisture $(100 \times (W - D) / D)$:		
(T 11)	Dry Mass after wash (Dw):		
	Mass of Fines lost by washing (D - Dw):		
	% -75 μ m Sieve $(100 \times (D - Dw)/D)$:		
Sieve Analysis of Fine and Coarse Aggregates (T 27)			
Sieve	Mass	% Ret	%Pass
31.5 mm			
25 mm			
19 mm			
16 mm			
12.5 mm			
9.5 mm			
4.75 mm			
2.36 mm			
1.18 mm			
600 μ m			
300 μ m			
150 μ m			
75 μ m			
PAN			
Total			

Material:		(T 255)	Wet Mass(W):	
Sample #:			Original Dry Mass(D):	
Source:			Moisture Loss (W - D):	
	% Moisture $(100 \times (W - D) / D)$:			
(T 11)	Dry Mass after wash (Dw):			
	Mass of Fines lost by washing (D - Dw):			
	% -75 μ m Sieve $(100 \times (D - Dw)/D)$:			
Sieve Analysis of Fine and Coarse Aggregates (T 27)				
Sieve	Mass	% Ret	%Pass	Spec. %
31.5 mm				
25 mm				
19 mm				
16 mm				
12.5 mm				
9.5 mm				
4.75 mm				
2.36 mm				
1.18 mm				
600 μ m				
300 μ m				
150 μ m				
75 μ m				
PAN				
Total				

Comments: _____

Tested by:		Reviewed by:	
Certification #:		Certification #:	
Date:		Date:	
Test Results Within Engineering Limits:	YES ☐	NO	☐

NorthEast Transportation Training & Certification Program

PCC Slump, Air Content & Unit Mass Test Report (T 119, T152, T196, T 121, C 1064)

Date/Time:	Lab/Location:	
Weather:	Date Rec'd #:	Random Sample: Yes No
Project:	Lab Login #:	Lot #:
Contract #:	Material ID:	Sublot #:
Contractor:	Material #:	Sample Location:
Pay Item #:	Sample #:	Station:
Source:	Sample Type: QC A-V IA DR Other	Offset:
Plant Type:	Sampled By/Cert. #:	

Concrete Reference Information			
Mix Strength, psi (Mpa):		Weather:	
Maximum Aggregate Size, in. (mm):		Ambient Air Temperature, °F:	
Cement Type:		Base/Form Temperature, °F:	
Cement Brand:		Reinforcing Steel Temperature, °F:	
Additives:			
Sample Location:			

[illegible]

Comments:

Tested by:		Reviewed by:	
Certification #:		Certification #:	
Date:		Date:	
Test Results Within Engineering Limits:	YES ☐	NO ☐	

NorthEast Transportation Training & Certification Program

PCC Field Tests and Cylinder Strength Test Report (T 23, T 119, T 152, T 196, C 1064, T 231, T 22)

Date/Time:	Lab/Location:	
Weather:	Date Rec'd #:	Random Sample: Yes No
Project:	Lab Login #:	Lot #:
Contract #:	Material ID:	Sublot #:
Contractor:	Material #:	Sample Location:
Pay Item #:	Sample #:	Station:
Source:	Sample Type: QC A-V IA DR Other	Offset:
Plant Type:	Sampled By/Cert. #:	

Concrete Reference Information			
Mix Strength, Mpa (psi):		Weather:	
Maximum Aggregate Size, mm (in):		Ambient Air Temp., °C:	
Cement Type:		Ticket No.:	
Cement Brand:		Truck No.:	
Job Water Added:		Quantity Represented, m ³ (CY):	
Additives:			
Sample Location:			

Preparation of Concrete Specimens in the Field (T 23)			
Project Cylinder Identification:			
Specimen Type:	Cylinder ☐	Beam ☐	
Specimen Size:	150 x 300 mm (6 x 12") ☐	100 x 200 mm (4 x 8") ☐	Other:
Specimens Covered:	Yes ☐	No ☐	
Initial Curing Method:	Curing Box ☐	Field Cured ☐	Other:
Curing Temperature:	Low Temperature, °C:	High Temperature, °C:	

Sample Properties by Field Tests			
Slump, mm (in) (T 119):	% Air (T 152 or T 196):	Conc Temp, °C (C 1064):	

Laboratory Preparation of Specimens			
Sulfur Capping (T 231) ☐	Neoprene Capping (T 22) ☐	Cutting (T 22) ☐	

Compressive Strength of Cylindrical Specimens (T 22)							
Sample/ Cylinder #	Sample Type (QC,QA, etc.)	Cylinder Age	Cylinder Mass	Cylinder Area	Compressive Strength	Average Compressive Strength	Type of Break*
* Types of Break	1 	2 	3 	4 	5 	6 Unusual Fracture	

Comments:	
Tested by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Results Within Engineering Limits: ☐	Results Outside Engineering Limits: ☐

NorthEast Transportation Training & Certification Program

Resistance to Degradation of Aggregate by Abrasion Test Report (T 96)

Date/Time:	Lab/Location:	
Weather:	Date Rec'd #:	Random Sample: Yes No
Project:	Lab Login #:	Lot #:
Contract #:	Material ID:	Sublot #:
Contractor:	Material #:	Sample Location:
Pay Item #:	Sample #:	Station:
Source:	Sample Type: QC A-V IA DR Other	Offset:
Plant Type:	Sampled By/Cert. #:	

Resistance to Degradation of Small-Size Coarse Aggregate By Abrasion & Impact in the Los Angeles Machine (T 96)					
Standard Gradings (500 Revolutions)					
Sieve Size		Mass of Indicated Sizes, g			
Passing, in. (mm)	Retained, in. (mm)	Grading A	Grading B	Grading C	Grading D
1 1/2 (37.5)	1 (25)	1250 +/- 25			
1 (25)	3/4 (19)	1250 +/- 25			
3/4 (19)	1/2 (12.5)	1250 +/- 10	1250 +/- 10		
1/2 (12.5)	3/8 (9.5)	1250 +/- 10	1250 +/- 10		
3/8 (9.5)	1/4 (6.3)			1250 +/- 10	
1/4 (6.3)	#4 (4.75)			1250 +/- 10	
#4 (4.75)	#8 (2.36)				5000 +/- 10
Total:		5000 +/- 10	5000 +/- 10	5000 +/- 10	5000 +/- 10
Number of Steel Balls:		12	11	8	6
Mass of Ball Charge, g:		5000 +/- 25	4584 +/- 25	3330 +/- 20	2500 +/- 15
Test Results					
Passing Sieve	Retaining Sieve	Grading A	Grading B	Grading C	Grading D
1 1/2 (37.5)	1 (25)				
1 (25)	3/4 (19)				
3/4 (19)	1/2 (12.5)				
1/2 (12.5)	3/8 (9.5)				
3/8 (9.5)	1/4 (6.3)				
1/4 (6.3)	#4 (4.75)				
#4 (4.75)	#8 (2.36)				
Total original Sample (a):					
Coarse Portion > #12 (1.7 mm) after 500 Revolutions (b):					
Los Angeles Wear: ((a - b) / a)*100					

Comments:

Tested by:	Reviewed by:
Certification #:	Certification #:
Date:	Date:
Test Results Within Engineering Limits:	YES ☐ NO ☐

NorthEast Transportation Training & Certification Program

PCC Cover Over Reinforcing Steel Test Report

Date/Time:	Lab/Location:									
Weather:	Date Rec'd #:					Random Sample: Yes No				
Project:	Lab Login #:					Lot #:				
Contract #:	Material ID:					Sublot #:				
Contractor:	Material #:					Sample Location:				
Pay Item #:	Sample #:					Station:				
Source:	Sample Type: QC A-V IA DR Other					Offset:				
Plant Type:	Sampled By/Cert. #:									

Cover Testing Device & Reference Information

Make:			Serial #:		
Model #:			Equipment #:		
Transverse Bar size:		Longitudinal Bar Size:			
Transverse Bar Spacing:		Longitudinal Bar Spacing:			

Cover Measurements

[illegible]

* T = Transverse & L = Longitudinal

Comments:

Tested by:		Reviewed by:	
Certification #:		Certification #:	
Date:		Date:	
Test Results Within Engineering Limits:	YES ☐	NO ☐	

40 Strafello Drive, Unit: G
Avon, MA 02322
Office (508) 588-0886
Fax (508) 588-2414



149 Wayside Ave., Rear
W. Springfield, MA 01089
Office (413) 736-1870
Fax (413) 736-1872

FIELD DENSITY TEST REPORT

Client Name:

Date:

Project Name:

Report No.: 25.

Weather _____

Contractor: _____

General Location: _____

SAMPLE NO.	MAXIMUM DENSITY (pcf)	OPTIMUM MOISTURE (%)

TEST NO.	LOCATION	ELEV.	SAMPLE NO.	PROBE DEPTH (in)	MOISTURE (%)	DRY DENSITY (pcf)	COMPACTION (%) OF PROCTOR	
							ACTUAL	SPEC.
1								
2								
3								
4								
5								
6								
7								
8								

- (1) Test Location Established By: ☐ Grid Lines ☐ Stations ☐ Estimation ☐ Contractor
(2) Elev. Of Test Established By: ☐ Survey ☐ Grade Stakes ☐ Estimation ☐ Contractor
(3) Test Conducted On: ☐ Full Time Basis ☐ Intermittent Basis
(4) Tests Performed Utilizing: ☐ Nuclear Density Gauge ☐ Sand Cone

Remarks:

sjm

Respectfully Submitted,
ATC Group Services, LLC

Appendix V

Preliminary QC Inspection & Testing Schedules

1. Preliminary Quality Control Inspection Schedules
2. Preliminary Quality Control Sampling & Testing Schedules
3. Quality Control Sampling & Testing Ledger (Rev 0)



New England, Inc.



Preliminary Quality Control Inspection Schedule

Work Item	Material Description	Inspection Attributes	Inspection Method(s)	Lot Size	Sublot Size / Inspection Frequency	Point of Inspection	Inspection Type	Comments / Remarks
Project Produced Materials								
150.	Ordinary Borrow (M1.01.0)	Max. Rock Size	Visual/ Measurement	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans
		Max. Lift Thickness	Rod/Stake	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	
150.1	Special Borrow (M1.02.0)	Max. Rock Size	Visual/ Measurement	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans
		Max. Lift Thickness/ Compaction Cleanliness	Rod/Stake	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	
151.	Gravel Borrow (M1.03.0)	Max. Rock Size	Visual/ Measurement	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans
		Max. Lift Thickness	Rod/Stake	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	
402.	Dense Graded Crushed Stone (M2.01.7)	Max. Lift Thickness	Rod/Stake	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans
404.5 (Sub)	Reclaimed Pavement Borrow (M1.11.0)	Max. Rock Size	Visual	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans
		Max. Lift Thickness	Rod/Stake	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	



New England, Inc.



Preliminary Quality Control Inspection Schedule

Work Item	Material Description	Inspection Attributes	Inspection Method(s)	Lot Size	Sublot Size / Inspection Frequency	Point of Inspection	Inspection Type	Comments / Remarks
450. & 455.	Hot Mix Asphalt	PER SPECIFICATIONS 450 & 455 & Hot Mix Asphalt Pavement Quality Control Plan						
751.	Loam Borrow (M1.05.0)	Max. Lift Thickness	Rod/Stake	Total Qty of Material for Each Type from Each Source	4 per Lift per Day	Each Lift	Random Visual	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans. Certified independent test report
901.	Cement Materials	Included in Drilled Shaft & Concrete Structure Elements QC Plans						
901.	Cement Concrete (M4.02.00)	(Per QC Plan)	(Per QC Plan)	Total Quantity of Cement Concrete for Each Mix Design from Each Plant	1 per each 150 cy, minimum 1 per day.		Random Visual At Plant, On Site	Specific Attributes for each Inspection Component (Equipment; Environmental Conditions; Materials; and Workmanship) to be specified in QC Plans
945.	Drilled Shafts	Included in Drilled Shaft QC Plan						
965.	Membrane Waterproofing	(Per QC Plan)	Visual	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.



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Preliminary Quality Control Inspection Schedule

Work Item	Material Description	Inspection Attributes	Inspection Method(s)	Lot Size	Sublot Size / Inspection Frequency	Point of Inspection	Inspection Type	Comments / Remarks
Fabricated Structural Materials								
960.	Structural Steel (M8.05.0)	(Per QC Plan)	Visual/ Measurement	Total Quantity of Material (Per QC Plan)	(Per QC Plan)		Random	Sufficient Inspection for conformance with procedures and specifications. Certificates of Compliance and Mill Test Reports required for release of Material. RMS Source of materials. Check QPL list. Certificate of domestic steel.



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Preliminary Quality Control Inspection Schedule

Work Item	Material Description	Inspection Attributes	Inspection Method(s)	Lot Size	Sublot Size / Inspection Frequency	Point of Inspection	Inspection Type	Comments / Remarks
Standard Manufactured Materials (Verify Each Item is on MassDOT Qualified Products List, Check COC & Manufacturer QC Results, Inspect On-site)								
201.	Precast Drainage Structures	(Per QC Plan)	Visual	Total Qty of Material for each Type and Size	(Per QC Plan)	At Plant / On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.
220.	Cast Iron Frames, Grates and Covers	(Per QC Plan)	(Per QC Plan)	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials. Check QPL list.
230.	RCP Drain Pipe / ADS Drain Pipe	(Per QC Plan)	(Per QC Plan)	Total Qty of Material for each Type	(Per QC Plan)	At Plant / On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials. Check QPL list.
621.	Steel Beam Highway Guard	Dimensions, Galvanizing	Visual/ Measurement	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.
644.	Fencing	Dimensions, Finish	Visual/ Measurement	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.



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Preliminary Quality Control Inspection Schedule

Work Item	Material Description	Inspection Attributes	Inspection Method(s)	Lot Size	Sublot Size / Inspection Frequency	Point of Inspection	Inspection Type	Comments / Remarks
698.	Geotextile Fabrics	Application	Visual	Total Qty of Material for Each Type from Each Source	1 per Delivered Lot	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials. Check QPL list.
801.	PVC Electrical Conduit	Dimensions, Plastic Finish	Visual/ Measurement	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.
813.	Electrical Wire/Cable	Protective Coating/Insulator Quality	Visual	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.
815.	Traffic Control Signals	Dimensions, Finish, Type	Visual/ Measurement	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.



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Preliminary Quality Control Inspection Schedule

Work Item	Material Description	Inspection Attributes	Inspection Method(s)	Lot Size	Sublot Size / Inspection Frequency	Point of Inspection	Inspection Type	Comments / Remarks
828.	Traffic Sign Components	Dimensions, Finish/Galvanizing	Visual/ Measurement	Total Qty of Material for each Type	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.
860.	Permanent Pavement Markings	Finish, Batch Number, Thickness, Application	Visual/ Measurement	Total Qty of Material for Each Type from Each Source	Per Batch	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials. Check QPL list, if product is on QPL than no samples are required, only Certificate of Compliance.
910.	Steel Reinforcement	(Per QC Plan)	Visual/ Measurement	Total Qty of Material for each Type and Size (Per QC Plan)	(Per QC Plan)	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials. Check QPL list.
970.	Bituminous Dampproofing	Thickness, Application	Visual	Total Qty of Material for Each Type from Each Source	1 per Delivered Lot	On Site	Random	Equipment; Environmental Conditions; Material; and Workmanship Certificate of Compliance and Sample; and RMS Source of materials.



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Preliminary Quality Control Sampling and Testing Schedule

Work Item	Material Description	Quality Characteristic	Test Method(s)	Lot Size	Sublot Size / Test Frequency	Sample Size	Sampling Method	Point of Sample	Comments / Remarks
Project Produced Materials									
150.	Ordinary Borrow (M1.01.0)	Soil Classification	AASHTO M145	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy / 1 Per Stockpile	50#	Random	Stockpile	
		Max. Density / Sieve Analysis	AASHTO T99 C AASHTO T180	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
		Percolation / In-Place Density		Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
150.1	Special Borrow (M1.02.0)	Sieve Analysis	AASHTO T11 AASHTO T2	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	Stockpile	
		Max. Density	AASHTO T99 C	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
		Percolation		Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
151.	Gravel Borrow (M1.03.0)	Sieve Analysis	AASHTO T11 AASHTO T2	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	Stockpile	
		Max. Density	AASHTO T99 C	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
		Percolation		Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
156.	Crushed Stone (M2.01.1)	Sieve Analysis		Total Quantity of Material for Each Type from Each Source	1 per 5,000 ton	50#	Random	Stockpile	
		LA Abrasion		Total Quantity of Material for Each Type from Each Source	1 per 5,000 ton	50#	Random	Stockpile	



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Preliminary Quality Control Sampling and Testing Schedule

Work Item	Material Description	Quality Characteristic	Test Method(s)	Lot Size	Sublot Size / Test Frequency	Sample Size	Sampling Method	Point of Sample	Comments / Remarks
402.	Dense Graded Crushed Stone (M2.01.7)	Sieve Analysis	AASHTO T11 AASHTO T27	Total Quantity of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	Stockpile	
		Max. Density	AASHTO T99 C	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy	50#	Random	In Place	
404.5 (Sub)	Reclaimed Pavement Borrow (M1.11.0)	Sieve Analysis	AASHTO T11 AASHTO T2	Total Qty of Material	1 per 5,000 cy/ 1 Per Stockpile	50#	Random	Stockpile / In Place	
		Max. Density	AASHTO T99 C	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy/ 1 Per Stockpile	50#	Random	Stockpile / In Place	
		LA Abrasion	ASTM C535	Total Qty of Material for Each Type from Each Source	1 per 5,000 cy/ 1 Per Stockpile	50#	Random	Stockpile / In Place	
450. & 455.	Hot Mix Asphalt	PER SPECIFICATIONS 450 & 455 & Hot Mix Asphalt Pavement Quality Control Plan							
751.	Loam Borrow (M1.05.0)	Sieve Analysis	AASHTO T11 AASHTO T2	Total Qty of Material	1 per 1,000 cy	25#	Random	Stockpile	
		pH		Total Qty of Material	1 per 1,000 cy	25#	Random	Stockpile	
901.	Cement Materials	Included in Drilled Shaft and Concrete Structure Elements QC Plans							
901.	Cement Concrete (M4.02.00)	Temperature	ASTM C1064	Total Quantity of Material for Each Type from Each Source/ Per Day/ Per Plant/ Per Placement	1 Test per 150 cy for Each Class	Min. (5) 6x12 or (5) 4x8 Cylinders, depending on break schedule	Random	At Plant / On Site	Concrete Sample ASTM C172 Compressive Strength ASTM T22
		Slump	ASTM C143						
		Density (Unit Weight)	ASTM C138						
		Air Content	ASTM C231						
		Compressive Strength	ASTM C31						
945.	Drilled Shafts	Included in Drilled Shaft QC Plan							
965.	Membrane Waterproofing	(Per QC Plan)		Total Quantity of Material	1 per Delivered Lot		As Required		Certificate of Compliance Independent Test Report



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Preliminary Quality Control Sampling and Testing Schedule

Work Item	Material Description	Quality Characteristic	Test Method(s)	Lot Size	Sublot Size / Test Frequency	Sample Size	Sampling Method	Point of Sample	Comments / Remarks
Standard Manufactured Materials - Verify All Material on MassDOT Qualified Products List and Certify Product is Suitable for Intended Use									
201.	Precast Utility Structures	Temperature	ASTM C1064	Total Qty of Material for each Structure Type	1 Test for each Type from each Source	Five 6x12 or Five 4x8 Cylinders	As Required	Plant	Concrete Sample ASTM C172 Certificate of Compliance
		Slump	ASTM C143						
		Density (Unit Weight)	ASTM C138						
		Air Content	ASTM C231						
		Compressive Strength	ASTM C31						
		Visual Inspection							
220.	Frames, Grates and Covers			Total Qty of Material/ Source	1 Sample for Each Source	1 Test Bar for each Type	As Required	Plant	Certificate of Compliance Sample
230.	RCP/ADS Drain Pipe			Total Qty of Material/ Source/ Size	Each Size/ Source				Certificate of Compliance
621.	Steel Beam Highway Guard			Total Qty of Material/ Source		1 for each	As Required	Plant	Certificate of Compliance Mill Cert
644.	Fencing			Total Qty of Material/ Source	1' Section Fence 12" Post 3' Tension Wire	1 for each	As Required	On Site	Sample
698.	Geotextile Fabrics	Relevant tests, as required		Total Qty of Material/ Type/ Source			As Required		Certificate of Compliance



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Preliminary Quality Control Sampling and Testing Schedule

Work Item	Material Description	Quality Characteristic	Test Method(s)	Lot Size	Sublot Size / Test Frequency	Sample Size	Sampling Method	Point of Sample	Comments / Remarks
801.	PVC Electrical Conduit			Total Qty of Material/ Type	Each Size				Certificate of Compliance
813.	Electrical Wire/Cable			Total Qty of Material/ Type	Each Size				Certificate of Compliance
815.	Traffic Sign Components			Total Qty of Material/ Type					Certificate of Compliance
828.	Traffic Sign Components			Total Qty of Material/ Type					Certificate of Compliance
860.	Permanent Pavement Markings	Relevant tests, as required		Total Quantity of Material / Type/ Source	Per Batch	1 qt. Paint 1 bag Thermo 1 bag Beads	As Required	On Site	Certificate of Compliance Sample Independent Test Report
910.	Steel Reinforcement	Relevant tests, as required		Total Quantity of Material for each size bar/ Source	1 for each size bar	Two 2' lengths for each size bar	As Required	On Site	Certificate of Compliance Mill Cert Independent Test Report
970.	Bituminous Damp-proofing	Relevant tests, as required		Total Qty of Material/ Type/ Source	1 per Delivered Lot	1 qt	As Required	On Site	Certificate of Compliance Independent Test Report

PROJECT ITEM INFORMATION							ACCEPTANCE SAMPLING AND DOCUMENTATION REQUIREMENTS									STATUS	
ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		NU	SA	SOURCE & LOCATION	NOTES	SAMPLING	FREQUENCY	RMS 784 (NCR) STATUS	RMS	RMS	RMS	CC	OTHER DOCUMENTATION	RE	DME
222	FRAME AND GRATE - MASSDOT BAR TYPE	35	EA								768*	903*		CC	1. * = If manufacturer's casting date is not on the QCML, RMS 768 must be submitted and the manufacturer must submit test bars and Certificate of Compliance. Otherwise, submit RMS 903 and Certificate of Compliance.		
187.3	REMOVAL AND DISPOSAL OF DRAINAGE STRUCTURE SEDIMENTS		CY				New item number: 227.3								No Material Requirements	C	V
187.31	REMOVAL AND DISPOSAL OF DRAINAGE PIPE SEDIMENTS		FT				New item number: 227.31								No Material Requirements	C	V
227.4	MASONRY PLUG	25	SF				Same as Item 201	"Same as Item XXX" wording may be used in the "NOTES" Column in lieu of typing the sub-items ONLY IF SOURCE IS IDENTICAL.							1. Enter the following sub-items into the next three rows: "Mortar Sand", "Portland Cement", "Clay Brick"		
241.12	12 INCH REINFORCED CONCRETE PIPE	1112	FT								903			CC			
241.15	15 INCH REINFORCED CONCRETE PIPE	160	FT								903			CC			
241.18	18 INCH REINFORCED CONCRETE PIPE	64	FT								903			CC			
242.12	12 INCH REINFORCED CONCRETE PIPE FLARED END	6	EA								903			CC			
242.15	15 INCH REINFORCED CONCRETE PIPE FLARED END	1	EA								903			CC			
242.18	18 INCH REINFORCED CONCRETE PIPE FLARED END	1	EA								903			CC			
258	STONE FOR PIPE ENDS	76	SY								902						
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	1869	FT								903			CC	1. Enter the following sub-items into the the next two rows: "Crushed Stone" & "Geotextile Fabric"		
	CRUSHED STONE							1 test per lot per each source			772						
	GEOTEXTILE FABRIC										903			CC			
269.08	8 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	1000	FT								903			CC	1. Enter the following sub-items into the the next two rows: "Crushed Stone" & "Geotextile Fabric"		
	CRUSHED STONE							1 test per lot per each source			772						
	GEOTEXTILE FABRIC										903			CC			
402	DENSE GRADED CRUSHED STONE FOR SUB-BASE	3829	CY					1 per 5,000 cy or fraction thereof from each source			772	901					
402.13	PAVEMENT MILLING MULCH	928	CY					1 per 5,000 cy or fraction thereof from each source			780	901					
415	PAVEMENT MICROMILLING		SY								902				1. Quality Control Plan for Field Inspection		
431	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE		SY				No QTY Provided								1. Enter the following sub-items in the next three rows: "Cement Concrete", "Preformed Joint Filler", "Hot Poured Joint Sealer"		
	CEMENT CONCRETE							1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	PREFORMED JOINT FILLER													CC			
	HOT POURED JOINT SEALER							1 for each material from each source			769			CC			
440.5	CONSTRUCTION DUST CONTROL														No Material Requirements	C	V
443	WATER FOR ROADWAY DUST CONTROL		MGL												No Material Requirements	C	V
450.8	HMA FRICTION COURSE - ASPHALT RUBBER GAP GRADED (HMA - ARGG)	5738	TON				Non-Standard Item	PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
450.9	CONTRACTOR QUALITY CONTROL		TON												1. Quality Control Plan for Plant Inspection and Field Inspection		
451	HMA FOR PATCHING	53	TON								902						
452	ASPHALT EMULSION FOR TACK COAT	12000	GAL					DME is to randomly select 2 projects per month for sampling. District is to use the labels developed by RMS. RMS 100 is required with the samples. 1 quart min size.			776			CC	Certificate of Compliance for each sample, with the lot number		
453	HMA JOINT SEALANT	10000	FT					1 for each material from each source			769						
455.22	SUPERPAVE SURFACE COURSE - 9.5 (SSC - 9.5)	5591	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
455.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	988	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
455.31	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5)	2011	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
455.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	5868	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
455.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	7203	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
455.52	SUPERPAVE LEVELING COURSE - 9.5 (SLC - 9.5)		TON				Need QTY	PG Binder Grading - 1 per 12,000 tons (sublot); Plant & Cores - 1 per 600 tons (sublot)			777	785	773				
455.60	SUPERPAVE BRIDGE SURFACE COURSE - 9.5 (SSC-B - 9.5)	1005	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant - 1 per 600 tons (sublot); Nuclear Guage or Pavement by Electronic Surface Contact Devices - 1 per 150 tons (sublot)			777	900	773				
455.70	SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 (SPC-B - 9.5)	1005	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant - 1 per 600 tons (sublot); Nuclear Guage or Pavement by Electronic Surface Contact Devices - 1 per 150 tons (sublot)			777	900	773				
455.71X	WARM MIX ASPHALT PAVEMENT	23671	TON					PG Binder Grading - 1 per 12,000 tons (sublot); Plant - 1 per 600 tons (sublot); Nuclear Guage or Pavement by Electronic Surface Contact Devices - 1 per 150 tons (sublot)			777	900	773				
472	HOT MIX ASPHALT FOR MISCELLANEOUS WORK	100	TON								902						
477.5	RUMBLE STRIP MILLED AND PATCHED	18800	FT								902						
482.3	SAWING ASPHALT PAVEMENT		FT												No Material Requirements	C	V
511.1	GRANITE EDGING TYPE SB - STRAIGHT	5300	FT								902						
512.1	GRANITE EDGING TYPE SB (RADIUS 10 FEET OR LESS)	17	FT								902						
514	GRANITE CURB INLET - STRAIGHT	2	EA								902						
595	CURB INLET REMOVED AND DISCARDED		EA				Confirm Not Used?								No Material Requirements	C	V
597	EDGING REMOVED AND DISCARDED	3400	FT												No Material Requirements	C	V
620.33	GUARDRAIL, TL-3 (SINGLE FACED)	13200	FT				Non-Standard Item				903			CC	1. Mill Test Report with heat number and galvanization; 2. Provide Heat Number information when installing guardrail panel		

PROJECT ITEM INFORMATION							ACCEPTANCE SAMPLING AND DOCUMENTATION REQUIREMENTS								STATUS	
ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	NU	SA	SOURCE & LOCATION	NOTES	SAMPLING	FREQUENCY	RMS 784 (NCR) STATUS	RMS	RMS	RMS	CC	OTHER DOCUMENTATION	RE	DME
627.1	STEEL W BEAM TERMINAL SECTION (SINGLE FACED)	5 EA				Trailing Anchorage				903			CC	1. Mill Test Report with heat number and galvanization		
627.83	GUARDRAIL TANGENT END TREATMENT, TL-3	1 EA				Non-Standard Item				903			CC	1. Mill Test Report with heat number and galvanization; 2. Provide Heat Number information when installing guardrail panel		
627.93	GUARDRAIL FLARED END TREATMENT, TL-3	4 EA				Non-Standard Item				903			CC	1. Mill Test Report with heat number and galvanization; 2. Provide Heat Number information when installing guardrail panel		
628.21	TRANSITION TO NCHRP 350 GUARDRAIL	24 EA				Non-Standard Item				903			CC	1. Mill Test Report with heat number and galvanization; 2. Provide Heat Number information when installing guardrail panel		
628.24	TRANSITION TO BRIDGE RAIL	24 EA				Non-Standard Item				903			CC	1. Mill Test Report with heat number and galvanization; 2. Provide Heat Number information when installing guardrail panel		
629.1	PRECAST CONCRETE BARRIER - SINGLE FACED	1200 FT								903			CC	1. Shop Drawings; 2. R&M - Plant Inspection Reports		
629.3	CAST-IN-PLACE CONCRETE BARRIER - SINGLE FACED	2100 FT					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
635.1	HIGHWAY GUARD REMOVED AND DISCARDED	8582 FT				New Item Number: 630.2								No Material Requirements	C	V
697	SEDIMENTATION FENCE	250 FT								903			CC	1. Data Sheet Approved by Engineer		
697.1	SILT SACK	105 EA											CC	1. Data Sheet Approved by Engineer		
698.3	GEOTEXTILE FABRIC FOR SEPARATION	4500 SY								903			CC	1. Data Sheet Approved by Engineer		
740.3	ENGINEERS FIELD OFFICE AND EQUIPMENT (TYPE A)	LS												No Material Requirements	C	V
748	MOBILIZATION	LS												No Material Requirements	C	V
751	LOAM BORROW	3790 CY												1. Independent Test Report		
751.7	HAY MULCH	144 SY				New Item Number: 751.7				902						
751.72	COMPOST TOPDRESSING	34144 CY				Non-Standard Item								1. Independent Test Report		
775.75	WETLAND RESTORATION AND LANDSCAPING															
756	NPDES STORMWATER POLLUTION PREVENTION PLAN	LS												1. NDPES Stormwater Pollution Prevention Plan		
765.422	SEEDING - MID HEIGHT UPLAND NATIVE MIX - FULL SUN	34144 SY				Non-Standard Item								1. Enter the following sub-items into the next three rows: "Seed", "Limestone", "Fertilizer"		
	SEED												CC	1. Container Label		
	LIMESTONE												CC	1. Container Label		
	FERTILIZER												CC	1. Container Label		
767.121	SEDIMENT CONTROL BARRIER	8500 FT											CC	1. Enter the following sub-items into the row: "Compost Soil"		
	COMPOST SOIL													1. Independent Test Report		
767.8	BALES OF HAY FOR EROSION CONTROL	EA												No Material Requirements	C	V
769	PAVEMENT MILLING MULCH UNDER GUARD RAIL	13087 FT								902				1. Enter the following sub-component into the next row: "Geotextile Fabric"		
	GEOTEXTILE FABRIC									903			CC			
800	OVERHEAD GUIDE SIGN/SIGNS/PAVEMENT MARKINGS					Pay Item										
819.903	INSTALL 3 LANE TRAFFIC DATA STATION	2 LS				Non-Standard Item				902			CC	1. Include data of operation test on RMS902; 2. List of Equipment to be supplied; 3. Catalog Cuts 4. Data; 4. Design Engineer Stamp of Approval		
827.21	24 INCH WARNING CLUSTER (H1-2) - ALUMINUM PANEL (TYPE A)	EA				No QTY Provided							CC			
828.03	OVERHEAD GUIDE SIGN REMOVED	EA												No Material Requirements	C	V
828.1	OVERHEAD GUIDE SIGN - ALUMINUM PANEL (TYPE B)	1047 SF											CC			
829	ROADSIDE GUIDE SIGN (G) - ALUMINUM PANEL (TYPE B)	195 SF											CC			
832	WARNING-REGULATORY AND ROUTE MARKER - ALUM. PANEL (TYPE A)	220 SF											CC			
833.5	DEMOUNTABLE REFLECTORIZED DELINEATOR - GUARD RAIL	524 EA											CC			
833.7	DELINEATION FOR GUARD RAIL TERMINI	10 EA											CC			
840	UTILITY PROTECTION AND CCTV INSPECTION															
840.103	SUPPORTS FOR OVERHEAD GUIDE SIGN (OD-3) STEEL	1 LS								903			CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
840.104	SUPPORTS FOR OVERHEAD GUIDE SIGN (OD-4) STEEL	1 LS								903			CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
840.105	SUPPORTS FOR OVERHEAD GUIDE SIGN (OD-5) STEEL	1 LS								903			CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
840.106	SUPPORTS FOR OVERHEAD GUIDE SIGN (OD-6) STEEL	1 LS								903			CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
840.107	SUPPORTS FOR OVERHEAD GUIDE SIGN (OD-7) STEEL	1 LS								903			CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		

PROJECT ITEM INFORMATION							ACCEPTANCE SAMPLING AND DOCUMENTATION REQUIREMENTS								STATUS	
ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	NU	SA	SOURCE & LOCATION	NOTES	SAMPLING	FREQUENCY	RMS 784 (NCR) STATUS	RMS	RMS	RMS	CC	OTHER DOCUMENTATION	RE	DME
840.108	SUPPORTS FOR OVERHEAD GUIDE SIGN (OD-8) STEEL	1 LS								903			CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
844.103	SUPPORTS FOR GUIDE SIGN (G3) STEEL	1 LS											CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
844.104	SUPPORTS FOR GUIDE SIGN (G4) STEEL	1 LS											CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
844.105	SUPPORTS FOR GUIDE SIGN (G5) STEEL	1 LS											CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
844.106	SUPPORTS FOR GUIDE SIGN (G6) STEEL	1 LS											CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
844.107	SUPPORTS FOR GUIDE SIGN (G7) STEEL	1 LS											CC	1. Enter the following sub-items into the next three rows: "Anchor Bolts", "Cement Concrete", "Rebar"		
	ANCHOR BOLTS												CC	1. Mill Test Report		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
847.1	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL	29 EA								903			CC			
851.11	TRAFFIC MANAGEMENT AND MOBILIZATION															
851.21	TEMPORARY TRAFFIC CONTROL															
852	SAFETY SIGNING FOR CONSTRUCTION OPERATIONS	480 SF								902			CC	1. Certificate of Compliance if item is a new material; 2. RMS 902 if item is a used Material		
851.1	TRAFFIC CONES FOR TRAFFIC MANAGEMENT	32550 DAY								902			CC			
853.23	TEMPORARY BARRIER (TL-3)	5950 FT								903			CC	1. For previously used barrier, RMS 903 QCML Form is required and Contractor is to generate Certificate of Compliance, identifying the manufacturer of the barrier and type.		
853.231	TEMPORARY BARRIER (TL-3) REMOVED & RESET	1550 FT								903			CC	1. For previously used barrier, RMS 903 QCML Form is required and Contractor is to generate Certificate of Compliance, identifying the manufacturer of the barrier and type.		
853.3	TEMPORARY BARRIER - RESTRAINED (TL-3)	780 FT								903			CC	1. For previously used barrier, RMS 903 QCML Form is required and Contractor is to generate Certificate of Compliance, identifying the manufacturer of the barrier and type.		
853.31	TEMPORARY BARRIER - RESTRAINED (TL-3) REMOVED & RESET	780 FT								903			CC	1. For previously used barrier, RMS 903 QCML Form is required and Contractor is to generate Certificate of Compliance, identifying the manufacturer of the barrier and type.		
853.33	TEMPORARY BARRIER - LIMITED DEFLECTION (TL-3)	7150 FT								903			CC	1. For previously used barrier, RMS 903 QCML Form is required and Contractor is to generate Certificate of Compliance, identifying the manufacturer of the barrier and type.		
853.331	TEMPORARY BARRIER - LIMITED DEFLECTION (TL-3) REMOVED & RESET	15780 FT								903			CC	1. For previously used barrier, RMS 903 QCML Form is required and Contractor is to generate Certificate of Compliance, identifying the manufacturer of the barrier and type.		
853.403	MOVABLE IMPACT ATTENUATOR	600 UD								903			CC			
853.501	TEMP.IMP.ATTENUATOR - R&R	EA												No Material Requirements	C	V
853.53	TEMPORARY IMPACT ATTENUATOR, UNI-DIRECTIONAL, NON-REDIRECTIVE (TL-3)	5 EA				Non-Standard Item				903			CC			
853.63	TEMPORARY IMPACT ATTENUATOR, UNI-DIRECTIONAL, REDIRECTIVE (TL-3)	EA				Non-Standard Item, No QTY Provided				903			CC			
853.73	TEMPORARY IMPACT ATTENUATOR, BI-DIRECTIONAL, NON-REDIRECTIVE (TL-3)	EA				Non-Standard Item, No QTY Provided				903			CC			
853.8	TEMPORARY ILLUMINATION FOR NIGHT WORK	UD												No Material Requirements	C	V
853.81	TEMPORARY ILLUMINATION FOR LANE CLOSURES/SHIFT AND CROSSOVER AREAS													No Material Requirements	C	V
853.83	TEMPORARY IMPACT ATTENUATOR, BI-DIRECTIONAL, REDIRECTIVE (TL-3)	EA				Non-Standard Item, No QTY Provided				903			CC			
854.016	TEMPORARY PAVING MARKINGS - 6 IN. (PAINTED)	84119 FT								903			CC	1. Enter the following sub-component into the next row. "Glass Beads"		
	GLASS BEADS									903			CC			
854.036	TEMPORARY PAVEMENT MARKINGS - 6 IN. (REMOVABLE TAPE)	500 FT								903			CC			
854.1	PAVEMENT MARKING REMOVAL - PAINT	SF												No Material Requirements	C	V
856	SPECIAL LIGHTING UNIT (FLASHING ARROW)	UD												No Material Requirements	C	V
856.3	REAL-TIME TRAFFIC MANAGEMENT SYSTEM FOR WORK ZONES															
859	REFLECTORIZED DRUM	216000 DD								902						
864.31	SLOTTED PAVEMENT MARKER ONE-WAY WHITE	260 EA								903			CC			
864.33	SLOTTED PAVEMENT MARKER TWO-WAY WHITE/RED	260 EA								903			CC			

PROJECT ITEM INFORMATION							ACCEPTANCE SAMPLING AND DOCUMENTATION REQUIREMENTS								STATUS	
ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	NU	SA	SOURCE & LOCATION	NOTES	SAMPLING	FREQUENCY	RMS 784 (NCR) STATUS	RMS	RMS	RMS	CC	OTHER DOCUMENTATION	RE	DME
866.06	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	15291 FT				EWO - Change from Polyurea to Thermoplastic				903			CC	1. Enter the following sub-component into the next row: "Glass Beads"		
	GLASS BEADS									903			CC			
866.12	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	2966 FT				EWO - Change from Polyurea to Thermoplastic				903			CC	1. Enter the following sub-component into the next row: "Glass Beads"		
	GLASS BEADS									903			CC			
867.06	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)	10338 FT				EWO - Change from Polyurea to Thermoplastic				903			CC	1. Enter the following sub-component into the next row: "Glass Beads"		
	GLASS BEADS									903			CC			
874.2	TRAFFIC SIGN REMOVED AND RESET	EA												No Material Requirements	C	V
874.41	TRAFFIC SIGN REMOVED AND DISCARDED	EA												No Material Requirements	C	V
900.9	PUNCH LIST/AS-BUILT REQUIREMENTS													No Material Requirements	C	V
904.14	RAPID SETTING CONCRETE (LOW ABSORPTION)	320 CY				Check Material Requirements										
905	4000 PSI, 3/8 IN., 660 CEMENT CONCRETE	550 CY					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
909.4	VERTICAL & OVERHEAD SURFACE CONCRETE REPAIR MORTAR	320 CY					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
910	STEEL REINFORCEMENT FOR STRUCTURES	14400 LB					1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
910.1	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	14400 LB					1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
910.11	EMBEDDED GALVANIC ANODES					Non-Standard Item, No QTY Provided				902						
911.607	7/8 INCH DIAMETER HIGH STRENGTH BOLTS	3750 EA				Temp Works							CC	1. Mill Test Report		
911.61	1 1/4 INCH DIAMETER HIGH STRENGTH BOLTS	375 EA				Temp Works							CC	1. Mill Test Report		
943.24	STEEL PIPE PILE 24 INCH OUTSIDE DIAMETER	9500 FT				Moses Wheeler Piles - per Temp Works Plan							CC	1. Mill Test Report; 2. Enter the following sub-items into the next two rows: "Cement Concrete" & "Rebar"		
960.11	STRUCTURAL STEEL - UNCOATED	2725000 LB				Moses Wheeler Steel - per Temp Works Plan				903			CC	1. Mill Test Report; 2. Bridge - Plant Inspection		
964.3	ELASTOMERIC PROTECTIVE COATING	SF				Non-Standard Item, No QTY Provided				903			CC	OR IF NOT ON QPL: Approved shop drawings by the design engineer		
993.2	CONSTRUCTION ACCESS STRUCTURES FOR BRIDGE STRUCTURES H-12-039 (2WM AND 2WN)					Per Temp Works Management Plan										
995.01 - 1	Example															
995.01	BRIDGE STRUCTURE, BRIDGE NO. _____	LS												1. Read the Contract Document Special Provisions and enter all structure lump sum bid items, sub-items, and documentation requirements		
119.5	CONSTRUCTION NOISE CONTROL					Non-Standard Item								No Material Requirements	C	V
140	BRIDGE EXCAVATION	CY												No Material Requirements	C	V
901	4000 PSI, 1.5 IN., 565 CEMENT CONCRETE	9 CY					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
904	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE	2211 CY					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
904.3	5000 PSI, 3/4 IN., 685 HP CEMENT CONCRETE	976 CY					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
904.4	4000 PSI, 3/4 IN., 585 HP CEMENT CONCRETE	7915 CY					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775						
910.4	MECHANICAL REINFORCING BAR SPLICER	5928 EA					1 for each grade and size from each source with heat number			903			CC	1. Must include heat number on RMS 903; 2. Mill Certification		
911.1	SHEAR CONNECTORS	29220 EA												1. Mill Certification		
911.607	7/8 INCH DIAMETER HIGH STRENGTH BOLTS	368 EA											CC	1. Mill Test Report		
911.61	1 INCH DIAMETER HIGH STRENGTH BOLTS	14696 EA											CC	1. Mill Test Report		
912	DRILLING AND GROUTING DOWELS	250 EA								768				1. Review Engineering Directive "E-10-001" and Special Provisions; 2. Enter the following sub-components into the next two rows: "Adhesive for Anchoring" and "Grout"		
	ADHESIVE FOR ANCHORING									768				1. Review Engineering Directive "E-10-001" and Special Provisions		
	GROUT									768*	903*		CC	1. 768* = RMS768 is required when Special Provision accepts only certain Manufacturers on the QCML; 2. 903* = RMS903 is required when Special Provision accepts all manufacturers listed on the QCML		
933	ELASTOMERIC BRIDGE BEARING PAD	104 EA					1 of each size per type							1. Independent Test Report; 2. Manufacturer's Analysis		
935	GALVANIZED STEEL STAY-IN-PLACE FORM	91957 SF			Non-Standard Item, Check Material Requirements								CC			
942.144	STEEL PILE HP 14 X 117	7672 FT											CC	1. Mill Test Report		
944.144	STEEL PILE SPLICE HP 14 X 117.	28 EA											CC	1. Mill Test Report; 2. Shop Drawings		
945.109	DRILLED SHAFT EXCAVATION 7.0 FOOT DIAMETER	FT												No Material Requirements	C	V
945.208	ROCK SOCKET EXCAVATION 6.5 FOOT DIAMETER	FT												No Material Requirements	C	V
945.309	OBSTRUCTION EXCAVATION 7.0 FOOT DIAMETER	FT												No Material Requirements	C	V
945.508	DRILLED SHAFT 6.5 FOOT DIAMETER	271 FT											CC	1. Enter the following sub-items in the next two rows: "Cement Concrete", "Rebar"		
	REBAR						1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
	CEMENT CONCRETE						1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
945.509	DRILLED SHAFT 7.0 FOOT DIAMETER	821 FT											CC	1. Enter the following sub-items in the next two rows: "Cement Concrete", "Rebar"		
	REBAR	401725					1 (2 x 24" Sample) for each grade and size from each source with heat number			769			CC	1. Must include heat number on RMS 769; 2. Mill Certification		
	CEMENT CONCRETE	1550					1 Test per 100 (sublot) cy or fraction thereof for each pour of each class, minimum one test a day			775				1. District - Plant Inspection		
945.609	PERMANENT CASING 7.0 FOOT DIAMETER	821 FT											CC			
945.81	OSTERBERG LOAD CELL AXIAL LOAD TEST	EA				New Item Number: 945.61								1. Shop Drawings; 2. Test Reports		
945.71	CROSS HOLE SONIC TESTING ACCESS PIPES	4368 FT												1. Shop Drawings; 2. Test Reports		
945.72	CROSS HOLE SONIC TEST	16 EA												1. Shop Drawings; 2. Test Reports		
948.4	DYNAMIC LOAD TEST PREPARATION	8 EA												1. Test Reports		
948.41	DYNAMIC LOAD TEST BY CONTRACTOR	8 EA												1. Test Reports		
948.5	PILE SHOES	104 EA											CC	1. Mill Test Report; 2. Shop Drawings		

PROJECT ITEM INFORMATION							ACCEPTANCE SAMPLING AND DOCUMENTATION REQUIREMENTS								STATUS	
ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY	NU	SA	SOURCE & LOCATION	NOTES	SAMPLING	FREQUENCY	RMS 784 (NCR) STATUS	RMS	RMS	RMS	CC	OTHER DOCUMENTATION	RE	DME
950.X	TEMPORARY EARTH SUPPORT SYSTEM	115 SY				This Item Number needs to be revised				902				1. Shop Drawings		
950.1	TEMPORARY SHORING	1 LS								902				1. Shop Drawings		
960.12	STRUCTURAL STEEL - M270 GRADE 70HPS & 50 HPS	3742500 LB								903			CC	1. Mill Test Report; 2. Bridge - Plant Inspection		
965.2	MEMBRANE WATERPROOFING FOR BRIDGE DECKS - SPRAY APPLIED	103392 SF					Manufacturer Prequalification: 1 per project, from the manufacturer; Manufacturer Field Testing: 1 per project, from the job site			768	769		CC	1. Independent Test Reports conforming to specifications shall be attached to the RMS 768; 2. District is to submit prequalification sample to Research & Materials; 3. Manufacturer is to perform field testing on site		
968.1	SCUPPER AND DOWNSPOUT	58 EA											CC			
970	BITUMINOUS DAMP-PROOFING	9500 SY					1 per project			769						
973	MODULAR EXPANSION JOINT SYSTEM	304 FT			Non-Standard Item					903			CC	1. RMS 903 category is Approved Fabricators, Misc. Steel; 2. Enter the following sub-items into the next six rows: "Neoprene Strip Seal", "Elastomeric Concrete", "Epoxy-Resin Base Bonding System for Concrete", "Structural Steel", "Galvanized Coatings", & "Steel Extrusions"		
	NEOPRENE STRIP SEAL						1 per joint			769			CC	1. Data Sheet Approved by Engineer		
	STRUCTURAL STEEL												CC	1. Mill Test Report		
	GALVANIZED COATINGS												CC			
	STEEL EXTRUSIONS												CC	1. Mill Test Report		
981.01	MONITORING OF EXISTING STRUCTURES															
983.2	RIPRAP	550 CY								902						
983.3	RIPRAP REMOVED AND RELAID	CY												No Material Requirements	C	V
986	MODIFIED ROCKFILL	840 TON								902						
989.211	CEMENT CONCRETE CRACK SEALING															
991.1	CONTROL OF WATER - STRUCTURE NO. _____	LS												1. Read the Contract Document Special Provisions and enter all structure lump sum bid items, sub-items, and documentation requirements		
994.1	TEMPORARY PROTECTIVE SHIELDING	67640 SF								902				1. Read the Contract Document Special Provisions and enter all structure lump sum bid items, sub-items, and documentation requirements; 2. Shop Drawings		
994.3	REMOVE PROTECTIVE SHIELDING	SF												No Material Requirements	C	V
999.49	HMA PAY ADJUSTMENT - PG ASPHALT BINDER CONTENT															
999.491	HMA PAY ADJUSTMENT - VOLUMETRICS (AIR VOIDS)															
999.492	HMA PAY ADJUSTMENT - IN-PLACE MAT DENSITY															
999.493	HMA PAY ADJUSTMENT - THICKNESS															
999.494	HMA PAY ADJUSTMENT - RIDE QUALITY															
999.7	GRANITE STONE VENEER	1 LS				Non-Standard Item - See SP, Check Req's				769						



New England, Inc.



Appendix VI

Mock-Up and Control Section Forms

To be developed and incorporated if/as needed.