STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0016

Paul R. LePage
GOVERNOR

David Bernhardt
COMMISSIONER

April 12, 2013
Subject: **Bridgewater**
Federal Project No: BH-1786(900)X
State WIN: 17869.00
Amendment No. 2

Dear Sir/Ms:

Make the following changes to the Bid Document:

In the Bid Book (pages 16 thru 23) **REMOVE** the "SCHEDULE OF ITEMS" 8 pages dated 130319 and **REPLACE** with the attached new "SCHEDULE OF ITEMS" 8 pages dated 130412.

In the Bid Book (after page 113) **REMOVE** "SPECIAL PROVISION, SECTION 403, HOT MIX ASPHALT OVERLAY" 1 page dated February 12, 2013 and added in Amendment #1and **REPLACE** with the attached new "SPECIAL PROVISION, SECTION 403, HOT MIX ASPHALT OVERLAY" 1 page dated April 10, 2013

In the Bid Book (page 115) **REMOVE** "SPECIAL PROVISION, SECTION 502, STRUCTURAL CONCRETE" 1 page dated March 5, 2013 and **REPLACE** with the attached new "SPECIAL PROVISION, SECTION 502, STRUCTURAL CONCRETE" 1 page dated March 28, 2013

In the Bid Book (pages 150 thru 157) **REMOVE** "SPECIAL PROVISION, SECTION 534, PRECAST STRUCTURAL CONCRETE" 8 pages dated February 1, 2013 and **REPLACE** with the attached new "SPECIAL PROVISION, SECTION 534, PRECAST STRUCTURAL CONCRETE" 8 pages dated March 28, 2013.

In the Plans, Sheet Number 2 of 29, "ESTIMATED QUANTITIES" **DELETE** item "202.12 – REMOVING EXISTING STRUCTURAL CONCRETE – 1 – LS" and **REPLACE** in pen and ink with item "**202.17 - REMOVING EXISTING STRUCTURAL CONCRETE (1275 CY) – 1 – LS**"

In the Plans Sheet Number 21 of 29, "TEMPORARY BEARING" **DELETE** note #1 of the "BEARING NOTES" and **REPLACE** with the following in pen and ink;
"**1. The use of ASTM A709 Grade 50W will be allowed for the temporary bearing plate. Change Sentence 1 of Note 1 on Sheet 21 to read: Temporary bearing plates shall meet the requirements of ASTM A709 or A710 Grade 50W.**"

The following questions have been received:

Question: Item 2012.12 – Removing Structural Concrete is paid by the CY. Due to this activity being on the critical path, would the Department consider revising this to a Lump Sum pay item?

Response: Item 202.12 has been changed to Item 202.17 Removing Existing Structural Concrete (LS). Please see new Schedule of Items.

Question: Sheet No. 1 lists epoxy coated reinforcing steel under materials. Where is the epoxy reinforcing steel? The bar list calls for black reinforcing only.

Response: Epoxy coated reinforcing steel shall be used in the curb.

Question: Are density requirements for hot-mix asphalt waived for the bridge deck per normal MDOT practice? Special Provision 403 waives density on drives and incidentals only.

Response: Density required will be waived for hot-mix asphalt for the bridge deck. See updated Special Provision Section 403 Hot Mix Asphalt. The updated Special Provision Section 403 Hot Mix Asphalt dated April 10, 2013 supersedes Amendment #1 SP 403 dated February 12, 2013. See updated Special Provision 403.

Question: Will virgin hot-mix asphalt be required for the bridge deck?

Response: See Section 403 – Hot Bituminous Pavement (403.03). No recycled asphalt pavement will be allowed.

Question: Is a grouted shear key required for the precast approach slab sections?

Response: A grouted shear key is not required for precast approach slabs.

Question: Will MDOT consider waiving the pile re-strike requirements due to the relative short abutment piles bearing directly on bedrock?

Response: No restrike is required.

Question: Will MDOT consider waiving the 2nd PDA test due to the accelerated schedule on this project?

Response: The Department will not waive the second Dynamic Load Test.

Question: Reference Section 104, Utilities. The contract book says the utility company will set one pole at station 13+78 -32.5' LT and transfer wires. The pole that is currently located at 15+61.05 – 23.45' LT is very close to the Northerly edge of the new bridge. The North corner of the new abutment is approx.. 22' left of center line. The wires will be almost over it. The pole at 15+61.05 needs to be moved at least 10' further left.

Response: Existing poles shown on the plans at Sta. 15+61.05 – 23.45 Lt and Sta. 15+61.34 – 24.82 Lt are stub poles (abandoned). Upon further investigation it was found that the utilities would pass overhead in roughly the same position as the existing stub poles. A pole will be placed at Sta. 15+61.34 – 28.5 Lt to keep wires further from the end of the wingwall.

Question: Did MDOT contact any precast firms during the design development process for input? If so, is a list available?

Response: During the exploration of alternative for ABC Stresscon and Fort Miller were contacted. After deciding to use Prefabricated Deck Units, MassDOT and CME were contacted for information about the I-93 Fast 14 project where Prefabricated Deck Units were successfully used. To clarify; precasting of the Prefabricated Deck Units may be performed by the Contractor in the field.

Question: Where is the Light capital Paving located on the project?

Response: Light Capital Paving will be place on a 1 mile stretch of E. Blaine Rd. to be determined by the Resident.

Question: Sheet number 1 of 29 calls for structural steel to be ASTM A710, grade 50W. Sheet number 21 of 29 also refers to this specification for the temporary bearing plates. Please confirm that this is in fact the specification the State desires for this project.

Response: The use of ASTM A709 Grade 50W will be allowed for the temporary bearing plate. Change Sentence 1 of Note 1 on Sheet 21 to read: Temporary bearing plates shall meet the requirements of ASTM A709 or A710 Grade 50W.

Question: Can the 17 day bridge closure be extended to 35 days? The project site and the current design make an accelerated bridge project impossible to complete in the allotted time frame.

Response: The 17 day closure will not be changed. Using adequate resources, the Department is confident the project can be completed in the allotted time frame.

Question: Will the Department consider extending the bid date for this project?

Response: Due to the potential long lead time items, the bid date will remain the same.

Question: Does the Department have any special funding that relates to the means & methods shown in the drawings? Will alternate methods be considered after the award?

Response: The Department has secured funding directly related to the use of precast abutments and ASTM A710 Grade 50W steel. Alternative designs may be proposed after contract award according to the provisions of section 109 of the Standard Specifications.

Consider these changes and information prior to submitting your bid on April 17, 2013.

Sincerely,

George M. A. Macdougall P.E.
Contracts & Specifications Engineer

BIDDERS MUST ENTER ALL UNIT PRICES, MAKE ALL EXTENSIONS AND TOTAL THE BID.

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
SECTION 0001 PROJECT ITEMS						
0010	107.51 PROSECUTION OF WORK - INITIAL SCHEDULE	LUMP	LUMP			
0020	107.52 PROSECUTION OF WORK - MONTHLY UPDATE	3.000 EA				
0030	107.54 PROSECUTION OF WORK - WEEKLY UPDATES	2.000 EA				
0040	202.10 REMOVING EXISTING SUPERSTRUCTURE (PROPERTY OF CONTRACTOR)	LUMP	LUMP			
0050	202.17 REMOVING EXISTING STRUCTURAL CONCRETE	LUMP	LUMP			
0060	203.20 COMMON EXCAVATION	400.000 CY				
0070	203.21 ROCK EXCAVATION	10.000 CY				
0080	203.24 COMMON BORROW	400.000 CY				
0090	203.25 GRANULAR BORROW	450.000 CY				
0100	203.26 GRAVEL BORROW	85.000 CY				

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0110	206.082 STRUCTURAL EARTH EXCAVATION - MAJOR STRUCTURES	1435.000 CY				
0120	304.09 AGGREGATE BASE COURSE - CRUSHED	725.000 CY				
0130	403.208 HOT MIX ASPHALT 12.5 MM HMA SURFACE	117.000 T				
0140	403.213 HOT MIX ASPHALT 12.5 MM BASE	220.000 T				
0150	409.15 BITUMINOUS TACK COAT - APPLIED	67.000 G				
0160	461.13 LIGHT CAPITAL PAVING	750.000 T				
0170	501.231 DYNAMIC LOADING TEST	2.000 EA				
0180	501.50 STEEL H-BEAM PILES 89 LBS/FT, DELIVERED	400.000 LF				
0190	501.501 STEEL H-BEAM PILES 89 LBS/FT, IN PLACE	400.000 LF				
0200	501.903 PILE TIPS - ROCK INJECTOR POINT	12.000 EA				
0210	501.91 PILE SPLICES	4.000 EA				

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0220	501.92 PILE DRIVING EQUIPMENT MOBILIZATION	LUMP	LUMP			
0230	502.219 STRUCTURAL CONCRETE, ABUTMENTS AND RETAINING WALLS	LUMP	LUMP			
0240	503.12 REINFORCING STEEL, FABRICATED AND DELIVERED	3950.000 LB				
0250	503.13 REINFORCING STEEL, PLACING	3950.000 LB				
0260	504.702 STRUCTURAL STEEL FABRICATED AND DELIVERED, WELDED	LUMP	LUMP			
0270	504.71 STRUCTURAL STEEL ERECTION	LUMP	LUMP			
0280	505.08 SHEAR CONNECTORS	LUMP	LUMP			
0290	506.9102 ZINC RICH COATING SYSTEM (SHOP APPLIED)	LUMP	LUMP			
0300	507.0811 STEEL BRIDGE RAILING, 2 BAR	LUMP	LUMP			
0310	507.0812 STEEL APPROACH RAILING, 2 BAR	4.000 EA				
0320	508.14 HIGH PERFORMANCE WATERPROOFING MEMBRANE	LUMP	LUMP			

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0330	510.10 SPECIAL DETOUR_____ROADWAY WIDTH VEHICULAR & PEDESTRIAN TRAFFIC NOT SEPARATED 12 FT	LUMP	LUMP			
0340	511.07 COFFERDAM: ABUT NO.1	LUMP	LUMP			
0350	511.07 COFFERDAM: ABUT NO.2	LUMP	LUMP			
0360	512.081 FRENCH DRAINS	LUMP	LUMP			
0370	514.06 CURING BOX FOR CONCRETE CYLINDERS	1.000 EA				
0380	515.20 PROTECTIVE COATING FOR CONCRETE SURFACES	140.000 SY				
0390	526.301 TEMPORARY CONCRETE BARRIER TYPE I	LUMP	LUMP			
0400	527.303 ENERGY ABSORBING SYSTEM (ET-PLUS)	1.000 EA				
0410	527.34 WORK ZONE CRASH CUSHIONS	5.000 UN				
0420	534.30 PRECAST STRUCTURAL CONCRETE	LUMP	LUMP			

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0430	534.76 PRECAST ABUTMENT	LUMP	LUMP			
0440	534.7601 PRECAST APPROACH SLAB	LUMP	LUMP			
0450	606.1722 BRIDGE TRANSITION - TYPE 2	4.000 EA				
0460	606.23 GUARDRAIL TYPE 3C - SINGLE RAIL	185.000 LF				
0470	606.232 GUARDRAIL TYPE 3C - OVER 15 FOOT RADIUS	12.500 LF				
0480	606.353 REFLECTORIZED FLEXIBLE GUARDRAIL MARKER	8.000 EA				
0490	606.366 GUARDRAIL, REMOVE & RESET TYPE 3C	90.000 LF				
0500	606.367 REPLACE UNUSABLE EXISTING GUARDRAIL POSTS	10.000 EA				
0510	606.79 GUARDRAIL 350 FLARED TERMINAL	1.000 EA				
0520	610.08 PLAIN RIPRAP	375.000 CY				
0530	610.16 HEAVY RIPRAP	1275.000 CY				

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS		UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0540	610.18 STONE DITCH PROTECTION	40.000	CY				
0550	613.319 EROSION CONTROL BLANKET	140.000	SY				
0560	615.07 LOAM	85.000	CY				
0570	618.1401 SEEDING METHOD NUMBER 2 - PLAN QUANTITY	14.000	UN				
0580	619.1401 EROSION CONTROL MIX	165.000	CY				
0590	620.58 EROSION CONTROL GEOTEXTILE	2050.000	SY				
0600	627.733 4" WHITE OR YELLOW PAINTED PAVEMENT MARKING LINE	1200.000	LF				
0610	629.05 HAND LABOR, STRAIGHT TIME	10.000	HR				
0620	631.12 ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR)	10.000	HR				
0630	631.14 GRADER (INCLUDING OPERATOR)	40.000	HR				
0640	631.15 ROLLER, EARTH AND BASE COURSE (INCLUDING OPERATOR)	10.000	HR				

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0650	631.172 TRUCK - LARGE (INCLUDING OPERATOR)	10.000 HR				
0660	631.175 CONTRACTOR TRUCKING	750.000 T				
0670	631.21 ROAD BROOM (INCLUDING OPERATORS AND HAULER)	10.000 HR				
0680	637.071 DUST CONTROL	LUMP	LUMP			
0690	639.18 FIELD OFFICE TYPE A	1.000 EA				
0700	652.312 TYPE III BARRICADE	4.000 EA				
0710	652.33 DRUM	20.000 EA				
0720	652.34 CONE	20.000 EA				
0730	652.35 CONSTRUCTION SIGNS	650.000 SF				
0740	652.36 MAINTENANCE OF TRAFFIC CONTROL DEVICES	30.000 CD				
0750	652.38 FLAGGER	200.000 HR				

CONTRACT ID: 017869.00 PROJECT(S): BH-1786(900)X

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0760	656.66 STONE CHECK DAM	5.000 CY				
0770	656.75 TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL	LUMP	LUMP			
0780	659.10 MOBILIZATION	LUMP	LUMP			
	SECTION 0001 TOTAL					
	TOTAL BID					

Bridgewater
WIN 017869.00
Boundary Line Rd.
Bridge Replacement
April 10, 2013

SPECIAL PROVISION
SECTION 403
HOT MIX ASPHALT OVERLAY

Desc. of Course	Grad Design	Item Number	Bit Cont. % of Mix	Total Thick	No. Of Layers	Comp. Notes
3" Boundary Bridge Deck						
Wearing	12.5mm	403.208	N/A	1 ½"	1	1,2,4,8
Base	12.5mm	403.213	N/A	1 ½"	1	1,2,4,8
5" Boundary Line Road						
Wearing	12.5mm	403.208	N/A	1 ½"	1	1,4,8
Base	12.5mm	403.213	N/A	1 ½"	1	1,4,8
Base	12.5mm	403.213	N/A	2"	1	1,4,8
2" Driveways						
Wearing	12.5mm	403.208	N/A	2"	1	1,2,4,10,14

COMPLEMENTARY NOTES

1. The required PGAB for this mixture will meet a **PG 58-28** to **PG 64-28** grading. The Contractor must stipulate which PGAB grading will be used to construct the entire HMA pavement structure prior to starting work.
2. The density requirements are waived. The use of an oscillating steel roller shall be required to compact all HMA pavements placed on bridge decks in addition to the normal roller train.
4. The design traffic level for mix placed shall be 0.3 to <3 million ESALS. The design, verification, Quality Control, and Acceptance tests for this mix will be performed at **50 gyrations.**
8. Section 106.6 Acceptance, (2) Method B.
10. Section 106.6 Acceptance, (2) Method D.
14. A mixture meeting the requirements of section 703.09 Grading 'D', with a minimum PGAB content of 6%, and the limits of Special Provision 401, Table 9 (Drives and Sidewalks) for PGAB content and gradation may be substituted for this item. A job mix formula shall be submitted to the department for approval.

Tack Coat

A tack coat of emulsified asphalt, RS-1, Item 409.15 shall be applied to any existing pavement at a rate of approximately 0.025 gal/yd², and on milled pavement approximately 0.05 gal/yd², prior to placing a new course. A fog coat of emulsified asphalt shall be applied between shim / intermediate course and the surface course, at a rate not to exceed 0.025 gal/yd².

Tack used between layers of pavement will be paid for at the contract unit price for Item 409.15 Bituminous Tack Coat.

SPECIAL PROVISION
SECTION 502
STRUCTURAL CONCRETE
(QC/QA Acceptance Methods)

CLASS OF CONCRETE	ITEM NUMBER	DESCRIPTION	P	METHOD
A	502.219	Structural Conc. Abut. and Retaining Walls, End Diaphragms and Longitudinal Closure Pours		C
A	502.219	Structural Conc. Abut. and Retaining Walls, Abutment Voids		C
A	*534.30	Structural Concrete Superstructure Slab	$400	A
LP	*534.30	Structural Concrete Curbs and Sidewalk		C

P values listed above reflect the price per cubic yard (yd^3) for all pay adjustment purposes

*If the Contractor chooses to perform work on the Prefabricated Deck Units in the field the requirements of Standard Provision 502 and the listed P value shall apply. If the work is performed in a Precast Plant the requirements of Special Provision 534, Precast Structural Concrete shall apply and no P value shall be applied.

Bridgewater
WIN 017869.00
March 28, 2013

SPECIAL PROVISION
SECTION 534

PRECAST STRUCTURAL CONCRETE

Section 534, Precast Structural Concrete of the Standard Specifications is added as follows:

534.01 Description: This work shall consist of fabricating, delivering, and erecting the precast abutments, prefabricated deck units and precast approach slabs, and related material. Materials, work, inspection and documentation not specifically addressed by this Specification shall be done in accordance with the applicable sections of the PRECAST/PRESTRESSED CONCRETE INSTITURE (PCI), *Manual for QUALITY CONTROL for Plants and Production of PRECAST AND PRESTRESSED CONCRETE PRODUCTS* (MNL 116), including Commentary.

534.02 Materials. Materials for precast and prestressed concrete products shall meet the requirements of the following Sections:

Water	701.02
Air Entraining Admixture	701.03
Water Reducing Admixture	701.04
High Range Water Reducing Admixture (HRWR)	701.0401
Set-Retarding Admixtures	701.05
Fly Ash	701.10
Calcium Nitrite Solution	701.11
Silica Fume	701.12
Ground Granulated Blast Furnace Slag	701.13
Fine Aggregate for Concrete	703.01
Coarse Aggregate for Concrete	703.02
Reinforcing Steel	709.01
Welded Steel Wire Fabric	709.02
Steel Strand for Concrete Reinforcement	709.03

Portland cement shall conform to the requirements of AASHTO M85 (ASTM C150), Type I, Type II, or Type III. The Contractor shall supply the Department with copies of certified mill tests of the cement. The mill tests shall show the name of the manufacturer, location where produced, silo number and the person or agency conducting the test.

Coarse aggregate shall conform to the requirements of Section 703.02 - Coarse Aggregate for Concrete, Class A, Class AA or Latex.

534.03. Drawings: The Contractor shall prepare shop detail, erection and other necessary working drawings in accordance with Section 105.7 - Working Drawings. The drawings will be reviewed and approved in accordance with the applicable requirements of Section 105.7. Changes and revisions to the approved working drawings shall require further approval by the Fabrication Engineer.

Concrete mix designs shall be part of the shop drawing submittal. Mix designs shall include aggregate specific gravity, absorption, percent fracture, fineness modulus and gradation.

A copy of the Contractor's Quality System Manual (Q.S.M.) shall be submitted when requested by the Fabrication Engineer.

534.04 Plant: Precast, prestressed or post-tensioned concrete products shall be manufactured in a Precast/Pre-stressed Concrete Institute (PCI) Certified facility. An alternate facility may be used at the discretion of the Engineer.

534.05 Inspection Facilities: The Contractor shall provide a private office at the fabrication plant for inspection personnel authorized by the Department. The office shall have an area not less than 100 ft² and shall be in close proximity to the work. The office shall be climate controlled to maintain the temperature between 65°F 18°C and 85°F, lighted and have the exit(s) closed by a door(s) equipped with a lock and 2 keys which shall be furnished to the Inspector(s). The office shall be equipped with a desk or table having a minimum size of 48 in by 30 in, 2 chairs, a telephone, telephone answering machine, line data port, plan rack and 2-drawer letter size file cabinet with a lock and 2 keys which shall be furnished to the Inspector(s).

The facilities and all furnishings shall remain the property of the Contractor upon completion of the work. Payment for the facilities, heating, lighting, telephone installation, basic monthly telephone charges and all furnishings shall be incidental to the contract.

534.06 Notice of Beginning Work: The Contractor shall give the Fabrication Engineer a minimum of two weeks notice prior to beginning work. The Contractor shall advise the Fabrication Engineer of the production schedule and any changes to it. If the Contractor suspends work on a project, the Fabrication Engineer will require 48 hours notice prior to the resumption of work.

534.07 Inspection: Quality Control (Q.C.) is the responsibility of the Contractor. Quality Control Inspectors (QCIs) shall have a valid PCI Quality Control Certification Level I, Level II or Level III. Personnel performing concrete testing shall hold a current ACI Field Testing Technician Grade I Certification or equivalent, or work under the direct supervision of an ACI certified technician.

The QCI shall inspect all aspects of the work in accordance with the Contractor's QSM. The QCI shall record measurements and test results on the appropriate forms from APPENDIX E of MNL 116 or an equivalent form prepared by the user. Copies of measurements and test results shall be provided to the Quality Assurance Inspector (QAI) as follows:

Type of Report	When Provided to Q.A.I*
Material certifications/stressing calculations/ calibration certifications	Prior to beginning work (anticipate adequate time for review by QAI)
Pre-pour inspection report	Prior to the concrete placement
Concrete Batch Slips	The morning of the next work day
Results of concrete testing	The morning of the next work day
Results of compressive testing (for release)	The same work day
Concrete temperature records	Provide with compressive testing (for Release)

Non-conformance reports/repair procedures	Within 24 hours of discovery
Results of compressive testing (for design strength)	Prior to stopping curing/Prior to final Acceptance
Post-pour inspection report	Prior to final acceptance

*The Contractor and QAI, by mutual agreement, may modify any part of the schedule; however, failure to provide the documentation when required will result in the product being deemed unacceptable.

The QCI shall reject materials and workmanship that do not meet contract requirements. The Contractor may perform testing in addition to the minimum required. The results of all testing shall be made available to the (QAI).

Quality Assurance (Q.A.) is the prerogative of the Fabrication Engineer. The QAI will verify documentation, periodically inspect workmanship, and witness testing. Testing deemed necessary by the Fabrication Engineer in addition to the minimum testing requirements shall be scheduled to minimize interference with the production schedule.

534.08 Inspector's Authority: The QAI will have the authority to reject material or workmanship that does not meet the contract requirements. The acceptance of material or workmanship by the QAI will not prevent subsequent rejection, if found unacceptable.

534.09 Rejections: Rejected material and workmanship shall be corrected or replaced by the Contractor. In the event that an item fabricated under this Specification does not meet the contract requirements but is deemed suitable for use by the Fabrication Engineer, said item will be paid for in accordance with Section 108.8.1 - Substantially Conforming Work.

534.10 Forms and Casting Beds: Form dimensions shall conform to the approved shop drawings. Forms shall be well constructed, carefully aligned and sufficiently tight to prevent leakage of mortar. Forms that do not maintain the plan dimensions within allowable tolerances during concrete placement shall be rejected.

Wood forms, if used, shall be sealed with a material to prevent absorption. The sealer shall be applied and cured in accordance with the manufacturer’s recommendations.

Forms shall be cleaned of adherent material before each use. Forms shall be cleaned of all foreign matter and debris immediately prior to placing concrete. New forms shall be free from paint or other protective coatings.

Forms shall be treated with a non-staining bond breaking compound applied in accordance with the manufacturer's recommendations.

If the reinforcing steel or post-tensioning ducts have been contaminated with the bond-breaking compound, it shall be cleaned with solvent. No concrete shall be placed until the reinforcing steel and post-tensioning ducts has been inspected and accepted by the QCI.

534.11 Reinforcing Steel: Reinforcing steel shall be fabricated, packaged, handled, stored, placed, spliced, and repaired in accordance with Section 503 - Reinforcing Steel.

Reinforcing steel shall be accurately located and securely anchored to prevent displacement during concrete placement. All reinforcing steel shall be installed and secured before beginning the concrete placement.

The concrete cover shown on the approved shop drawings shall be the minimum allowable cover. The contractor shall use bar supports and spacers to maintain the minimum concrete cover. The bar supports and spacers shall be made of a dielectric material or other material approved by the Fabrication Engineer.

534.12 Voids and Inserts: Voids shall be non-absorbent. The out-to-out dimensions of the voids shall be within 2% of plan dimensions. Damaged voids shall be repaired in manner acceptable to the QAI. Voids shall be stored, handled and placed in a manner that prevents damage. Residue from void placement shall be entirely removed from the forms before beginning or continuing the concrete placement.

Voids shall be located accurately, anchored securely, capped and vented. Any portion of a void that is displaced beyond the allowable dimensional tolerances shall be cause for rejection of the abutment segment.

534.13 Concrete: Concrete mix designs shall be submitted to the Fabrication Engineer for approval a minimum of 30 days prior to beginning work. Mix designs previously approved for use shall not require qualification by trial batch if the mix design meets all the requirements of this Section.

New concrete mix designs shall be qualified by trial batches prepared in accordance with AASHTO T126 (ASTM C192). The test results shall demonstrate that the concrete meets the requirements of the Plans and this Section. If accelerated curing is to be used in production, the test specimens shall be similarly cured.

No concrete shall be placed until the mix design has been approved. Approval of the mix design does not relieve the Contractor of the responsibility of meeting the requirements of this Section during production.

The concrete mix design shall meet the following requirements:

Table 1

Minimum cement content	658 lb/yd^3 [400 kg/m^3]
Water-cement ratio	0.40 maximum
Air entrainment	5½ % - 7½ %
Allowable slump	5 in to 10 in [125 mm to 255 mm]
Calcium Nitrite*	3 gal/yd^3 [14.85 L/m^3]
Silica Fume (when required)	5% - 10% of cement content by weight
Fly Ash	40% of cementitious material maximum
Slag	50% of cementitious material maximum

*The water in the Calcium Nitrite solution shall be included when calculating the water/cement ratio

The batching equipment, mixers and delivery equipment shall meet the requirements of MNL 116. Concrete shall be batched, mixed and handled in accordance with MNL 116.

534.14 Concrete Placement: The first two loads of concrete from each placement shall be tested by the QCI for temperature, air entrainment, and slump. If the first load is unacceptable, the second load shall be tested as the first. This process shall continue until two consecutive loads are found acceptable. After two consecutive loads are found acceptable, the frequency of testing shall be at the discretion of the QAI.

Concrete shall be tested if there is a change in the dosage rate of any admixture, a change of 2 in or more in slump or a change of more than 5°F in mix temperature.

Any load of 1 yd^3 or less from a stationary mixer or 2 yd^3 or less from a transit mixer shall be tested for air entrainment, slump, and temperature prior to being placed in the form.

Concrete shall be placed as nearly as possible to its final location. The depth of a lift shall be controlled in order to minimize entrapped air voids in conventional concrete castings. The maximum depth of an unconsolidated lift shall be 18 in in conventional concrete castings. Concrete shall be vibrated with internal or internal and external vibrators in conventional concrete castings. External vibrators shall not be used alone. Internal vibrators shall be inserted vertically and penetrate the lower layer of concrete by at least 4 in. The vibrators shall be inserted to assure that the radii of action of the vibrators overlap. The vibrators shall be held in position from 5 to 15 seconds. Vibrators shall not be used to move concrete horizontally. In concrete that is made self-consolidating by the addition of a polycarboxylating agent the amount of vibration and maximum depth of lifts shall be determined during the trial batching process with input from the Department, the Manufacturer's Technical Representative, and the Contractor.

When concrete placements are interrupted, no more than 60 minutes shall elapse from the time of the beginning of the placement and the resumption of the concrete placement when the concrete temperature is below 75°F. When the concrete temperature is above 75°F, the elapsed time shall be reduced to 30 minutes. Cold joints shall make the unit subject to rejection.

No water shall be added to the concrete after batching. HRWR may be added to the concrete after batching if that practice conforms to the manufacturer's published recommendations. Concrete that becomes unworkable shall be discarded.

534.15 Process Control Test Cylinders: All process control test cylinders shall be made and tested in accordance with the following Standards:

AASHTO T23 (ASTM C31/C31M) Practice for Making and Curing Concrete Test Specimens in Field
AASHTO T22 (ASTM C39) Test Method for Compressive Strength of Cylindrical Concrete Specimens
AASHTO T119 (ASTM C143) Test Method for Slump of Hydraulic Cement Concrete
AASHTO T141 (ASTM C172) Practice for Sampling Freshly Mixed Concrete
AASHTO T152 (ASTM C231) Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C1064 - Test Method for Temperature of Freshly mixed Portland Cement Concrete

A minimum of 8 concrete test cylinders shall be cast to represent each continuous concrete placement. Six of the cylinders from each test shall be cured under the same conditions as the units. Unit identification, entrained air content, water-cement ratio, slump and temperature of the sampled concrete shall be recorded by the Contractor at the time of cylinder casting. Testing shall be done in the presence of the QAI. The QAI will designate the loads to be tested. Cylinders made to determine handling strength shall be made during the last 1/3 of the placement.

At least once a week, the Contractor shall make four cylinders for use by the Department. They shall be cured in accordance with AASHTO T23 (ASTM C31/C31M).

If the Contractor fails to make enough cylinders to demonstrate that the product meets the contract requirements, the product will be considered unacceptable.

The standard size test cylinder for acceptance shall be 4 in by 8 in. The compressive strength of the concrete shall be determined by averaging the compressive strength of two test cylinders made from the same load.

For the purpose of acceptance, the average of two cylinders shall meet or exceed the design strength, and, neither cylinder shall be more than 3.5 MPa [500 psi.] below the required strength.

534.16 Abutment Segment Curing: Immediately after the concrete has been finished, the product shall be covered with an impermeable barrier to prevent moisture loss. The barrier shall be tight to the form and securely fastened. The exposed surface of the concrete shall be kept moist. The Contractor shall monitor and record the concrete temperature during the initial curing cycle.

After the product has been removed from the form, moist curing shall continue until it has reached design strength. All surfaces of the product shall be kept moist and the product shall be placed in a moisture retention enclosure with a relative humidity not less than 80%. The product shall not be exposed to temperatures below 50°F until design strength is achieved.

Membrane curing compounds shall not be used without the approval of the Fabrication Engineer. If approved, the compound shall be applied in strict accordance with the manufacturer's published instructions. The Contractor shall provide the QAI with the product data sheet for the compound prior to application. The compound shall be applied immediately after stripping.

534.165 Curing Self consolidated concrete placed within Abutment voids, around piling: An approved membrane curing compound shall be applied in strict accordance with the manufacturer's published instructions.

534.17 Accelerated Curing (Optional): Accelerated curing shall begin after the concrete has attained its initial set. Initial set shall be determined in accordance with ASTM C403, Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance. A strength gain of 3.5 MPa [500 psi.] indicates initial set. The Contractor shall provide documentation that the mix design being used has been tested in accordance with ASTM C403. Accelerated curing shall begin after the concrete has attained initial set. Application of heat more than 8 hours after initial set will not be considered accelerated curing.

The enclosure temperature may be increased by a maximum of 10°F/hour prior to initial set. The total temperature gain prior to initial set shall not exceed 40°F.

After initial set, the temperature gain of the concrete shall not exceed 40°F/hour. The concrete temperature shall attain a minimum temperature of 120°F and that temperature shall be maintained for a minimum of 8 hours. The maximum allowable concrete temperature shall be 180°F. Concrete temperature shall be measured near each end of the casting bed and at intervals not to exceed 100 ft.

The cooling rate from maximum accelerated curing temperature shall not exceed 40°F/hour. The cooling rate shall continue until the concrete temperature is within 40°F of the ambient air temperature.

Steam curing shall take place in an enclosure that allows the free circulation of steam. Steam jets shall provide a uniform distribution of steam without discharging directly on the product or the test cylinders.

When radiant heat is used, the Contractor shall take measures to assure that there is no moisture loss from the product. Free water shall be present on all exposed surfaces at all times.

Recording thermometers that indicate the time/temperature relationship shall be used by the Contractor until transfer/stripping strength has been achieved. Copies of the time/temperature records shall be made available to the QAI.

If the units have achieved 80% of design strength during the curing cycle, no further curing will be required.

534.20 Finishing Concrete and Repairing Defects Products fabricated under this Section shall meet Standard Grade finish requirements as defined in MNL 116 when they are hidden from view in their final position by backfill or riprap, all other surfaces will be considered exposed to view and will require a special architectural finish.

For portions of product not exposed to view in their final position the recommendations of Standard Grade finish requirements shall be mandatory.

Portions requiring an architectural finish shall meet the following standards. No projections from the surface along the length of each piece will be allowed, uniform color and texture, no visible form tie holes patched or otherwise, all surface voids filled. In order to assure uniformity in appearance of the exposed abutment face, prior to any production work the Precaster shall prepare a sample of 24 in by 24 in by 6 in thick for acceptance by the Department on an aesthetic and cosmetic basis; this piece shall be used throughout production as the standard by which all abutment surfaces exposed to view in their final position are compared for acceptance of the finish.

Structural defects shall be repaired by a method approved by the Fabrication Engineer. Structural defects shall include, but not be limited to exposed reinforcing steel or strand, cracks in bearing areas, through cracks and cracks 0.013 in [0.3 mm] in width that extend more than 12 in [300 mm]. The Contractor shall submit a proposed repair procedure for structural repairs to the Fabrication Engineer. No structural repairs shall be made without the QAI being present. The QAI shall be given adequate notice before beginning repairs.

Chamfers and drip notches shall be made smooth and uniform. Keyways shall be sandblasted to remove mortar paste.

On surfaces not exposed to view in their final position honeycombing, ragged or irregular edges and other cosmetic defects shall be repaired using a product from the MDOT Prequalified List for Patching Materials. The repair, including preparation of the repair area, mixing, application, and curing of the patching material shall be in accordance with the manufacturer's published instructions. Edges not exposed in the final product may be ground smooth with no further repair necessary if the depth of the defect does not exceed ½ in. Form ties shall be removed to a depth of not less than 1 in from the face of the concrete and patched using a cementitious mortar or patching compound.

534.22 Tolerances: Tolerances for precast units shall be in conformance with the latest edition of MNL 116, as applicable.

534.23 Transportation and Storage: The precast products may only be handled, moved or transported after the 28 day design strength has been attained.

Precast products shall be transported and stored so that the reactions with respect to the unit shall be approximately the same as the product in its final position. The product shall be handled so that only a vertical force is applied to the lifting devices.

Stored products shall be supported above the ground on dunnage in a manner to prevent twisting or distortion. Products shall be protected from discoloration and aesthetic damage.

Units damaged by improper storing, hoisting or handling shall be replaced by the Contractor.

534.28 Method of Measurement: Precast structural concrete will be measured by the lump sum.

534.29 Basis of Payment: All work done under Precast Structural Concrete will be paid for at the contract lump sum price. Payment will be full compensation for furnishing all materials in the precast unit including, reinforcing steel, post-tensioning bars, ducts and related materials and work. Related materials and work will include, but not be limited to, erecting the products, grouting of ducts and voids, post-tensioning operations, providing and applying adhesive epoxy, providing and casting of self-consolidated concrete, and concrete admixtures used.

Payment will be made under:

Pay Item		Pay Unit
534.76	Precast Abutment	Lump Sum
534.7601	Precast Approach Slab	Lump Sum