



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

JOHN ELIAS BALDACCI
 GOVERNOR

DAVID A. COLE
 COMMISSIONER

July 13, 2009
 Subject: **Deer Isle & Sedgwick**
 Federal Project No: BR-1669(600)S
 State Pin No: 016696.00
Amendment No. 2

Dear Sir/Ms:

Make the following changes to the Bid Documents:

In the Bid Book (pages 63 through 72), **REMOVE** "SPECIAL PROVISION, SECTION 531, PYLON REPAIR AND SCC CONCRETE FILL" 10 pages dated June 17, 2009 and **REPLACE** it with the attached new "SPECIAL PROVISION, SECTION 531, PYLON REPAIR AND SCC CONCRETE FILL" 10 pages dated July 10, 2009.

In the Bid Book (pages 73 through 80), **REMOVE** "SPECIAL PROVISION, SECTION 532, UNDERWATER PYLON BASE REPAIRS" 8 pages dated June 17, 2009 and **REPLACE** with the attached new "SPECIAL PROVISION, SECTION 532, UNDERWATER PYLON BASE REPAIRS" 8 pages dated July 10, 2009.

In the Plans, SHEET NUMBER 2 OF 16, make the following **CHANGES** in pen and ink to the "ESTIMATED QUANTITIES":

1. Item No. 504.70 STRUCTURAL STEEL FABRICATION AND DELIVERY – PYLON JACKET, **REMOVE** "(56,000 LBS)" and **INSERT** "**(130,000 LBS)**"
2. Item No. 504.71 STRUCTURAL STEEL ERECTION – PYLON JACKET, **REMOVE** "(56,000 LBS)" and **INSERT** "**(130,000 LBS)**"

In the Plans, Sheet Number 2 of 16, "SUGGESTED SEQUENCE OF CONSTRUCTION" Under Pier 4, **CHANGE** note 1 to read as follows; "1. PERFORM **SILT REMOVAL AND** PYLON BASE CASING DEMOLITION." Make this change in pen and ink.

In the Plans, Sheet Number 7 of 16, under "SUGGESTED SEQUENCE OF CONSTRUCTION - PYLONS", **CHANGE** note 2 to read as follows; "2. THE REPAIRS SHALL BE EXECUTED ACCORDING TO SPECIAL PROVISION **SECTIONS 202, 503, 504 AND 531**, AND AS OUTLINED BELOW." Make this change in pen and ink.

In the Plans, Sheet Number 7 of 16, "SUGGESTED SEQUENCE OF CONSTRUCTION – PYLON BASE", **CHANGE** note 2 to read as follows "2. THE REPAIRS SHALL BE



PRINTED ON RECYCLED PAPER

EXECUTED ACCORDING TO SPECIAL PROVISION SECTIONS 202, 503, 504 AND 532, AND AS OUTLINED BELOW." Make this change in pen and ink.

Consider these changes prior to submitting your bid on July 15, 2009.

Sincerely,



For Scott Bickford
Contracts & Specifications Engineer

SPECIAL PROVISION

SECTION 531

PYLON REPAIR AND SCC CONCRETE FILL

Section 531 – Pylon Repair with Steel Jacket and Self Consolidating Concrete (SCC) fill is as follows:

531.01 Description

Furnish and place all labor, materials, equipment and supervision necessary to complete work specified in this Section.

The work under this section shall be coordinated with the work under Section 202 – REMOVING STRUCTURES AND OBSTRUCTIONS, Section 504 – STRUCTURAL STEEL, Section 518 – STRUCTURAL CONCRETE REPAIR, and Section 532 – UNDERWATER PYLON BASE REPAIRS.

531.02 Scope of Work

Scope of work includes, but is not necessarily limited to, furnishing and installing the following:

1. Remove existing steel and wrought iron casing and defective concrete.
2. Pylon cleaning.
3. Supplement corroded reinforcing steel.
4. Place underwater patching grout as needed to fill deep voids.
5. Pump SCC into new steel jackets placed around existing pylons.

531.03 Site Conditions

Method of pylon jacketing as described in this specification and shown on the contract drawings can be used by the Contractor. Modifications to the method may be submitted for approval to the Resident.

Following are conditions which will impact construction methods and scheduling at the site:

1. Tide
2. Current
3. Water depth
4. No road access
5. No equipment or obstructions allowed on bridge deck

531.04 Quality Assurance

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Concrete Institute (ACI), latest edition
 - a. 305.1 Hot Weather Concreting
 - b. 306.1 Cold Weather Concreting
 - c. 318 Building Code Requirements for Structural Concrete
 - d. 347 Guide to Formwork for Concrete
 - e. 237R-07 Self Consolidating Concrete
2. American Society for Testing and Materials (ASTM), latest edition
 - a. A 82 Steel Wire, Plain, for Concrete Reinforcement
 - b. A 185 Steel Welded Wire Reinforcement, Plain, for Concrete
 - c. A 615 Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
 - d. C494 Chemical Admixtures for Concrete
 - e. C 1611 Slump Flow for Self Consolidating Concrete
3. Society for Protective Coatings (SSPC), latest edition
 - a. SSPC-SP 12/NACE No. 5- Surface Preparation and Cleaning of Steel and other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating
 - b. SSPC-SP 3 – Power Tool Cleaning
4. International Concrete Repair Institute (ICRI), latest edition
 - a. ICRI Guideline No. 03737 - Guide For Preparation of Concrete Surfaces for Repair Using Hydro-demolition Methods

531.05 Submittals

1. Manufacturers' data for cement, aggregate fillers and admixtures.
2. Mix Design for Self Consolidating Concrete (SCC)
3. Manufactures data for Patching grout– Including test data verifying compliance with the specified material.
4. Plan for testing / qualifying of SCC
5. Report on SCC Testing results with recommended mix design
6. Surface preparation / Demolition plan - Submit plan indicating method of removal for casing, surface preparation for concrete, Final Cleaning for concrete, collection and disposal method for removed materials. Disposal of materials shall be according to Maine DOT Standard Specification Section 202.
7. SCC Pumping Plan - Submittal shall indicate equipment and methods used to place SCC concrete within the forms. Pumping plan shall include the manufacturer's information and specifications of concrete pump, as well as location, quantity and details for the pumping ports on the jackets.

8. Patching grout Pumping/ Placement Plan.
9. Testing laboratory certification and location
10. Submit color sample of coating proposed for forms

531.06 Video Monitoring

The Contractor shall have on site to be used by the contractor's divers a complete and functional underwater color video system. The system shall be maintained in working order throughout the duration of the work on this project. The system will be used by the Contractor to assist the Resident in making observations of the underwater work progress. The system shall be in operation at all times when underwater work is being performed.

The underwater color video system shall comply with the following minimum requirements:

1. Color camera, dive helmet mounted, with sufficient additional light source to illuminate the work.
2. The camera resolution shall be a minimum of 420 TV lines.
3. The camera shall have a minimum light sensitivity of 0.5 Lux.
4. The camera shall be fixed focus from 4 inches to infinity or better.
5. The camera shall be hardwired to a console located topside in an area protected from the weather and from the Contractors activities.
6. The console shall be one unit capable of displaying the video in real time as well as recording the video on a hard drive (DVR) and have transfer capability to data storage devices (i.e. laptop computer, smart card, etc...) through a USB port.
7. The monitor shall be a 12" LCD color monitor with audio.
8. The audio from both diver and topside tender shall be recorded on the DVR as well as be audible to the Resident in real time.
9. The console/monitor shall have a character generator and time/date stamp visible in the recording.
10. The system shall include all cables, connectors, power supplies, and other accessories required to make high quality video recordings of the work progress.

531.07 Job Conditions

1. Cold Weather Requirements
 - a. SCC shall not be mixed or placed when the air temperature is below 40 degrees F., or the water temperature is below 40 degrees F., or when conditions indicate that the temperature may fall below 40 F. within 72 hours unless precautions are taken to protect the concrete.
 - b. Calcium chloride shall not be used.
2. Hot Weather Requirements
 - a. The maximum temperature of the SCC, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled

by appropriate methods as submitted in writing by the Contractor and approved by the Resident.

531.08 Testing of Self Consolidating Concrete (SCC)

Qualification

Contractor shall qualify and test the SCC mix design by preparing a minimum of 3 mix designs for testing. Each design will be made into a test batch of concrete by the contractor and placed into a form 20 feet long by 4 inches wide and 2 feet deep. The form shall be filled with water prior to placement of the concrete. The concrete shall be placed by pumping into the form at one end and shall be allowed to fill the form without external consolidation and displace the water in the form. Once the concrete has cured a minimum of 7 days the test sample shall be cut vertically into 4 pieces as directed by the Resident to inspect for segregation of the aggregate and general quality of the sample. For each sample/mix design tests shall be conducted according to Section 531.07 Testing of this specification. Contractor shall notify the Resident of the concrete placement dates for the qualification program such that adequate time is available for the Resident and others to witness the placement of the concrete.

Testing

The contractor shall be required to perform the following tests on the SCC to assure compliance with the specification.

1. Test specimens: The Contractor will be required to make, cure and have tested a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM Designations C172, C31 and C39. One cylinder shall be broken after seven days and two cylinders after twenty-eight days. The 4th cylinder will be held in reserve.
2. Slump: A slump flow test shall be made for each truckload of concrete in accordance with ASTM Designation C1611. Slump flow outside of the standard limits for SCC will be grounds for rejection of the concrete.
3. Air Content: The Contractor shall make an air content test from each truckload of concrete by the pressure method in accordance with ASTM Designation C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. Column Test for Aggregate Segregation: The Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique shall be performed on each truckload of concrete in accordance with ASTM C 1610/C 1610M. Static segregation above the specified limit shall be grounds for rejection of the concrete.
5. Testing: All personnel and laboratories testing concrete shall be licensed by the State of Maine.
6. In the event the compressive strength of the test specimens, when tested, is below the specified minimum, the State of Maine DOT may require test cores of the hardened structure to be taken by the Contractor. If such test indicates that the core specimen is below the required strength, the SCC in question shall be removed and replaced without cost to the Department. Any other work damaged as a result of this SCC removal shall be replaced

with new materials to the satisfaction of the State of Maine DOT at no additional cost to the Department. Where cores have been taken by the Contractor and the SCC proves to be satisfactory, core holes shall be filled in a manner satisfactory to the State of Maine DOT at no additional cost to the Department.

The Contractor shall coordinate the date and location of tests with the Resident before any jacketing work is started.

531.09 Product Delivery

Underwater polymer modified cement based patching grout shall be delivered in manufacturer's sealed and undamaged packaging. Each package shall contain clear and legible labels that meet requirements of local, state, and federal regulations identifying manufacturer's name, product name, quantity of material, production date, and batch number.

Store underwater polymer modified cement based patching grout in accordance with manufacturer's instructions, with seals and labels intact and legible. Store in a dry area and maintain temperatures within required ranges.

Provide personnel and/or equipment to handle materials by methods that prevent damage.

531.10 Materials

Patching Grout

1. Patching grout shall be prepackaged, polymer modified, non-metallic, non-shrink, cement-based patching material requiring only the addition of fresh water. The grout shall be described as seawater and salt resistant and be formulated for underwater use by its manufacturer.

2. The compressive strength (ASTM C 109) shall be:

7 days	4,500 psi (38.0 MPa)
28 days	5,000 psi (48.3 MPa)

3. The bond strength (ASTM C 882) shall be:

7 days	1,200 psi (8.2 MPa)
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Self Consolidating Concrete (SCC)

Materials shall comply with Division 700 of the Maine DOT Standard Specification Sections 502-Structural Concrete and 503-Reinforcing Steel and as described below.

1. Concrete – shall be self consolidating concrete with a high flow rate, little or no segregation, and resistant to washout.
 - a. Concrete minimum requirements:
 1. Compressive strength at 28 days: 5,000 psi
 2. Slump Flow: 28 inches \pm 2.5”
 3. Air entrainment: 6%
 4. W/C Ratio: .40
 5. Aggregate: uniformly graded from fine to 3/8 inch max.
 6. Static Segregation: 15% maximum
 - b. Admixtures – For placement of SCC underwater provide anti-washout admixture to prevent the washout of cementitious materials during pumping and placement. Provide high-range water-reducing (HRWR) admixtures such as synthetic polycarboxylate as needed for the mix design to assure that the above requirements are met.
 - c. Aggregates – provide mix design with uniform aggregate gradation that will produce a self consolidating concrete without segregation when placed in the forms underwater.

Water

Clean and potable, free of impurities detrimental to grout and patching materials.

531.11 Execution

Execution shall comply with Division 700 of the Maine DOT Standard specification Sections 502 and 503 as applicable and as described below.

Contractor shall follow the construction sequence as indicated on the plans unless an alternate method is submitted and approved by the Resident.

Surface Preparation

Remove all existing steel and wrought iron casing topside and underwater to 1" below the top elevation of the pylon base. Securely embedded steel in the pylon concrete shall remain. Surface preparation shall be as follows:

1. Mechanically remove unsound concrete to the limits indicated on the drawings.
2. Remove a minimum of 1" of existing concrete facing and continue removal as required to expose sound concrete. Substrate should have a minimum amplitude of 1/4 in. Use hydro-demolition methods below the waterline and use light chipping hammers to prepare surface above the waterline. Follow ICRI - 03737 for general hydro-demolition methods. Limit the size of chipping hammers to 35 lb to reduce micro fractures. Hydro-demolition shall be undertaken using High-pressure Water Cleaning (HP WC – SSPC-SP 12) or Ultrahigh-Pressure Water Jetting (UHP WJ-SSPC-SP 12) to prepare the surface as long as the above requirements are met. Adjust the pressure and or nozzles on HP WC and UHP WJ equipment to prevent excessive removal of concrete. Prepare a 9 SF trial area for approval

- by the Resident of procedure and depth of removal prior to beginning work.
3. Contractor shall leave a 6" wide band of unprepared concrete around the full circumference of the pylon at the top and bottom of each section of the pylon to be used as a reference point to measure quantity of removed material. Once quantities have been measured and verified by the Resident, this band shall be prepared as indicated in this Special Provision.
 4. Where reinforcing steel with active corrosion is encountered, comply with the following:
 - a. Tool clean (SSPC SP3) reinforcing steel to remove rust and contaminants.
 - b. If half or greater of the diameter of the reinforcing steel is exposed, chip out behind the reinforcing to a 1 inch minimum depth.
 - c. Splice new reinforcing steel to existing steel where corrosion has depleted the cross-section area by 25% or more as directed by the Resident. Splice new steel according to Section 518.04 of the Maine DOT Standard Specification.
 5. Thoroughly abrade the roughened surface and exposed reinforcement to remove all bond inhibiting materials such as: rust, dirt, loose chips and marine growth.
 6. Final Cleaning of the prepared surface shall be done by Low Pressure Water Cleaning (LP WC – SSPC-SP 12) and shall occur no more than 72 hours prior to placement of the concrete repair material. Re-cleaning may be required based on time elapsed from initial and secondary cleanings. Special nozzles, equipment and/or form access ports may be required to perform secondary cleanings.
 7. Contractor shall remove deteriorated concrete from the existing pylon until reaching sound concrete, up to a maximum depth of 16". All concrete removal below the waterline shall be performed by hydro-demolition methods as described above. The removal of any more than 3 linear feet of concrete around the perimeter of the pylon to a depth of between 6 inches and 16 inches shall require the approval of the Resident.
 8. In areas where the defective concrete is between 6" and 16" deep the voids shall be patched with a patching grout prior to the removal of any adjacent defective concrete areas. Deep patch areas shall be repaired with form and pump placement method. Remove patch forms prior to placement of jacket forms. Patching grout shall be mixed and placed according to the manufacturers' recommendations.
 9. Hold Point- Contractor shall provide 48 hours notice to the Resident to inspect the surface preparation and shall not proceed until the presented area(s) are accepted by the Resident.
 10. Concrete removals shall be shaped to avoid the creation of areas which may trap water during placement of repair materials (i.e. overhangs, concavities in horizontal surfaces, etc.).

Jacket Form Preparations

Jackets shall be provided with adequate devices for secure setting so that when in place the form shall conform to the specifications herein and as shown on the drawings, and shall withstand, without excessive spring, settlement or deflection, the forces applied during placing and curing of the SCC concrete. The top rim or flange of the jacket shall be level.

Hold Point- Contractor shall provide 48 hours notice to the Resident to inspect the Jacket forms and shall not proceed until the presented area(s) are accepted by the Resident.

SCC concrete shall be placed within 72 hours of Final Cleaning the prepared surfaces of the pylon.

During pumping, forms shall be inspected to guarantee that no leaks are present and Contractor shall ensure that SCC when cured will result in a composition as specified herein.

Steel jackets shall be left in place upon completion of concrete placement. Any damage to the steel jacket coating shall be recoated according to Special Provision Section 506.

Conveying and Placing SCC

The Resident shall be notified at least 48 hours in advance of the placing of any SCC.

The method and equipment to be used shall be approved by the Resident before work has begun. Placement of SCC shall be through ports at the bottom of the steel jackets. SCC shall be pumped through the port and into the steel jackets to displace the water in the jackets in one continuous operation until fresh, un-segregated concrete is overflowing from the top of the jacket and the section of approved size and shape is completed.

SCC shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods which prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid re-handling or flowing.

Tubes and hoses shall be watertight and shall be constructed in sections with flange couplings fitted with gaskets or flexible hose, and the inside diameter shall be sufficiently large to permit a free flow of SCC.

During pumping, jackets shall be inspected to guarantee that no leaks are present and Contractor shall ensure that SCC when cured will result in a composition as specified herein.

SCC pumping ports shall be fitted with a valve to close off the port when the hose is moved to the next port.

The connection of the hose to the SCC pumping port on the jacket shall be mechanical. The end of the hose at this connection shall be fitted with a valve to prevent the loss of SCC and intrusion of water while moving the hose from port to port.

SCC that has partially hardened shall not be deposited in the work.

531.12 Defective Work

Protection

The Contractor shall protect SCC and patching grout from defects of any nature during construction operation.

Defective Work

The following SCC and patching grout work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense.

1. Incorrectly formed.
2. Not specified strength.
3. Segregation of aggregate.
4. Trapped laitance.
5. Otherwise not in accordance with the intent of the drawings and specifications.

531.13 Method of Measurement

Item 531.21 PYLON PATCHING, shall be measured by the volume, in CUBIC FEET, of patch material furnished, installed and accepted. This computation shall be based on measurements taken in the field by the Resident.

Item 531.22 PYLON STRENGTHENING BELOW ELEVATION +8.0', shall be measured by the volume, in CUBIC FEET, of SCC concrete strengthening material furnished, installed and accepted. This computation shall be based on measurements taken in the field by the Resident.

Work described in this Section, but included under Section 202 – REMOVING STRUCTURES AND OBSTRUCTIONS, Section 503 – REINFORCING STEEL, and Section 504 – STRUCTURAL STEEL, shall not be measured for payment under this Section, but shall be paid for under the applicable Sections to which the respective work tasks apply.

531.14 Basis of Payment.

The work under Item 531.21 shall be paid at the Contract Unit Price Bid, CUBIC FOOT, which price shall include full compensation for all materials, transportation, tools, equipment, and labor required for providing and placing patch material in voids in the pylons as specified herein, as shown on the plans, and/or as directed by the Resident.

The work under Item 531.22 shall be paid at the Contract Unit Price Bid, CUBIC FOOT, which price shall include full compensation for all materials, transportation, tools, equipment, and labor required for providing and placing concrete strengthening into steel jackets on the pylons as specified herein, as shown on the plans, and/or as directed by the Resident.

<u>Pay Item</u>	<u>Pay Unit</u>
531.21 Pylon Patching	CF
531.22 Pylon Strengthening Below Elevation +8.0'	CF

END OF SECTION

SPECIAL PROVISION

SECTION 532

UNDERWATER PYLON BASE REPAIRS

532. 01 Description

The work shall consist of repairing the existing pylon base as shown on the plans and / or as directed by the Resident. The repairs shall include demolition and removal of the existing metal casing, demolition and removal of unsound concrete, preparation of surface for formwork base, and placement of self consolidating concrete (SCC) in the forms.

The work under this section shall be coordinated with the work under Section 202 – REMOVING STRUCTURES AND OBSTRUCTIONS, Section 504 – STRUCTURAL STEEL, and Section 531 – PYLON REPAIR AND SCC CONCRETE FILL.

532. 02 Scope of Work

The scope of work includes, but is not necessarily limited to, performing, furnishing and/or installing the following:

1. Remove existing metal casing and defective concrete.
2. Clean pylon base, and top of footing.
3. Pump SCC into new steel forms, in phases, placed around the pylon base via pump hose connected to the formwork until the cavity is filled.

532. 03 Site Conditions

Method of pylon base repair as described in this specification and shown on the contract drawings can be used by the Contractor. Modifications to the method may be submitted for approval to the Resident.

Following are conditions which will impact construction methods and scheduling at the site:

1. Tide
2. Current
3. Water depth
4. No road access
5. No equipment or obstructions allowed on bridge deck

532. 04 Quality Assurance

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Concrete Institute (ACI), latest edition
 - a. 305.1 Hot Weather Concreting
 - b. 306.1 Cold Weather Concreting
 - c. 318 Building Code Requirements for Structural Concrete
 - d. 347 Guide to Formwork for Concrete
 - e. 237R-07 Self Consolidating Concrete

2. American Society for Testing and Materials (ASTM), latest edition
 - a. A 82 Steel Wire, Plain, for Concrete Reinforcement
 - b. A 185 Welded Steel Wire Fabric for Concrete Reinforcement
 - c. A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - d. C494 Chemical Admixtures for Concrete
 - e. C 1611 Slump Flow for Self Consolidating Concrete

3. Society for Protective Coatings (SSPC), latest edition
 - a. SSPC-SP 12/NACE No. 5- Surface Preparation and Cleaning of Steel and other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating
 - b. SSPC-SP 3 – Power Tool Cleaning

4. International Concrete Repair Institute (ICRI), latest edition
 - a. ICRI Guideline No. 03737 - Guide For Preparation of Concrete Surfaces for Repair Using Hydro-demolition Methods

532. 05 Submittals

1. Manufacturers' data for cement, aggregate fillers and admixtures.
2. Mix Design for Self Consolidating Concrete (SCC)
3. Plan for testing / qualifying of SCC
4. Report on SCC Testing results with recommended mix design
5. Surface preparation / Demolition plan - Submit plan indicating method of removal for casing, surface preparation for concrete, Final Cleaning for concrete, collection and disposal method for removed materials. Disposal of materials shall be according to Maine DOT Standard Specification Section 202.
6. SCC Pumping Plan. Submittal shall indicate equipment and methods used to place concrete within the forms. Pumping plan shall include manufacturer's information and specifications of the concrete pump, as well as location, quantity and details for the pumping ports on the forms. Plan shall also include procedures for limiting the introduction of grout, concrete and wash water into the environment.

532.06 Video Monitoring

Video monitoring shall conform to the requirements of Subsection 532.06 of these Special Provisions.

Job Conditions

1. Cold Weather Requirements
 - a. SCC shall not be mixed or placed when the air temperature is below 40 degrees F., or the water temperature is below 40 degrees F., or when conditions indicate that the temperature may fall below 40 F. within 72 hours unless precautions are taken to protect the concrete.
 - b. Calcium chloride shall not be used.

2. Hot Weather Requirements
 - a. The maximum temperature of the SCC, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by appropriate methods as submitted in writing by the Contractor and approved by the Resident.

532. 07 Testing of Self Consolidating Concrete (SCC)

Qualification

Contractor shall qualify and test the SCC concrete mix design by preparing a minimum of 3 mix designs for testing. Each design will be made into a test batch of concrete by the contractor and placed into a form 20 feet long by 12 inches wide and 2 feet deep. The form shall be filled with water prior to placement of the concrete. The concrete shall be placed by pumping into the form at one end and shall be allowed to fill the form without external consolidation and displace the water in the form. Once the concrete has cured a minimum of 7 days the test sample shall be cut vertically into 4 pieces as directed by the Resident to inspect for segregation of the aggregate and general quality of the sample. For each sample/mix design, tests shall be conducted as described under the Testing paragraph of this Subsection. Contractor shall notify the Resident of the concrete placement dates for the qualification program such that adequate time is available for the Resident and others to witness the placement of the concrete.

Testing

The Contractor shall be required to perform the following tests on the SCC to assure compliance with the specification.

1. Test specimens: The Contractor will be required to make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM Designations C172, C31 and C39.

- One cylinder shall be broken after seven days and two cylinders after twenty-eight days. The 4th cylinder will be held in reserve.
2. Slump: A slump flow test shall be made for each truckload of concrete in accordance with ASTM Designation C1611. Slump flow outside of the standard limits for SCC will be grounds for rejection of the concrete.
 3. Air Content: The Contractor shall make an air content test from each truckload of concrete by the pressure method in accordance with ASTM Designation C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
 4. Column Test for Aggregate Segregation: The Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique shall be performed on each truckload of concrete in accordance with ASTM C 1610/C 1610M. Static segregation above the specified limit shall be grounds for rejection of the concrete.
 5. Testing: All personnel and laboratories testing concrete shall be licensed by the State of Maine.
 6. In the event the compressive strength of the test specimens, when tested, is below the specified minimum, the Department may require test cores of the hardened structure to be taken by the Contractor. If such test indicates that the core specimen is below the required strength, the SCC in question shall be removed and replaced without cost to the Department. Any other work damaged as a result of this SCC removal shall be replaced with new materials to the satisfaction of the State of Maine DOT at no additional cost to the Department. Where cores have been taken by the Contractor and the SCC proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Department at no additional cost.

The Contractor shall coordinate the date and location of the tests with the Resident prior to placement of any concrete.

532.08 Materials

Self Consolidating Concrete (SCC)

Materials shall comply with Division 700 of the Maine DOT Standard Specification Sections 502-Structural Concrete and 503-Reinforcing Steel and as described below.

1. Concrete – shall be self consolidating concrete with a high flow rate, little or no segregation, and resistant to washout.
 - a. Concrete minimum requirements:
 1. Compressive strength at 28 days: 5,000 psi
 2. Slump Flow: 26 inches \pm 2.5"
 3. Air entrainment: 6%
 4. W/C Ratio: .40
 5. Aggregate: uniformly graded from fine to 3/8 inch max.
 6. Static Segregation: 15% maximum

- b. Admixtures – For placement of SCC underwater provide anti-washout admixture to prevent the washout of cementitious materials during pumping and placement. Provide high-range water-reducing (HRWR) admixtures such as synthetic polycarboxylate as needed for the mix design to assure that the above requirements are met.
- c. Aggregates – provide mix design with uniform aggregate gradation that will produce a self consolidating concrete without segregation when placed in the forms underwater.

Water

Clean and potable, free of impurities detrimental to grout and patching materials.

532.09 Execution

Execution shall comply with Division 700 of the Maine DOT Standard specification Sections 502 and 503 as applicable and as described below.

Contractor shall follow the construction sequence as indicated on the plans unless an alternate method is submitted and approved by the Resident.

Surface Preparation

Remove all existing metal casing to 1" below the top elevation of the footing. Securely embedded steel channels in the pylon base concrete shall remain.

1. Mechanically remove unsound concrete to the limits indicated on the drawings.
2. Remove a minimum of 1" of existing concrete facing and continue removal as required to expose sound concrete. Substrate should have a minimum amplitude of 1/4 in. Use hydro-demolition methods to prepare the surface. Follow ICRI - 03737 for general hydro-demolition methods. Hydro-demolition shall be undertaken using High-pressure Water Cleaning (HP WC – SSPC-SP 12) or Ultrahigh-Pressure Water Jetting (UHP WJ-SSPC-SP 12) to prepare the surface as long as the above requirements are met. Adjust the pressure and or nozzles on HP WC and UHP WJ equipment to prevent excessive removal of concrete. Prepare a 9 SF trial area for approval by the Resident of procedure and depth of removal prior to beginning work.
3. Contractor shall leave a 6" wide band of unprepared concrete at the top and bottom across each face to be used as a reference point to measure quantity of removed material. If the embedded steel channels are in good condition and in original position these may be used as the reference. Once quantities have been measured and verified by the Resident, this band shall be prepared as indicated in this Special Provision.
4. Where reinforcing steel with active corrosion is encountered, comply with the following:
 - a. Tool clean (SSPC SP3) reinforcing steel to remove rust and contaminants.
 - b. If half or greater of the diameter of the reinforcing steel is exposed, chip out behind the reinforcing to a 1-5/8" in. minimum depth.

- c. Splice new reinforcing steel to existing steel where corrosion has depleted the cross-section area by 25% or more as directed by the Resident. Splice new steel according to Section 518.04 of the Maine DOT Standard Specifications.
5. Thoroughly abrade the roughened surface and exposed reinforcement to remove all bond inhibiting materials such as rust, dirt, loose chips and marine growth.
6. Final Cleaning of the prepared surface shall be done by Low Pressure Water Cleaning (LP WC – SSPC-SP 12) and shall occur no more than 72 hours prior to placement of the concrete repair material. Re-cleaning may be required based on time elapsed from initial surface preparation and secondary cleanings. Special nozzles, equipment and/or form access ports may be required to perform secondary cleanings.
7. Hold Point - Contractor shall provide 48 hours notice to the Resident to inspect the surface preparation and shall not proceed until the presented area(s) are accepted by the Resident.
8. Concrete removals shall be shaped to avoid the creation of areas which may trap water during placement of repair materials (i.e. overhangs, concavities in horizontal surfaces, etc.).

Form Preparations

Forms shall be set securely on the footing with bottom seal designed by the contractor. Forms shall be level, plum and true to line and grade.

Forms shall be provided with adequate devices for secure setting so that when in place the form shall conform to the specifications herein and as shown on the drawings, and shall withstand, without excessive spring, settlement or deflection, the forces applied during placing and curing of the SCC concrete.

Hold Point - Contractor shall provide 48 hours notice to the Resident to inspect the forms and shall not proceed until the presented area(s) are accepted by the Resident. Contractor shall not proceed until forms are approved.

SCC shall be placed within 72 hours of Final Cleaning the prepared surfaces of the pylon base. During pumping, forms shall be inspected to guarantee that no leaks are present and Contractor shall ensure that SCC when cured will result in a composition as specified herein. Steel forms shall be left in place. Any damage to the form coating shall be repaired according to the coating specification.

Conveying and Placing SCC

Concrete placement shall be through a single port at the bottom of the forms, in phases as shown on the contract drawings. Concrete shall be pumped through the port and into the forms to displace the water in the forms in one continuous operation until fresh, un-segregated concrete is overflowing from the top of the form.

The method and equipment to be used shall be approved by the Resident before work has begun.

SCC shall be placed in forms by the pumping method. Pumping, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.

SCC shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods which prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid re-handling or flowing.

Tubes and hoses shall be watertight, consisting of a tube constructed in sections with flange couplings fitted with gaskets or flexible hose, and the inside diameter shall be sufficiently large to permit a free flow of SCC.

SCC that has partially hardened shall not be deposited in the work.

Pumping of SCC concrete shall continue until undiluted SCC is overflowing from the top of the forms.

Defective Work

Protection

The Contractor shall protect SCC and patching grout from defects of any nature during construction operation.

Defective Work

The following concrete work shall be considered defective and may be ordered by the Owner to be removed and replaced at the Contractor's expense.

1. Incorrectly formed
2. Not specified strength
3. Segregation of the aggregate
4. Trapped laitance
5. Otherwise not in accordance with the intent of the drawings and specifications

532. 10 Method of Measurement

Item 532.01 PYLON BASE STRENGTHENING shall be measured by the volume, in CUBIC FEET, of concrete strengthening using SCC furnished, installed and accepted. This measurement shall be based on measurements taken in the field by the Resident.

Work described in this Section, but included under Section 202 – REMOVING STRUCTURES AND OBSTRUCTIONS, Section 503 – REINFORCING STEEL, and Section 504 – STRUCTURAL STEEL, shall not be measured for payment under this Section, but shall be paid for under the applicable Sections to which the respective work tasks apply.

532. 11 Basis of Payment.

The work under Item 532.01 shall be paid for at the Contract Unit Price Bid, CUBIC FEET, which price shall include full compensation for all materials, transportation, tools, equipment, and labor required for providing and placing pylon base strengthening as shown on the plans and/or as directed by the Resident.

The cleaning of existing reinforcing steel to remain in the structure shall be incidental to the work required under this item.

Payment for any staging, platforms or lifts required by the Contractor to gain access to the work in order to perform the work, or to provide access to the Resident in order to inspect or measure the work, shall be considered incidental to the work required under this item.

Payment for the removal of concrete and the furnishing and placing of new concrete, or other designated repair material, in areas where concrete is removed, will be included in the unit price for the respective concrete repair items.

Pay Item

Pay Unit

532.01 Pylon Base Strengthening

CF

END OF SECTION