

**ITEM 502.99RF0011 M - TEMPORARY CONCRETE REPAIRS**

**DESCRIPTION.** Place a very high early strength (VHES) concrete where indicated in the contract documents.

**MATERIALS AND EQUIPMENT.**

Aggregates .....	501-2.02B
Admixtures.....	501-2.02C
Concrete Batching Facility Requirements .....	501-2.03
Concrete Mixer and Delivery Unit Requirements .....	501-2.04
Handling, Measuring, and Batching Materials .....	501-3.02
Concrete Mixing, Transporting, and Discharge.....	501-3.03
Premoulded Resilient Joint Filler.....	705-07
Wire Fabric for Concrete Reinforcement.....	709-02
Epoxy-Coated Bar Reinforcement, Grade 420 .....	709-04
Quilted Covers (for Curing).....	711-02
Plastic Coated Fiber Blankets (for Curing).....	711-03
Polyethylene Curing Covers (White Opaque) .....	711-04
Membrane Curing Compound .....	711-05
Form Insulating Materials for Winter Concreting .....	711-07
Water.....	712-01

Use friction aggregate meeting §501-2.02B2, Friction, that corresponds to the item specified. See Basis of Payment. Use non-reactive aggregate, as identified in the *Approved List of Sources of Fine & Coarse Aggregate*, with high alkali cementitious products.

**Transit Mixed and Truck Mixed VHES Concrete.** Use trucks calibrated and approved by the Regional Materials Engineer. Apply a total of 100 – 200 mixing revolutions before discharge. Apply the following in addition to the standard specification sections listed above.

**A. Accelerating Admixtures.** Accelerating admixtures may be batched into transit mixed concrete at the plant in accordance with §501-2.03F, Admixture Dispensing Systems, or added at the site during or after any water addition. For truck mixed concrete, accelerating admixtures are always added at the site and after the water is added.

When adding accelerating admixtures at the site, equip trucks with an air pressurized tank that:

- Contains the correct volume of admixture (for the volume of concrete in the truck) dispensed through the plant’s Admixture Dispensing System.
- Discharges the admixture into the mixer drum in less than 1 minute.
- Has a clear plastic tank output hose that leads into the mixer drum.
- Has a properly working relief valve.

Add the entire accelerating admixture into the mixer drum in 1 uninterrupted operation in 1 minute or less.

**B. Aggregate Moisture Content.** Twice daily, or more frequently if weather conditions change significantly as determined by the Engineer, determine the aggregate moisture content in accordance with

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Materials Method 9.1, *Plant Inspection of PCC*. Compute the corresponding water added to the concrete in the truck from aggregate moisture. Subtract that quantity, as well as the water portion of the admixture in the tank and water added at the plant from the design water for the truck. Submit these calculations to the NYSDOT plant inspector for approval. Upon approval, write the maximum volume of water to be added to the truck at the site on the delivery ticket. Upon arrival at the site, provide the delivery ticket to the Engineer. Do not add more water than the maximum volume indicated on the delivery ticket.

**C. In-Line Water Flow Meter.** Equip trucks with an in-line water flow meter that:

- Resets easily to "0".
- Is mounted to allow easy reading.
- Withstands water temperatures up to 93°C.
- Is equipped with air strainers capable of removing entrapped air within the system.
- Has a batching delivery tolerance of 1% by weight or volume.
- Has a manufacturer's certified flow rate capacity of 265 l/min.
- Has a minimum actual flow rate of 190 l/min.

The Regional Materials Engineer will measure the actual flow rate and inspect the flow meter prior to use. Reset the flow meter to 0 before adding any water at the site.

For truck mixed concrete, execute 20 dry revolutions at 12 to 18 rpm before adding water. Add water in 1 uninterrupted operation. No water is to be removed from the truck for any purpose while water is being added to the drum. After the required water designated on the delivery ticket has been added, add the entire accelerating admixture, if any, as described above in Accelerating Admixtures.

**VHES Concrete Trial Batch.** Design the mix to satisfy Table 1, Temporary Concrete Mix Requirements. Submit the mix design to the Engineer. Include admixture brands and dosages as well as mixing, transporting, placing, paving, curing, and anticipated strength gain details.

Produce and place a 3.0 m<sup>3</sup> (minimum) trial batch at an off-project location approved by the Engineer. Produce the trial batch using the same materials and processes as those to be used to produce the project concrete. Provide the Engineer a 7 day minimum advance notification of trial batch production. Coordinate trial batch production to ensure the presence of the Engineer, the Regional Materials Engineer, and Materials Bureau personnel.

Provide an American Concrete Institute (ACI) Certified Concrete Field Testing Technician, Grade I, or higher, to:

- Measure slump, air content, and unit weight.
- Cast cylinders compressive strength and freeze-thaw resistance.

Begin compressive strength testing of the trial batch concrete 1 hour after discharge. Unless otherwise noted in the contract documents, use an agency accredited by the AASHTO Accreditation Program (AAP) in the field of construction materials testing of portland cement concrete to perform compressive strength testing. Cast and test in the presence of the Engineer, or the Engineer's representative. Provide acceptable proof of ACI Certification and AASHTO Accreditation to the Engineer before placing any concrete.

Cast a minimum of 12 cylinders in accordance with Materials Method 9.2, Field Inspection of Portland Cement Concrete. Determine the concrete compressive strength in accordance with ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. The mix will be considered acceptable for use if 3 cylinder pairs (6 total) meet the following strength criteria:

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- Average compressive strength of all cylinder pairs exceeds 17.2 MPa in 3 hours.
  - Average compressive strength of each cylinder pair exceeds 13.8 MPa in 3 hours.
- Cast a minimum of six (6) 100 x 200 mm cylinders for freeze-thaw testing. Materials Bureau personnel will transport the cylinders and conduct freeze-thaw testing.
- Changes other than minor fluctuations in admixture dosage rates require a new mix design and trial batch. The Engineer may halt paving and order additional trial batches whenever the specified properties are not achieved.

<b>TABLE 1 TEMPORARY CONCRETE MIX REQUIREMENTS</b>			
<b>Property</b>	<b>Minimum</b>	<b>Desired</b>	<b>Maximum</b>
Opening Compressive Strength	17.2 MPa	-	-
Freeze-Thaw Loss	-	-	10 %
Slump <sup>1</sup>	25 mm	-	200 mm

NOTES:

1. Minimum slump provided the mix consolidates and finishes properly. Maximum slump provided the mix is nonsegregating and holds grade.

**Equipment.**

Forms .....	§502-2.04B1
Paving Irregular Areas .....	§502-2.04B3
Vibrators .....	§502-2.04C
Saw Cutting Equipment .....	§502-2.04E
Curing Compound Applicators .....	§502-2.04F

**CONSTRUCTION DETAILS.** Meet with the Engineer as soon as practical to coordinate all aspects of removal, preparation, and material placement including mixing, transport, and discharge, jointing, material requirements and testing, and personnel requirements.

Apply the following from Section 502, Portland Cement Concrete Pavement, as modified herein:

Weather Limitations.....	§502-3.01
Fixed Form Paving.....	§502-3.05
Consider full-depth repairs to be irregular areas.	
Joint Construction .....	§502-3.06
Place a thin ( $\leq 13$ mm) bond breaker, such as premoulded resilient joint filler on untied longitudinal joints before placing concrete.	
Finishing .....	§502-3.09
Finish short repairs (those less than the length of the finishing equipment) transversely.	
Texturing.....	§502-3.10
Do not texture the plastic concrete if it will be diamond ground. The Engineer may require longitudinal astroturf drag if that was the original pavement texture.	
Curing .....	§502-3.11
Pavement Protection .....	§502-3.13
Damaged or Defective Concrete .....	§502-3.14
Hardened Surface Test.....	§502-3.15

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If the pavement is to be diamond ground, the maximum deviation is 10 mm in 3 m. If the pavement will not be diamond ground, the maximum deviation is 3 mm in 3 m.

**Reinforcement.** When specified, construct “Isolated, Mesh Reinforced” concrete and “Isolated, Heavily Reinforced” concrete in accordance with the 502 Standard Sheets. Construct concrete reinforced with a “Single Bar at Free Edges” using 19 mm bar reinforcement located 75 mm from the longitudinal edges of the placement and 75 mm above the subbase. Stop the bars 75 mm from any transverse joint.

**Project Strength Determination.** Provide an ACI Certified Concrete Field Testing Technician, Grade I, or higher, to cast all cylinders. Unless otherwise noted in the contract documents, use an agency accredited by the AASHTO Accreditation Program (AAP) in the field of construction materials testing of portland cement concrete to perform compressive strength testing. Cast and test in the presence of the Engineer, or the Engineer’s representative. Provide acceptable proof of ACI Certification and AASHTO Accreditation to the Engineer before placing any concrete. The Engineer, or the Engineer’s representative, will complete the Concrete Cylinder Report as cylinders are cast and tested.

Cast a minimum of 1 cylinder pair from each truck in a scheduled placement operation in accordance with Materials Method 9.2, Field Inspection of Portland Cement Concrete. A minimum of 3 cylinder pairs (6 total) is required for placement operations involving 3 or more trucks, with a minimum of 1 pair cast from the last truck of the operation. Develop an Engineer-approved marking system that allows a cylinder to be readily associated with the corresponding placement location and placement time.

Determine the concrete compressive strength in accordance with ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. Open the placement to traffic when the average compressive strength of the cylinder pair from the last truck of the operation exceeds 17.2 MPa. Use other cylinders cast to properly anticipate the time frame required for that pair to reach 17.2 MPa.

If 17.2 MPa is not achieved, test another cylinder pair from the last truck at a later time, provided an adequate number of additional cylinders were cast and the placement has not been opened to traffic. If the placement is opened to traffic before it has been shown to achieve 17.2 MPa, the placement will be considered Damaged or Defective Concrete and will be replaced at no additional cost to the State.

Contract testing for 28 day compressive strength is not required. If subsequent trial batches are required, the Engineer may waive the 28 day compressive strength testing.

**METHOD OF MEASUREMENT.** The work will be measured for payment as the number of cubic meters of concrete satisfactorily placed, measured to nearest 0.1 m<sup>3</sup>. No deductions will be made for catch basins, manholes, or other similar pavement obstructions requiring either mesh reinforced or heavily reinforced placements.

**BASIS OF PAYMENT.** Include the cost of all labor, material, and equipment necessary to satisfactorily perform the work in the unit price bid for Temporary Concrete Repairs. No additional payment will be made for extra work required to repair damage to the adjacent pavement that occurred during any operation. Additional payment will be made if the original repair area did not completely extend into sound concrete. Transverse and longitudinal joints are paid under separate items.

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*Payment Will Be Made Under:*

<b>Item No.</b>	<b>Item</b>	<b>Pay Unit</b>
502.99RF0011 M	Temporary Concrete Repairs	Cubic Meter

R - Reinforcement

0 - Unreinforced

1 - Isolated, Mesh Reinforced

2 - Isolated, Heavily Reinforced

3 - Single Bar at Free Edges

F - Friction

1 - Type 1

2 - Type 2

3 - Type 3

4 - Type 9