

ITEM 05502.0702 M - PCC PAVEMENT PARTIAL DEPTH SPALL REPAIRS USING MODIFIED CLASS D CONCRETE

DESCRIPTION:

Prepare and patch portland cement concrete (PCC) pavement spalls less than 100 mm deep. Use Class D concrete as modified by this specification or as directed by the Engineer

MATERIALS AND EQUIPMENT:

Portland Cement Concrete, Class D	501
Portland Cement Mortar Bonding Grout.	705-22
Membrane Curing Compound.	711-05
Admixtures	711-08
Water.	712-01
Non-Chloride Accelerator Admixture.	Approved List

Modified Class D Concrete Production. Apply the requirements of §501, Portland Cement Concrete - General, except as modified herein. At the contractor’s option, use any combination of Type III cement, non-chloride accelerators, and/or water reducers to meet the specified strength and slump. Use only a neutralized vinsol resin-based air entraining agent if a non-chloride accelerator is used. Water reducers, if used, may be either Type A (Normal) or Type F (High Range). Use only one type of accelerator at any one time.

Modified Class D Mix Design and Trial Batch. Develop a mix design and prepare a trial batch using the same (1) materials and (2) mixing, transporting, and discharging methods as those to be used on the project. Demonstrate the ability of the mix to achieve the specified properties to the Regional Materials Engineer. Changes other than minor fluctuations in admixture dosage rates will require a new mix design and trial batch as determined by the Regional Materials Engineer. The Engineer may halt material placement and order new trial batches whenever the specified properties are not achieved.

The mix must meet the following requirements:

Property	Minimum	Desired	Maximum
18-Hour Compressive Strength (Trial Batch)	15 MPA	–	–
18-Hour Compressive Strength (Project)	14 MPA	–	–
28-Hour Compressive Strength (Trial Batch)	30 MPA	–	–
Air Content	6.0%	7.5%	9.0%
Slump	65 mm	–	90 mm

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Alternate mixes will be considered, provided they meet the above requirements as determined by the Regional Materials Engineer.

Saw Cutting Equipment. Use diamond blade saws with guides that are capable of making straight cuts to the dimensions depicted in the contract documents. Saws must be equipped with blade guards, water cooling systems, and cut depth control. Maintain an adequate supply of saws, new blades, and other parts at the site to ensure uninterrupted operation.

Chipping Hammers. Use lightweight (13.5 kg, maximum) chipping hammers with spade bits. Provide the Engineer with specifications from the hammer manufacturer. Use a maximum air pressure of 700 kPa (measured at the compressor) to power the hammer. Provide an air pressure gauge at the compressor that allows the Engineer to easily monitor air pressure. Use sharp bits. Maintain adequate supply of hammers, new bits, and other parts at the site to ensure uninterrupted operation. The Engineer will halt operations if concrete to remain in place is damaged by the hammers.

Milling Machines. Use a milling machine with a high kilowatt rating and a 300 mm (minimum) wide milling head. The machine must be equipped with a mechanism that maintains the milling operation at a preset depth.

Vibrators. Use hand held spud vibrators have a maximum diameter of 25 mm and are capable of operating through a frequency range of 6000-9000 vibrations per minute.

CONSTRUCTION DETAILS:

Repair areas as detailed in the contract documents or as directed by the Engineer. The Engineer will convene a pre-repair meeting seven to fourteen days before the planned start of repair preparation. Inspection personnel and the Contractor shall attend to coordinate all aspects of patch preparation; material mixing, discharge, transport, and placement; material requirements; and inspection.

Determine Repair Boundaries. Sound the nearby areas with a 1 - 1.5 kg hammer to identify delaminated areas and include them within the repair boundaries. Extend repair areas 75 - 150 mm beyond the visible deterioration or delaminations, whichever is larger. Combine spalls within 600 mm of each other into one repair. Keep repair areas as square as possible. Avoid irregular or triangular repairs. Mark the repair boundary outlines with spray paint.

Saw Cut Repair Boundaries. Diamond blade saw cut the repair boundaries 50 - 75 mm deep. Cut at right angles to the pavement joints and vertical to the pavement surface. Overrun the cuts such that the entire repair area is cut to the same depth. Additional saw cuts of the same depth as the boundary cuts may be made within the repair area to facilitate concrete removal.

Remove Concrete Within the Saw Cuts. Use (1) chipping hammers or (2) a combination of chipping hammers and milling machines to remove concrete within the saw cuts. Remove concrete to a minimum depth of 50 mm such that (1) the repair bottom is at a uniform depth, ± 25 mm and (2) sound concrete is exposed along the entire repair bottom. Do not operate milling machine within 25 mm of the saw cuts. Use chipping hammers in these locations to establish the proper repair depth. If load transfer devices are

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encountered or the repair depth exceeds 125 mm, discontinue partial depth repair operations. The Engineer will inspect the repair bottom to ensure it is completely sound.

Clean the Repair Bottom and Vertical Faces. Thoroughly sand blast all repair faces that will be in contact with the repair material such that uniformly abraded surfaces result completely free of any dirt, loose particles, or oil. High pressure water blasting may be required where dust control is critical as determined by the Engineer.

After sand blasting, air blast the repair to remove sand blast and any moisture from the repair. The Engineer will check the air stream with a clean, white cloth to ensure no oil or contaminants are included in the air blast.

Place Joint or Crack Insert. Place a compressible styrofoam or asphalt impregnated fiberboard insert along an abutting joint or crack. Ensure that the material selected is compatible with the repair material. Alternate material use is subject to the Engineer's approval. Use an insert of the same thickness as the joint or crack width, ± 3 mm, to reestablish the joint or crack through the repair. Place the insert such that it (1) extends 25 mm below and 75 mm beyond the repair area and (2) restricts repair material from entering the joint or crack. Additional saw cuts may be needed to achieve the required dimensions for placing the insert. Do not cut load transfer devices with the additional cuts. The insert may be left in place after the repair is complete.

Apply Bonding Agent. Immediately before the bonding agent is applied, the Engineer will check the cleanliness of the repair area receiving faces by wiping them with a dark brown or black cotton cloth or glove. If any residue is found, re-clean the repair bottom and vertical faces as described above.

Use portland cement mortar bonding grout. Mix the grout in small quantities to limit waste and ensure recently mixed grout is routinely placed. Evenly apply a thin coat of grout with a stiff bristle brush or broom to all surfaces receiving the repair material such that all cavities are coated. Overlap the surrounding pavement surfaces.

Placement. Small construction mixers, mobile drums, or paddle mixers may be used subject to the Engineer's approval, provided the proper slump and air is obtained and all manufacturer's instructions are followed. Ready mix trucks may be used if quantities are sufficient in the Engineer's opinion. Use wheelbarrows, buggies, or other mobile batch vehicles approved by the Engineer to bring the repair material to the prepared area. Use shovels for very small patches. Place the repair material before the bonding agent has dried. Slightly overfill the repair area. Vibrate the material with a spud vibrator having a diameter less than 25 mm.

Finishing. Finish the repair area to meet the surrounding pavement surface elevation. Keep hand finishing to a minimum. Hand trowel from the center of the patch outward toward the edges. Do not add any additional water to the repair surface.

Curing. Thoroughly coat with a curing compound meeting the requirements of §711-05, Membrane Curing Compound, at a minimum rate of 3.5 m²/1.

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Opening to Traffic. The Engineer will cast two pairs (four total) of cylinders (in accordance with Materials Method 9.2, Field Inspection of Portland Cement Concrete) from each day's placement. The Engineer will mark the cylinders and leave them adjacent to the pavement under similar curing conditions.

The Regional Materials Engineer will determine the concrete compressive strength at the desired time. Test one cylinder from each of the pairs cast. Open the placement to traffic if:

- the average compressive strength of the cylinder pair exceeds 14 MPA,
- the compressive strength of each cylinder is above 10.5 MPA, and
- the corresponding time frame has elapsed for the entire area to be opened.

If these conditions are not met, the Regional Materials Engineer will retest the remaining cylinder pair a minimum of 6 hours later. If these conditions are again not met, open the placement after 72 hours.

Project testing of 28-day strength is not required. If subsequent trial batches are required, the Engineer may waive the 28-day compressive strength testing.

METHOD OF MEASUREMENT:

Cubic meters of each partial depth repair is obtained by multiplying the surface area of each repair by the average of three randomly selected depth measurements from each repair.

BASIS OF PAYMENT:

In the cubic meter bid price, include the cost of all materials, equipment, and labor necessary to determine the repair boundaries; saw cut the repair boundaries; remove PCC from within the repair boundaries; sand blast the repair faces; air blast the repair; place the joint or crack insert; apply the bonding agent; and mix, place, finish, and cure the repair material. No additional payments will be made for saw cuts performed to widen a joint or crack to receive the joint insert material or to facilitate concrete removal.

Payment will be made under:

<u>Item Number</u>	<u>Item</u>
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