

ITEM 04502.069801 M - THIN PORTLAND CEMENT CONCRETE (PCC) OVERLAY OF HOT MIX ASPHALT (HMA) SURFACED PAVEMENT - PROFILOGRAPHED

ITEM 04502.069802 M - THIN PORTLAND CEMENT CONCRETE (PCC) OVERLAY OF HOT MIX ASPHALT (HMA) SURFACED PAVEMENT - UNPROFILOGRAPHED

DESCRIPTION: Construct a thin (50 - 150 mm), fiber-reinforced, modified Class D or modified Class F PCC wearing surface atop a prepared HMA-surfaced pavement.

MATERIALS:

Portland cement concrete	501
Calcium chloride	712-02
Non-chloride accelerator admixture	Approved List
Membrane curing compound	711-05
Water	712-01

- If Type A Solid Flake Calcium Chloride is used, make an aqueous solution having a specific gravity of 1.290 to 1.295 at 15°C. If Type B Liquid Calcium Chloride solution is used, it shall consist of only calcium chloride and water. Any solution containing any other admixture is unacceptable.
- Use only neutralized vinsol resin based air entraining agents.
- Water reducers, if used, may be either Type A (Normal) or Type F (High Range).
- Cement may be Type I/II or Type III.
- Use 100 percent virgin polypropylene, fibrillated, multi-designed graded fibers, containing no reprocessed olefin material, specifically engineered and manufactured for use as secondary concrete reinforcement, such as FiberMesh, or approved equal as determined by the Director, Materials Bureau, to produce fiber-reinforced concrete.

Concrete Production. Apply the requirements of §501, Portland Cement Concrete - General, except as modified herein. Use either Class D or Class F concrete as specified in Table 501-3, Concrete Mixtures. At the contractor's option, use any combination of the above materials to achieve the specified strength, air content, and slump. Use only one type of accelerator at any one time. Hot water may be used to raise the concrete drop temperature to a maximum of 35°C.

Add 1.80 kilograms of fiber per cubic meter of concrete. Add fibers in whole bag increments during batching. Use batch-specific bags or batch the appropriate volume of concrete such that only whole "off-the-shelf" bags are used. Mix the concrete in accordance with the fiber manufacturer's recommendations. A slight increase in w/c ratio may result to achieve the desired slump due to the added fibers.

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Mix Design and Trial Batch. Develop a mix design and prepare a trial batch using those materials to be used on the project. Demonstrate the mix's ability to achieve the specified properties to the Regional Materials Engineer's satisfaction. Changes other than minor fluctuations in admixture dosage rates will 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.

The mix must meet the following requirements:

Property	Minimum	Desired	Maximum
12 Hour Compressive Strength (Trial Batch)	-	-	14 MPa
18 Hour Compressive Strength (Trial Batch)	15 MPa	-	-
18 Hour Compressive Strength (Project)	14 MPa	-	-
28 Day Compressive Strength (Trial Batch)	30 MPa	-	-
Air Content	5.0%	6.5%	8.0%
Slump	40 mm	-	100 mm

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

CONSTRUCTION DETAILS: Apply the requirements of §502-3, Construction Requirements, except as modified herein. The Engineer will convene a pre-paving meeting seven to fourteen days before concrete is placed. Inspection personnel, the Contractor, and any subcontractors shall attend to coordinate all aspects of paving and inspection, including equipment review, construction methods, and time and personnel requirements.

Equipment: Bring all equipment needed to place, consolidate, finish, cure, texture, saw cut and test the PCC to the job sufficiently ahead of its use to allow thorough examination by the Engineer. Repair or replace any equipment found to be defective before or during its use to the Engineer's satisfaction. Discontinue any operation if the equipment is not working properly or if unsatisfactory results are being obtained as determined by the Engineer. Use the following:

- A. Manual, vibrator equipped power screeds appearing on the Department's Approved List may be used in lieu of the paving equipment detailed in §502.

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- B. Lightweight, diamond blade saw (such as a Soft Cut saw or approved equal as determined by the Director, Materials Bureau) capable of cutting newly placed concrete after it has developed sufficient strength to accommodate the weight of the saw operator.
 - C. Atomizing mechanical sprayers with tank agitators to apply the curing compound. The sprayers must be capable of applying consistent pressure without hand pumping. Use nozzles with spray shields to prevent drift. Keep an adequate supply of spare nozzles on hand.
 - D. For profilographed projects only, furnish and maintain an automated California-type profilograph, including all required operational supplies, for the Engineer's daily use. The profilograph must meet the written requirements of the Materials Bureau and must be capable of producing and analyzing a profile trace in accordance with those instructions. Provide the means to transport the profilograph as required by the Engineer. Cover and store the profilograph in a secured area when idle. The Engineer may delegate profilograph operations and trace development to the Contractor.
 - E. Internal, hand operated vibrators capable of providing thoroughly consolidated, honeycomb-free concrete across the full width of the placement. Use hand operated vibrators in thickened edges or where the concrete depth exceeds 100 mm.
 - F. Diamond grinding equipment using gang mounted diamond saw blades specifically designed for pavement bump cutting or production grinding that meets the approval of the Director, Materials Bureau.

Use other equipment subject to the approval of the Deputy Chief Engineer, Construction Division.

Existing HMA Surface Preparation. Cold mill the entire existing pavement surface to be overlaid to the line, grade, and cross section shown on the contract documents in accordance with §490, Cold Milling. Power wash the milled surface within 4 hours of milling such that no slurry or residue builds up on the milled surface. Sand blast clean any milled surface where residue does build up as determined by the Engineer. Air blast the surface immediately before paving such that all debris and water is removed. The prepared surface must have a dry surface immediately before paving.

Remove additional HMA as required to (1) accommodate form installation and (2) to provide a thickened transverse edge of PCC where it abuts the existing pavement to remain in place as depicted in the attached detail. If construction traffic is allowed on the prepared HMA surface, completely cover the surface with plastic sheeting of sufficient thickness to withstand the traffic without tearing such that the surface is not contaminated prior to paving.

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Setting Forms. Clean and oil forms before use. Set forms to accommodate a full day's paving before placing any concrete. Securely anchor the forms such that they do not move during placement and paving. Check the alignment and grade of the forms before paving. Remove and replace any damaged or unstable form to the Engineer's satisfaction.

Placing and Spreading Concrete. Determine the temperature of the prepared surface. If the temperature exceeds 38°C, apply a fine water mist to the prepared surface such that the surface temperature drops below 38°C but no standing water remains. Remove standing water by air blasting.

Deposit concrete as near to final position as possible. Finish the concrete with a continuous forward movement of the equipment such that a smooth, homogeneous, well consolidated pavement results with a minimum of hand finishing. Stop the vibrating elements if the forward movement of the paving equipment stops. If concrete has been deposited on the prepared surface for 30 minutes without finishing, remove it and construct an undowelled transverse construction joint at the end of the finished concrete.

Thoroughly consolidate the thickened transverse edges using hand-held internal vibrators before finishing with the paving equipment.

Texturing. Immediately after finishing and prior to curing, texture the PCC surface with a set of irregularly spaced steel spring tines perpendicular to the pavement center line. Use rectangular tines 3 mm wide, 0.7 mm thick, and approximately 125 mm long. Use tines with the following spacing:

16/25/22/16/32/19/25/25/25/25/19/22/25/22/10/25/25/25/25/32/38/22/25/22/25.

Produce tine texture 3 - 4 mm deep with minimal aggregate dislodging as determined by the Engineer. Multiple tine passes in the same area are not permitted unless the surface is refinished between passes.

Operate the tine head manually or mechanically. In either case, hold the tines as near an angle of 45° with the PCC surface as possible to minimize mortar dragging. Keep the tines free of hardened concrete.

Joints. Use a lightweight saw (Soff Cut or approved equal) with diamond blades to construct transverse and longitudinal joints. Make the cuts as soon as the concrete has developed sufficient strength to be cut without raveling or chipping. Saw cut the overlaid surface into squares having a

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dimension equal to one-third the lane width. Do not saw cut the longitudinal joint between adjacent placements. Make saw cuts 25 mm deep and 3 mm wide. Do not make second stage saw cuts nor seal the joints.

Curing. Apply the requirements of §502-3.10A, Impervious Membrane Method, except (1) the equipment need not be self-propelled and (2) the curing compound is applied in two passes, one forward, one backward, with no longer than 15 minutes between passes.

Form Removal. Remove forms after the concrete has developed sufficient strength to allow removal without damaging the concrete. Repair concrete damaged during form removal as directed by the Engineer. Remove forms before saw cutting joints or saw cut into the forms as needed to provide full-width joints of the proper depth.

Patch the void resulting from form removal immediately after the PCC has achieved a compressive strength of 14 MPa as discussed below in Project Strength Determination. Use Asphalt Concrete - Truing and Leveling Course in a manner approved by the Engineer.

Project Strength Determination. 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 days 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 pair from each of the two 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 re-test 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 compressive strength is not required. If subsequent trial batches are required the engineer may waive the 28 day compressive strength testing.

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Testing the Surface. On projects with profilograph requirements, the Engineer will profilograph (or direct the Contractor to profilograph) the pavement surface wheel paths, develop a profile trace, and determine a preliminary profile index for each 160 m segment, or fraction thereof. Grind any surface irregularities equal to or exceeding 13 mm in 7.6 m. If more than 20 % of the surface is diamond ground to remove these irregularities, diamond grind the entire segment. After grinding (if necessary), the Engineer will determine a Final Profile Index (FPI) for each segment. If the FPI exceeds 200 mm per kilometer, diamond grind the entire segment must be diamond ground at no cost to the State such that the FPI is less than 200 mm per kilometer.

On projects with no profilograph requirements, apply the requirements of §502-3.13, Surface Test.

METHOD OF MEASUREMENT: Square meters from the payment lines shown on the plans and a linear measurement made on the finished pavement surface along the longitudinal axis except where revised payment lines are established by the Engineer prior to paving. No deductions are made for catch basins, manholes, or other similar pavement obstructions.

BASIS OF PAYMENT: In the unit bid price, include the cost of all materials, equipment, and labor necessary to clean the milled surface and place, spread, consolidate, finish, texture, cure, saw cut, profilograph (if required), and diamond grind (if required) the PCC. Cold Milling, saw cutting HMA pavement at the transition from PCC overlay to existing HMA, and HMA placement associated with form removal are paid for under separate items.

Additionally, on projects with profilograph smoothness requirements, apply the smoothness incentives found in Table 1 to the overlay item bid price for each 160 m segment, or fraction thereof. The Contractor may diamond grind up to 10% of the 160 m segment surface area to receive the incentive. No incentives will be paid if more than 10% of the surface is diamond ground. If more than 20 % of the surface must be diamond ground to meet the minimum smoothness requirement, diamond grind the entire 160 m segment.

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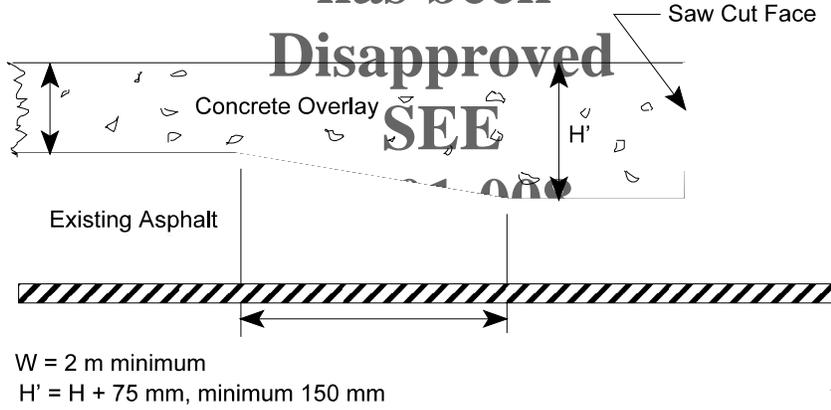
Final Profile Index (mm\km)	Percent Paid
0-40	105
41-80	104
81-120	103
121-160	102
161-180	101
180-200	100
200+	Grind

Table 1 - Smoothness Incentives

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Transition from PCC Overlay to Existing HMA Pavement