

PORTLAND CEMENT CONCRETE OVERLAYS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Bonded Concrete Overlays Over Concrete
- B. Bonded Concrete Overlays Over Asphalt
- C. Unbonded Concrete Overlays Over Concrete (with separation layer)
- D. Unbonded Concrete Overlays Over Asphalt

1.02 DESCRIPTION OF WORK

Includes the requirements for the construction of PCC overlays.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants and Section 7010, 1.03.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants.

1.05 DELIVERY, STORAGE, HANDLING, AND SALVAGING

Comply with Division 1 - General Provisions and Covenants and Section 7010, 1.05.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants and Section 7010, 1.06.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT**A. PCC Overlays:****1. PCC Overlay, Furnish Only:**

- a. **Measurement:** Measurement will be in cubic yards of PCC furnished and incorporated into the PCC overlay, including widening sections, partial depth patches (as part of pre-overlay repairs), and irregular sections.
- b. **Payment:** Payment will be at the unit price per cubic yard of PCC furnished and incorporated into the PCC overlay.
- c. **Includes:** Unit price includes, but is not limited to, furnishing the concrete mixture and delivery to the project site.

2. PCC Overlay, Place Only:

- a. **Measurement:** Measurement will be in square yards of PCC overlay placed, including widening sections, partial depth patches, and irregular sections. The area of manholes, intakes, or other fixtures in the overlay will not be deducted from the measured overlay area. Area is based on the longitudinal surface and nominal width of existing pavement.
- b. **Payment:** Payment will be at the unit price per square yard of PCC overlay placed.
- c. **Includes:** Unit price includes, but is not limited to, integral curb, bars and reinforcement, joints and sealing, finishing and texturing, surface curing and pavement protection, safety fencing, concrete for rigid headers, boxouts for fixtures, and pavement smoothness testing.

1.08 MEASUREMENT AND PAYMENT (Continued)

- 3. Surface Preparation for Bonded PCC Overlay:**
 - a. Measurement:** Measurement will be in square yards of pavement surface prepared for bonded PCC overlay based on the area shown in the contract documents. Area is based on the longitudinal surface and nominal width of existing pavement.
 - b. Payment:** Payment will be at the unit price per square yard of pavement surface prepared for bonded PCC overlay.
 - c. Includes:** Unit price includes, but is not limited to, sandblasting, shot blasting, scarification, and surface cleaning.

 - 4. Surface Preparation for Unbonded PCC Overlay:**
 - a. Measurement:** Measurement will be in square yards of pavement scarified for unbonded PCC overlay based on the area shown in the contract documents. Area is based on the longitudinal surface and nominal width of existing pavement.
 - b. Payment:** Payment will be at the unit price per square yard of pavement scarified for unbonded PCC overlay.
 - c. Includes:** Unit price includes, but is not limited to, surface preparation required by the contract documents, including scarification and surface cleaning.

 - 5. HMA Separation Layer for Unbonded PCC Overlay:**
 - a. Measurement:** Measurement will be in square yards of HMA separation layer for unbonded PCC overlay. Area is based on the longitudinal surface and nominal width of existing pavement.
 - b. Payment:** Payment will be at the unit price per square yard of HMA separation layer for unbonded PCC overlay.
 - c. Includes:** Unit price includes, but is not limited to, cleaning surface and furnishing and placing HMA mix, including asphalt binder.

 - 6. Geotextile Fabric Separation Layer for Unbonded PCC Overlay:**
 - a. Measurement:** Measurement will be in square yards of geotextile fabric separation layer for unbonded PCC overlay. Area is based on the longitudinal surface and nominal width of existing pavement.
 - b. Payment:** Payment will be at the unit price per square yard of geotextile fabric separation layer for unbonded PCC overlay.
 - c. Includes:** Unit price includes, but is not limited to, cleaning surface and furnishing, placing, and securing the geotextile fabric separation layer.
- B. Pavement Removal:** Comply with Section 7040, 1.08, H.
- C. Air Content Deficiency:** Comply with Section 7010, 1.08, B.
- D. Pavement Smoothness Deficiency:** Comply with Section 7010, 1.08, C.
- E. PCC Pavement Thickness Deficiency:** Comply with Section 7010, 1.08, D.
- F. Curb and Gutter:** Comply with Section 7010, 1.08, E.
- G. Fixture Adjustment:** Comply with Section 6010 for adjustment of manholes and intakes and Section 5020 for adjustment of water valves and fire hydrants.
- H. PCC Pavement Samples and Testing:** Comply with Section 7010

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. Cement:** Comply with Section 7010, 2.01, A.
- B. Supplementary Cementitious Materials (SCM):** Comply with Section 7010, 2.01, B.
- C. Fine Aggregate for Concrete:** Comply with Section 7010, 2.01, C.
- D. Coarse Aggregate for Concrete:**
1. Crushed stone particles with Class 2 durability complying with Iowa DOT Section 4115 and Materials I.M. 409.
 2. Comply with Iowa DOT Section 4115 and Article 4109.02, Gradation No. 3 and 5 in the Aggregate Gradation Table.
 3. Bonded PCC Overlays:
 - a. Use the maximum nominal coarse aggregate size that is no greater than one-third of the overlay thickness.
 - b. Provide aggregates that will produce a concrete mixture having a coefficient of thermal expansion (CTE) equal to or less than the CTE of the existing concrete pavement.
 4. The Engineer may authorize a change in gradation, subject to materials available locally at the time of construction.
- E. Fiber Reinforcement:**
1. Provide macro-synthetic fibers complying with ASTM C 1116, Type III Section 4.1.3
 2. Incorporate at a dosage rate according to the manufacturer's recommendations (typically 3 pounds per cubic yard to 7.5 pounds per cubic yard).
- F. Water Requirements:** Comply with Section 7010, 2.01, E.
- G. Admixtures:** Comply with Section 7010, 2.01, F.
- H. Tie Bars, Dowel Bars, and Expansion Tubes:** Comply with Section 7010, 2.01, G and H.
- I. Joint Fillers and Sealers:** Comply with Section 7010, 2.01, L.
- J. Liquid Curing Compound:**
1. **White Pigmented Compounds.** Comply with Iowa DOT Section 4105.
 2. **Poly Alpha-methylstyrene:** Comply with ASTM C 309, Type 2, Class B with 100% of the resin consisting of poly alpha-methylstyrene (PAMS) meeting the requirements of Table 7011.01.

Table 7011.01: PAMS Curing Compound

Properties	Range
Total solids, % by weight of compound	≥ 42
% reflectance in 72 hr (ASTM E 1347)	≥ 65
Loss of water, kg/m ² in 24 hr (ASTM C 156)	≤ 0.15
Loss of water, kg/m ² in 72 hr (ASTM C 156)	≤ 0.40
V.O.C. Content, g/L	≤ 350

2.01 MATERIALS (Continued)**K. HMA Separation Layer for Unbonded Overlay over Concrete:**

1. **Asphalt Binder:** PG 58-28S.
2. **Mixture:** Standard Traffic (ST) 3/8 inch HMA mix.
 - a. Target air voids is 3%.
 - b. No maximum film thickness restriction.
 - c. No minimum filler/bitumen ratio restriction.
3. **Aggregate:**
 - a. Type B.
 - b. No percent crushed particle requirement.
 - c. Gradation cannot fall below the restricted zone.

L. Geotextile Fabric Separation Layer for Unbonded Overlay over Concrete:

1. **Material Properties:** Based on the contract document's specified mass per unit area, provide a geotextile fabric meeting the requirements of Table 7011.02.
2. **Fabric Weight and Thickness:**
 - a. For unbonded overlays less than or equal to 4 inches thick, provide a geotextile separation layer with a weight of 13.3 oz/yd² and a thickness of 130 mils.
 - b. For unbonded overlays greater than or equal to 4.5 inches thick, provide a geotextile separation layer with a weight of 14.7 oz/yd² and a thickness of 170 mils.

Table 7011.02: Geotextile Separation Layer

Property	Requirements	Test Procedures
Geotextile Type	Nonwoven, needle-punched, no thermal treatment to include calendaring*	EN 13249, Annex F (Certification)
Color	Uniform/nominally same color fibers	(Visual Inspection)
Weight (mass per unit area) ¹³	≥ 13.3 oz/yd ² ≥ 14.7 oz/yd ² ≤ 16.2 oz/yd ²	ISO 9864 (ASTM D 5261)
Thickness under load (pressure)	[a] 0.29 psi: ≥ 0.12 in. [b] 2.9 psi: ≥ 0.10 in. [c] 29 psi: ≥ 0.04 in.	ISO 9863-1 (ASTM D 5199)
Wide-width tensile strength	≥ 685 lb/ft.	ISO 10319 (ASTM D 4595)
Wide-width maximum elongation	≤ 130 percent	ISO 10319 (ASTM D 4595)
Water permeability in normal direction under load (pressure)	≥ 3.3 x 10 ⁻⁴ ft/s at 2.9 psi	DIN 60500-4 (modified ASTM D5493)
In-lane water permeability (transmissivity) under load (pressure)	[a] ≥ 1.6 x 10 ⁻³ ft/s at 2.9 psi [b] ≥ 6.6 x 10 ⁻³ ft/s at 2.9 psi	ISO 12958 (ASTM D 6574) or ISO 12958 (modified ASTM D 4716)
Weather resistance	Retained strength ≥ 60 percent (70% average)	EN 12224 (ASTM D 4355 @ 500 hr exposure for grey, white, or black material only)
Alkali resistance	≥ 96 percent polypropylene/polyethylene	EN 13249, Annex B (Certification)

* Calendaring is a process that passes the geotextile through one or more heated rollers during the manufacturing process. The surface of the geotextile is modified during this process. Calendaring may reduce the absorption properties of the geotextile on the calendared side.

2.01 MATERIALS (Continued)**M. Covering:**

1. **Burlap:** Comply with Iowa DOT Section 4104.
2. **Plastic Film:** Comply with Iowa DOT Section 4106.
3. **Insulating Cover:** Comply with Iowa DOT Section 4106.

2.02 CONCRETE MIXES**A. Mix Design:** Comply with Section 7010, 2.01 and 2.02, except as modified below:

1. Provide C-3WR or C-4WR for bonded overlays.
2. Comply with Iowa DOT Class C mix meeting the requirements of Iowa DOT Materials I.M. 529.
2. Ensure compatibility of all material combinations. If the concrete materials are not producing a workable concrete mixture, a change in the material may be required. Changes will be at no additional cost to the Contracting Authority.

B. Consistency and Workability: Comply with Section 7010, 2.02, B.**C. Fly Ash and Ground Granulated Blast Furnace Slag (GGBFS) as Supplementary Cementitious Materials:** Comply with Section 7010, 2.02, C.

PART 3 - EXECUTION**3.01 EQUIPMENT**

Comply with Section 7010, 3.01.

3.02 CONSTRUCTION

Construct overlays in the same manner as PCC pavement (Section 7010, 3.02), except as modified herein.

A. Pre and Post Construction: Comply with the contract documents.

B. Overlay Transition Areas: Refer to the contract documents for details of overlay transitions at project limits, bridges, intersections, and other locations.

C. Temperature Limitations:

1. **Air Temperature:** Do not place overlay concrete when air or existing pavement surface is below 40°F.
2. **Surface Temperature:** Do not place overlay on pavement when the surface temperature exceeds 120°F. If the surface is above 110°F:
 - a. Apply water to the pavement surface ahead of the paving operation. Ensure no standing water remains on the pavement at the time the overlay is placed.
 - b. If a fabric separation layer is used, wet the fabric but do not saturate.
 - c. Do not apply water to the surface if the temperature is below 100°F.

D. Bonded Overlay Surface Preparation:

1. **Over PCC:**
 - a. Remove all dirt, oil, and other foreign materials, as well as any laitance or loose material from the surface against which new concrete is to be placed, including all pavement markings and raised pavement markings.
 - b. If the existing pavement is milled, shotblast or waterblast the milled surface.
 - c. Complete patching with concrete patches after milling, as shown in the contract documents.
 - d. Sweep the prepared surface and blow clean with dry, oil free compressed air directly ahead of the paving operation to remove loose dirt or debris. Keep air blasting operations as close to overlay operations as possible to prevent any resettlement of debris onto the previously cleaned area. If material is subsequently tracked onto the surface, the surface must be re-cleaned.
2. **Over HMA:**
 - a. If required, mill the existing surface to the depth and cross-slope shown in the contract documents. If stripped or loose asphalt is encountered, remove to provide sound structural layer for bonding. Minimum thickness of sound asphalt required for bonding is 3 inches.
 - b. Complete patching with concrete patching after milling, as shown in the contract documents. Adjust panel location as necessary so no single overlay panel is located over both asphalt pavement and a concrete patch.
 - c. Sweep the prepared surface and blow clean with dry, oil free compressed air directly ahead of the paving operation to remove loose dirt or debris. Keep air blasting operations as close to overlay operations as possible to prevent any resettlement of debris onto the previously cleaned area. If material is subsequently tracked onto the surface, the surface must be re-cleaned.

3.02 CONSTRUCTION (Continued)

E. Unbonded Overlay Surface Preparation: Clean the existing pavement surface immediately prior to paving to remove dirt or debris.

1. Over PCC with HMA Separation Layer:

- a. Do not scarify the existing PCC surface if an HMA separation layer will be constructed.
- b. Use Class II compaction except use only static steel wheeled rollers complying with Iowa DOT Articles 2303.03 and 2303.04.

2. Over PCC with Geotextile Fabric Separation Layer:

- a. Limit ridges on milled surfaces to 1/4 inch maximum height.
- b. Roll fabric onto pavement and pull fabric tight without wrinkles.
- c. Do not place more fabric than can be paved over within one day.
- d. Overlap adjacent rolls by 8 inches \pm 2 inches. No more than three layers should overlap.
- e. Fasten fabric to existing pavement with pneumatic driven nails every 6 feet or less or secure the geotextile with 3M HoldFast 70 Cylinder Spray Adhesive or approved equal. Apply adhesive to all edges of the fabric and as needed to prevent shifting or folding of the fabric during concrete placement.

3. Over HMA:

- a. Mill high spots in the existing asphalt surface as specified in the contract documents.
- b. Remove all loose asphalt material after milling.

F. Existing Pavement Loading:

1. Do not allow concrete delivery trucks to travel over existing pavement unless approved by the Engineer. If approved, limit cleaning and water misting of the existing pavement to just ahead of the paving machine.
2. Do not allow loads in excess of the legal axle load on the existing pavement.
3. Partially loaded trucks may be required to prevent damage to the existing pavement. If asphalt thickness after milling is 3 inches or less, reduce loaded truck hauling over the existing pavement.

G. Paving Suspended:

1. Suspend the paving operation where stability of the underlying pavement section has been lost.
2. Do not place concrete on an underlying pavement that has become unstable.

H. Bar and Reinforcement Placement:

1. **Tie Bars:** When the contract documents require tie bars for widening units greater in thickness than the overlay:
 - a. Provide No. 4 tie bars.
 - b. For overlay thickness 4.5 inches or less, secure tie bars to surface of existing pavement.
 - c. For overlay thickness 5 inches or greater, place tie bars at mid-point of overlay thickness.

3.02 CONSTRUCTION (Continued)**2. Dowel Bars:**

- a. At least 7 days prior to the beginning of concrete paving, submit a written Quality Control Plan that provides a method for keeping the dowel basket assemblies anchored to the subgrade, the existing pavement, or bond breaker layer and into the underlying pavement. Ensure the Quality Control Plan includes the following:
 - 1) Proposed type and number of fasteners
 - 2) Proposed installation equipment
 - 3) Dowel basket assembly anchoring plan (i.e. anchor all basket assemblies prior to concrete placement, one lane at a time, anchor all basket assemblies during the concrete placement operation, etc.)
 - 4) Action plan if misaligned baskets are identified during concrete pavement placement
- b. Paving operations may be suspended by the Engineer if basket anchoring fails to comply with the Quality Control Plan.

I. Surface Curing:

1. For bonded concrete overlays, apply curing compound at twice the standard rate recommended by the manufacturer.
2. For unbonded concrete overlays 6 inches or thinner, apply curing compound at twice the standard rate recommended by the manufacturer.
3. If PAMS curing compound is specified per Section 7011, 2.01, J, apply at the rate recommended by the manufacturer.

J. Saw Joints:

1. **General:** Submit a plan for the Engineer's approval, which includes the following items.
 - a. Method(s) for assuring adequate sawcut depth in areas of variable concrete overlay thickness.
 - b. Anticipated production rate of concrete overlay placement.
 - c. Estimated number of saws necessary to prevent random cracking.
 - d. Appropriate corrective actions should random cracking occur.
2. **Bonded Overlay Over Existing Concrete Pavement:** Submit a plan for the Engineer's approval, which includes the following items.
 - a. Marking of all existing joint locations to ensure that joints in the overlay will be placed directly over all existing joints in the underlying concrete pavement.
 - b. Transverse Joints:
 - 1) Saw transverse contraction joints directly over the existing concrete joint the full depth of the overlay plus 1/2 inch (including accommodating variable thickness of the bonded concrete overlay).
 - 2) Ensure that the width of the sawed transverse joints in the bonded concrete overlay exceeds the width of the crack opening in the underlying joints.
 - c. Longitudinal Joints: Saw directly over existing joints full depth.
3. **Bonded Overlay Over Existing Asphalt or Composite Pavement:**
 - a. Transverse Joint: Saw to a depth of 1/3 of the overlay thickness or no less than 1.25 inches with an early entry saw.
 - b. Longitudinal Joints: Saw to a depth of 1/3 of the overlay thickness.
 - c. Expansion Joints: Match expansion joints in the bonded overlay to those in the existing concrete pavement.

3.02 CONSTRUCTION (Continued)**4. Unbonded Overlays Over Concrete, Composite, or Asphalt Pavement:**

- a. Transverse Joints:** Saw to a depth of 1/3 of the overlay thickness or no less than 1.25 inches with an early entry saw.
- b. Longitudinal Joints:** Saw to a depth of 1/3 of the overlay thickness.
- c. Expansion Joints:** Match expansion joints in the bonded overlay to those in the existing concrete pavement.

3.03 CURB AND GUTTER CONSTRUCTION

Comply with Section 7010, 3.03.

3.04 PAVEMENT PROTECTION

Comply with Section 7010, 3.04.

3.05 USE OF PAVEMENT

Comply with Section 7010, 3.05.

3.06 TRANSPORTATION RESTRICTIONS

Comply with Section 7010, 3.06.

3.07 QUALITY CONTROL

Comply with Section 7010, 3.07.

END OF SECTION