SECTION 524—BONDED CONCRETE OVERLAY OF CONCRETE PAVEMENTS

524.1 DESCRIPTION—This work is the construction of a bonded concrete overlay, or inlay, of concrete pavements including surface preparation and joint sawing and sealing.

524.2 MATERIAL—

(a) Cement Concrete, Class AA. Section 704 and as follows:
   • Maximum water-cement mass (weight) ratio: 0.40
   • If overlay thickness is less than 3 inches, use No. 8 coarse aggregate instead of No. 57 coarse aggregate.

(b) Concrete Admixtures. Section 711.3

(c) Concrete Covering Material. Section 711.1(a)

(d) Concrete Curing Materials. Section 711.1(b) or 711.2(a), Type 2

(e) Joint Backing Material. Section 705.9

(f) Joint Sealing Material. Section 705.4(a), (b), or (c)

(g) Tape Bond Breaker. An acceptable self-adhesive tape the width of the sealant reservoir.

(h) Grout. Section 525.2(d)

(i) Slab Stabilization. Section 679.

524.3 CONSTRUCTION—Construct concrete overlay as specified in Section 501.3 and as follows:

(a) Surface Preparation. Prepare the existing concrete surface as follows:

1. Equipment.
   
   1.a Scarifying Equipment. Provide a self-propelled mechanical scarifier capable of uniformly removing the old surface across the entire cutting path, to the depth indicated, in a satisfactory manner.

   1.b Shot Blasting, Sand Blasting, or Water Blasting Equipment. Provide equipment capable of removing any loose concrete and rust from exposed reinforcement.

   1.c Power Tools. Provide concrete saws, 30-pound pneumatic hammers, air compressors, and any other tools necessary to perform this work.

2. Scarification of the Existing Pavement Surface. Scarify the existing pavement surface as indicated. Cut off and remove any reinforcement that is exposed and loose.
3. **Extra-Depth Surface Preparation.** After scarifying, remove any deteriorated concrete or asphalt materials that extend below the level of the scarification, as indicated or directed. Remove all asphalt patches and replace with concrete as specified in Section 516 and 525. Use either 30-pound pneumatic hammers, operated at an angle of no more than 45 degrees measured from the pavement surface, or other scarifying equipment approved by the Representative.

   In the presence of the Inspector, sound the concrete to determine the extent of the concrete delamination using a steel bar, drag chains, or a hammer. When voids are detected under existing slabs, the slabs need to be stabilized as specified in Section 679.

   Remove all loose material from the pavement surface before cleaning.

4. **Steel Plates.** If inlaying and the existing transverse pavement joints have steel plates, remove exposed steel plates.

5. **Cleaning the Surface.** Following surface preparation and prior to paving, clean the scarified pavement surface by appropriate means to ensure adequate bonding between the overlay and original concrete. Cleaning may be accomplished by sweeping the concrete surface, followed by cleaning in front of the paver with compressed air but no more than 30 minutes prior to the placement of the concrete.

   Use a compressed air stream that is free of oil, moisture, and other potential contaminants, and that has a minimum pressure of 100 pounds per square inch measured at the source. Do not allow any standing water or moisture to remain on the pavement surface prior to the placement of the overlay/inlay.

   Keep the prepared surface free of all contaminants if the prepared surface becomes contaminated prior to the placement of the concrete reclean the contaminated areas as directed by the representative.

   Protect the cleaned and prepared surface from oil or grease drippings from compressors, concrete trucks, spreaders, pavers, etc. by using protective covers. Remove all deleterious materials before placing the concrete overlay/inlay.

   **(b) Overlay Transition.** Construct paving notches, as indicated.

   **(c) Transverse Joint Location.** Accurately mark the location of all transverse joints so that they can be located after the overlay has been placed. Submit the proposed method of location marking for approval before the start of construction.

   **(d) Grout.** Adjust the grout proportions, as directed, at no cost to the Department. Furnish grout having the consistency of latex paint. If the coarse aggregate in the prepared surface is visible through the grout, the grout is too thin.

   Mix grout in an approved mobile mixer on the job site. Do not use grout mixed for more than 90 minutes.

   **(e) Grout Application.** After the surface has been cleaned, spray or scrub a coating of grout into the dry, prepared surface immediately ahead of the paver. Exercise extreme care to ensure that all areas receive a thorough, even coating and that no excess grout collects in pockets.

   Place new concrete before the grout begins to dry. If grout exhibits signs of drying, by a whitish appearance to the surface, remove the grout by sand blasting or shot blasting. Regrout the cleaned pavement surface before placing new concrete.

   **(f) Bond Strength.** Bond strength testing will be performed at 7 days, according to PTM No. 610, on the area represented by each day's placement. Obtain three drilled cores for each test in the presence of the Inspector. The Inspector will select coring locations at random, according to PTM No. 1. When directed, supply the Department with a minimum of three additional 4-inch or 6-inch diameter cores. Provide a testing apparatus conforming to PTM No. 610. Minimum acceptable bond strength is 150 pounds per square inch at 7 days.

   If the average of the test results on the three cores is below minimum acceptable bond strength, the area represented will be considered defective. If this occurs, obtain additional cores at 100-foot intervals in both directions longitudinally from the defective cores to determine the limits of defective work. Each set of three defective cores will represent the condition in the same traffic lane for a distance of 50 feet in both directions longitudinally.

524.3(g) 524.4(b)

*Initial Edition*
(g) **Final Finish.** Section 501.3(k) 4.

(h) **Curing Concrete.** Membrane-forming curing compound shall be placed on the overlay surface and edges within 30 minutes of concrete placement or as soon as the bleed water has dissipated or been removed, whichever occurs later, unless otherwise directed by the Representative. Remove any standing pools of bleed water that may be present on the surface before applying the curing compound. Do not allow the concrete surface to dry before applying the curing compound.

Apply at a minimum rate of 1 gallon (± 0.1 gallon) per 150 square feet, or as directed by the Representative. If conditions warrant (e.g., the combination of heavy curing compound and pavement grade/cross-slope makes joint sawing operations hazardous), the curing compound can be applied in two equal coatings, with the first applied as stated previously and the second applied immediately after the sawing operations have been completed. Joint faces must be protected from exposure to curing compound or cleaned thoroughly prior to sealant installation. Apply curing compound homogenously to provide a uniform, solid, white opaque coverage on all exposed concrete surfaces.

(i) **Transverse Joints.** Install joint backing or other approved joint filling material to within 1/4 inch of the pavement surface in all existing transverse joints (including those associated with full-depth repairs) prior to placement of the overlay. Ensure that the joint backing or filling material cannot be dislodged by the paving operation.

Use guide nails, tacks or other Representative-approved devices to accurately mark the locations of the centers of all transverse joints noted above prior to placing the concrete overlay. After placement of the overlay, use the joint location devices and a chalkline or other suitable means to mark the transverse joints locations on the pavement surface.

As soon as the concrete is strong enough for cutting the joints without significant raveling or chipping, saw cut transverse joints directly over all existing transverse joints, including those produced by pre-overlay repairs. Saw cut depth must be equal to the full thickness of the overlay (including any additional thickness used for grade corrections) plus at least 1/2 inch, but must not result in damage to dowel load transfer devices in the original pavement. Saw cut width should be at least the width of the underlying joint or crack in the existing pavement.

When inlaying, saw cut transverse joints to the full depth of the inlay, including any extra depth concrete placed at the joint, directly over the existing transverse joint and a minimum of 1/2 inch wide.

Construct a sealant reservoir as shown on the Standard Drawing for Cement Concrete Pavement Joints. The Contractor may saw cut the overlay in a second operation, or may make the initial saw cut equal to the required reservoir width. After sawing, immediately flush the joint with water to remove sawing slurry that might otherwise prevent proper sealant installation.

Place backing material to the proper depth and seal the joints, as specified in Section 501.3(n).

(j) **Longitudinal Joints.** Accurately reference the location of existing longitudinal joints within the overlay area and between the adjacent lane and the overlay area, so that they can be accurately located after paving. After paving, saw cut a sealant reservoir, 1/4 inch wide, and the full depth of the overlay, directly over the existing longitudinal joint, plus at least 1/2 inch.

Seal joints as specified in Section 501.3(n).

Provide a neat vertical edge face, free of honeycomb and segregation, longitudinally along both sides of the overlaid pavement.

(k) **Edge Slump.** Maximum edge slump permitted in the outside 6 inches next to the shoulder is 1/4 inch. Maximum edge slump permitted in the outside 6 inches next to an adjacent lane is 1/8 inch.

(m) **Opening to Traffic.** Before opening to traffic, sound the newly placed bonded overlay/inlay using only drag chains in the presence of the Inspector. Remove and replace unbonded areas as directed.

Do not open to traffic until the overlay develops the minimum bond strength as specified in Section 524.3(f).
(n) Surface Tolerance. Section 506.3(o)

(p) Defective Work. Unless otherwise directed in writing, remove and replace pavement overlay that is defective in depth, as specified in Table A; defective in air content, as specified in Section 704.1(c)3; defective in bond strength, as specified in Section 524.3(f); or showing surface defects resulting from the effects of rain, improper final finish, or honeycombing which, in the Representative's opinion, cannot be repaired.

Replace defective pavement overlay as specified in Section 501.3(t); except, provide a minimum pavement removal and replacement length between transverse joints of 6 feet.

524.4 MEASUREMENT AND PAYMENT—

(a) Surface Preparation. Square Yard

(b) Extra-Depth Surface Preparation. Square Foot
(c) Bonded Concrete Overlay of Concrete Pavements. Square Yard
The unit price includes saw cutting and sealing of existing and new transverse and longitudinal joints.

1. Adjustment for Deficiencies. If a lot, as specified in Section 506.3(u), contains depth deficiencies, the Department will determine the contract price paid for the lot as follows:

<table>
<thead>
<tr>
<th>Deficiency in Depth Determined by Cores mm (inches)</th>
<th>Payment Percent of Contract Price by Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 0.25</td>
<td>100%</td>
</tr>
<tr>
<td>0.26 to 0.30</td>
<td>95%</td>
</tr>
<tr>
<td>0.31 to 0.35</td>
<td>85%</td>
</tr>
<tr>
<td>0.36 to 0.40</td>
<td>75%</td>
</tr>
<tr>
<td>0.41 to 0.45</td>
<td>50%</td>
</tr>
<tr>
<td>0.46 to 0.50</td>
<td>25%</td>
</tr>
<tr>
<td>Over 0.50</td>
<td>Defective Work</td>
</tr>
</tbody>
</table>

2. Defective Pavement Left in Place. The Department will not make any payment.

(d) Evaluation of Concrete Pavement Ride Quality and Payment of Incentive. Section 507.4
SECTION 524—THIN-BONDED PORTLAND CEMENT CONCRETE OVERLAY OF CONCRETE PAVEMENTS

524.1 DESCRIPTION—This work is the construction of a thin-bonded Portland cement concrete overlay, or inlay, of concrete pavements including surface preparation and joint sawing and sealing.

524.2 MATERIAL—

(a) Cement Concrete, Class AA. Section 704 and as follows:

- Maximum water-cement mass (weight) ratio: 0.40
- If overlay thickness is less than 75 mm (3 inches), use No. 8 coarse aggregate instead of No. 57 coarse aggregate.

(b) Concrete Admixtures. Section 711.3

(c) Concrete Covering Material. Section 711.1(a)

(d) Concrete Curing Materials. Section 711.1(b) or 711.2(a), Type 2

(e) Joint Backing Material. Section 705.9

(f) Joint Sealing Material. Section 705.4(a), (b), or (c)

(g) Tape Bond Breaker. An acceptable self-adhesive tape the width of the sealant reservoir.

(h) Grout. Use the following initial mass (weight) proportions: Section 525.2(d)

\[
\begin{align*}
\text{Cement} & \quad \text{Water} \\
2 & \quad 4
\end{align*}
\]

--- Adjust as necessary.

(i) Slab Stabilization. Section 679.

524.3 CONSTRUCTION—Construct concrete overlay as specified in Section 501.3 and as follows:

(a) Surface Preparation. Prepare the existing concrete surface as follows:

1. Equipment.
   1.a Scarifying Equipment. Provide a self-propelled mechanical scarifier capable of uniformly removing the old surface across the entire cutting path, to the depth indicated, in a satisfactory manner.
   1.b Shot Blasting, Sand Blasting, or Water Blasting Equipment. Provide equipment capable of removing any loose concrete and rust from exposed reinforcement.
   1.c Power Tools. Provide concrete saws, 6.6 kg (15-pound) 30-pound chipping pneumatic hammers, air compressors, and any other tools necessary to perform this work.

2. Scarification of the Existing Pavement Surface. Scarify the existing pavement surface as indicated. Cut off and remove any reinforcement that is exposed and loose.
3. **Extra-Depth Surface Preparation.** After scarifying, remove any deteriorated concrete or asphalt materials that extend below the level of the scarification, as indicated or directed. Remove all asphalt patches and replace with concrete as specified in Section 516 and 525. Use either 6.6 kg (15-pound) chipping 30-pound pneumatic hammers, operated at an angle of no more than 45 degrees measured from the pavement surface, or other approved scarifying equipment approved by the Representative.

Sound the pavement to ensure that all deteriorated and delaminated concrete has been removed. In the presence of the Inspector, sound the concrete to determine the extent of the concrete delamination using a steel bar, drag chains, or a hammer. When voids are detected under existing slabs, the slabs need to be stabilized as specified in Section 679.

Remove all loose material from the pavement surface before cleaning.

4. **Steel Plates.** If inlaying and the existing transverse pavement joints have steel plates, remove exposed steel plates.

5. **Cleaning the Surface.** Following surface preparation and prior to paving, clean the scarified pavement surface by appropriate means to ensure adequate bonding between the overlay and original after removing deteriorated and delaminated concrete, and before placing grout. Use shot blasting or water blasting. Cleaning may be accomplished by sweeping the concrete pavement to be overlaid the day before paving operations are planned. Do not clean more pavement than will be overlaid that day. Cover the cleaned surface, followed by cleaning with polyethylene sheeting. Keep the surface covered until ready to pave. Do not remove sheeting more than 30 m (100 feet) in front of the paver with compressed air but no more than 30 minutes prior to the placement of the concrete grouting operation. Immediately ahead of the grouting operation, air blast the pavement surface to remove any shot, dust, or other debris.

Use a compressed air stream that is free of oil, moisture, and other potential contaminants, and that has a minimum pressure of 100 pounds per square inch measured at the source. Do not allow any standing water or moisture to remain on the pavement surface prior to the placement of the overlay/inlay. Use a compressed air stream of at least 700 kPa (100 pounds per square inch) (measured at the source). Use compressed air that is free of oil, moisture, and other contaminants.

Keep the prepared surface free of all contaminants if the prepared surface becomes contaminated prior to the placement of the concrete overlay/inlay. Protect the cleaned and prepared surface from oil or grease drippings from compressors, concrete trucks, spreaders, pavers, etc. by using protective covers. Remove all deleterious materials before placing the concrete overlay/inlay.

(b) **Overlay Transition.** Construct paving notches, as indicated.

(c) **Transverse Joint Location.** Accurately mark the location of all transverse joints so that they can be located after the overlay has been placed. Submit the proposed method of location marking for approval before the start of construction.

(d) **Grout.** Adjust the grout proportions, as directed, at no cost to the Department. Furnish grout having the consistency of latex paint. If the coarse aggregate in the prepared surface is visible through the grout, the grout is too thin.

Mix grout in an approved mobile mixer on the job site. Do not use grout mixed for more than 90 minutes.

(e) **Grout Application.** After the surface has been cleaned, spray or scrub a coating of grout into the dry, prepared surface immediately ahead of the paver. Exercise extreme care to ensure that all areas receive a thorough, even coating and that no excess grout collects in pockets.

Place new concrete before the grout begins to dry. If grout exhibits signs of drying, by a whitish appearance to the surface, remove the grout by sand blasting or shot blasting. Regrout the cleaned pavement surface before placing new concrete.

(f) **Bond Strength.** Bond strength testing will be performed at 7 days, according to PTM No. 610, on the area represented by each day's placement. Obtain three drilled cores for each test in the presence of the Inspector. The Inspector will select coring locations at random, according to PTM No. 1. When directed, supply the Department...
with a minimum of three additional 100 mm or 150 mm (4-inch or 6-inch) diameter cores. Provide a testing apparatus conforming to PTM No. 610. Minimum acceptable bond strength is 14 kPa (200 pounds per square inch) at 7 days.

If the average of the test results on the three cores is below minimum acceptable bond strength, the area represented will be considered defective. If this occurs, obtain additional cores at 30 m (100-foot) intervals in both directions longitudinally from the defective cores to determine the limits of defective work. Each set of three defective cores will represent the condition in the same traffic lane for a distance of 15 m (50 feet) in both directions longitudinally.

(g) Final Finish, Section 501.3(k) 4.

Concrete Slump. Provide concrete with a slump within the following ranges when tested according to AASHTO T 119:

- Slipform Paving 25 mm to 50 mm (1 inch to 2 inches)
• Fixed Form Paving —— 50 mm to 75 mm (2 inches to 3 inches)

(h) Curing Concrete. Use only burlap-backed white polyethylene, white membrane-forming curing compound shall be placed on the overlay surface and edges within 30 minutes of concrete placement or as soon as the bleed water has dissipated or been removed, whichever occurs later, unless otherwise directed by the Representative. Remove any standing pools of bleed water that may be present on the surface before applying the curing compound. Do not allow the concrete surface to dry before applying the curing compound. Apply at a minimum rate of 1 gallon (+ 0.1 gallon) per 150 square feet, or as directed by the Representative. If conditions warrant (e.g., the combination of heavy curing compound and pavement grade/cross-slope makes joint sawing operations hazardous), the curing compound can be applied in two equal coatings, with the first applied as stated previously and the second applied immediately after the sawing operations have been completed. Joint faces must be protected from exposure to curing compound or cleaned thoroughly prior to sealant installation. Apply burlap for normal curing compound homogenously to provide a uniform, solid, white opaque coverage on all exposed concrete surfaces. If specified, apply curing material as specified in Section 501.3(l).

(i) Transverse Joints. Clean to a depth sufficient to place the new backer rod material. Place joint backing or other approved joint filling material to within 1/4 inch of the pavement surface in all the existing transverse joints (including those associated with full-depth repairs) before prior to placement of the overlaying. Cement this material in place so that it cannot be dislodged by the paving operation. Saw cut all transverse joints as specified in Section 501.3(e).

Use guide nails, tacks or other Representative-approved devices to accurately mark the locations of the centers of all transverse joints noted above prior to placing the concrete overlay. After placement of the overlay, use the joint location devices and a chalkline or other suitable means to mark the transverse joints locations on the pavement surface. As soon as the concrete is strong enough for cutting the joints without significant raveling or chipping, saw cut transverse joints directly over all existing transverse joints, including those produced by pre-overlay repairs. Saw cut depth must be equal to the full thickness of the overlay (including any additional thickness used for grade corrections) plus at least 1/2 inch, but must not result in damage to dowel load transfer devices in the original pavement. Saw cut width should be at least the width of the underlying joint or crack in the existing pavement.

Saw cut all transverse joints to the full depth of the overlay, including any extra depth concrete placed at the joint, directly over the existing transverse joint and the width of the existing transverse joint. Include transverse joints created by concrete pavement patching within the overlay area. When inlaying, saw cut transverse joints to the full depth of the inlay, including any extra depth concrete placed at the joint, directly over the existing transverse joint and a minimum of 13 mm (1/2 inch) wide. Construct a sealant reservoir as shown on the Standard Drawing for Cement Concrete Pavement Joints. The Contractor may saw cut the overlay in a second operation, or may make the initial saw cut equal to full depth, the required reservoir width, of the sealant reservoir. After sawing, immediately flush the joint with water to remove sawing slurry that might otherwise prevent proper sealant installation. Place backing material to the proper depth and seal the joints as specified in Section 501.3(n).

(j) Longitudinal Joints. Accurately reference the location of existing longitudinal joints within the overlay area and between the adjacent lane and the overlay area, so that they can be accurately located after paving. After paving, saw cut a sealant reservoir, 6 mm (1/4 inch) wide, and the full depth of the overlay, directly over the existing longitudinal joint, plus at least 1/2 inch. Seal joints as specified in Section 501.3(n). Provide a neat vertical edge face, free of honeycomb and segregation, longitudinally along both sides of the overlaid pavement.

(k) Edge Slump. Maximum edge slump permitted in the outside 150 mm (6 inches) next to the shoulder is 6 mm (1/4 inch). Maximum edge slump permitted in the outside 150 mm (6 inches) next to an adjacent lane is 3 mm (1/8 inch).
(m) Opening to Traffic. Before opening to traffic, sound the newly placed bonded overlay/inlay using only drag chains as directed by and in the presence of the Inspector. Remove and replace unbonded areas as directed.

Do not open to any traffic until the overlay/inlay develops a minimum compressive strength of 21 MPa (3,000 pounds per square inch), according to PTM No. 604, and the minimum acceptable bond strength as specified in Section 524.3(f).

Do not open to traffic until the overlay develops the minimum bond strength as specified in Section 524.3(f).

(n) Surface Tolerance. Section 506.3(o)

(p) Defective Work. Unless otherwise directed in writing, remove and replace pavement overlay that is defective in depth, as specified in Table A; defective in air content, as specified in Section 704.1(c)3; defective in bond strength, as specified in Section 524.3(f); or showing surface defects resulting from the effects of rain, improper final finish, or honeycombing which, in the Representative's opinion, cannot be repaired.

Replace defective pavement overlay as specified in Section 501.3(t); except, provide a minimum pavement removal and replacement length between transverse joints of 1.8 m (6 feet).

524.4 MEASUREMENT AND PAYMENT—

(a) Surface Preparation. Square Meter (Square Yard)

(b) Extra-Depth Surface Preparation. Square Meter (Square Foot)
(c) Thin-Bonded Portland Cement Concrete Overlay of Concrete Pavements. Square Meter (Square Yard)

The unit price includes saw cutting and sealing of existing and new transverse and longitudinal joints.

1. Adjustment for Deficiencies. If a lot, as specified in Section 506.3(u), contains depth deficiencies, the Department will determine the contract price paid for the lot as follows:

<table>
<thead>
<tr>
<th>Deficiency in Depth Determined by Cores mm (inches)</th>
<th>Payment Percent of Contract Price by Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 6.5 (0.00 to 0.25)</td>
<td>100%</td>
</tr>
<tr>
<td>6.6 to 7.7 (0.26 to 0.30)</td>
<td>95%</td>
</tr>
<tr>
<td>7.8 to 8.9 (0.31 to 0.35)</td>
<td>85%</td>
</tr>
<tr>
<td>9.0 to 10.1 (0.36 to 0.40)</td>
<td>75%</td>
</tr>
<tr>
<td>10.2 to 11.3 (0.41 to 0.45)</td>
<td>50%</td>
</tr>
<tr>
<td>11.4 to 12.5 (0.46 to 0.50)</td>
<td>25%</td>
</tr>
<tr>
<td>Over 12.5 (Over 0.50)</td>
<td>Defective Work</td>
</tr>
</tbody>
</table>

2. Defective Pavement Left in Place. The Department will not make any payment.

(d) Evaluation of Concrete Pavement Ride Quality and Payment of Incentive. Section 507.4