SPECIAL SPECIFICATION
4666
Deck Surface Crack Repair

1. **Description.** Seal cracks in horizontal concrete surfaces by gravity feeding. Use four different sealants. Seal discrete cracks using the four methods specified. Flood coat the deck surface and address cracks using the three methods specified.

2. **Materials.** Furnish materials meeting the following criteria.

   A. **Sealant.** Furnish 2 two-component epoxies (or modified epoxy) and 2 two- or three-component methacrylates with the following properties. Provide amounts of each material able to accommodate an equal portion of the proposed work.

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity</td>
<td>&lt; 75 cps</td>
<td>ASTM C 881</td>
</tr>
<tr>
<td>Bond Strength</td>
<td>&gt; 1500 psi</td>
<td>ASTM C 882 (14-day)</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>&gt; 4%</td>
<td>ASTM C881</td>
</tr>
<tr>
<td>Tack Free Time*</td>
<td>See note below</td>
<td>At 73F and 50% RH</td>
</tr>
</tbody>
</table>

   * For flood coat application only. Provide 1 sealant with tack free time less than 1 hour and one sealant with take free time greater than 1 hour but less than 5 hours.

   Provide manufacturer’s information for proposed material indicating compliance with the above listed properties to the Engineer for approval prior to starting work. The Engineer may require testing of the proposed material prior to approval.

   B. **Fine Aggregate.** Furnish a finely graded, oven dry mason’s sand meeting the following gradation.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4</td>
<td>100</td>
</tr>
<tr>
<td>No. 8</td>
<td>95/100</td>
</tr>
<tr>
<td>No. 16</td>
<td>70/100</td>
</tr>
<tr>
<td>No. 40</td>
<td>15/70</td>
</tr>
<tr>
<td>No. 100</td>
<td>2/15</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>80 min.</td>
</tr>
</tbody>
</table>

   C. **Caulk.** Provide gray caulk for reservoir creation capable of adhering to concrete. Submit proposed caulk for approval.

3. **Equipment.** Provide power sweepers, air compressors able to remove all oil and moisture from air stream, grinders, vacuum cleaners, and brooms necessary to prepare the surface.
Provide mixing and safety equipment in accordance with the sealant manufacturer’s recommendations. Provide spray equipment, brooms, squeegees, rollers, or other equipment necessary to apply the sealant. For flooding application, provide spreaders or other necessary distribution equipment to apply the fine aggregate.

4. Construction. Prepare and seal cracks in accordance with the specified method. The plans will indicate locations for each method of crack sealing at particular areas of the bridge deck.

A. Crack and Surface Preparation. Collect all debris and other material removed from the surface and cracks, and dispose of it in accordance with applicable federal, state and local regulations.

1. Discrete Cracks. Locate cracks greater than 0.003” in width for discrete crack sealing. Prepare crack in accordance with the method specified.

   a. Method A. Blow out cracks using high-pressure air.

   b. Method B. Use wire brushes attached to power tools to trace crack on deck surface to remove all laitance and other surface film near crack opening. Use high-pressure air or vacuum to remove debris from cracks.

   c. Method C. Use grinder or saw equipped with diamond blade to route the crack to obtain a trench 3/16” in width and 1/4” deep at the deck surface. Other methods may be proposed and demonstrated but approval will be required for the continued use. Do not use wet methods for sawing. Use high-pressure air or vacuum to remove debris from cracks.

   d. Method D. Create a reservoir by running parallel beads of caulk down each side of the crack approximately 1/2 in. from the crack. Ensure caulk creates a leak-proof reservoir with surface of deck. When crack passes through groove on deck, ensure caulk fills groove.

2. Flood. Remove all debris from deck surface by an approved method. Use compressed air for final cleaning of the entire surface and debris removal from all visible cracks. Prepare cracks in accordance with the method specified.

   a. Method A. No additional preparation required at crack locations.

   b. Method B. No additional preparation required at crack locations.

   c. Method C. Use grinder or saw equipped with diamond blade and route the crack to obtain a trench 3/16” in width and 1/4” deep at the deck surface. Other methods may be proposed and demonstrated but approval will be required for the continued use. Do not use wet methods for sawing. Use high-pressure air or vacuum to remove debris from cracks.

B. Sealant Application. Allow the cracks and deck surface to dry at least 24 hours after rain before sealing. Apply the crack sealant when the ambient and substrate temperatures are between 40°F and 90°F and in accordance with manufacturer’s specifications. Do not apply sealant if rain is expected within 12 hours of application.
Mix the sealant according to the manufacturer’s instructions. Mix only a quantity that can be placed within its pot life. Discard any mixed sealant that has exceeded its pot life or has begun to thicken.

Treat the cracks in accordance with the application method specified.

Broadcast or spread sand onto the still tacky sealant within 10 to 20 minutes of the last application of sealant. Apply the sand at a rate of 15 to 20 lb. per 100 sq. ft. of area.

1. Discrete Cracks.
   a. **Methods A and B.** Pour the mixed sealant directly onto the cracks. Use a heavy nap roller or other approved method to work the sealant into the crack. Immediately apply an additional application of sealant onto crack. Do not allow any pooling of sealant on surface and brush the sealant in the grooves on the deck surface to keep grooves open. Wait 5 minutes and apply sand to wet sealant remaining on the surface.
   
   b. **Method C.** Pour the mixed sealant directly onto the prepared cracks to fill the trench created. Allow the sealant to penetrate into the crack. Re-apply the sealant to the cracks to refill the trench. Do not wait until the sealant becomes tack-free before re-coating crack. Do not allow any pooling of sealant on surface and brush the epoxy in the grooves on the deck surface to keep grooves open. Wait 5 minutes and apply sand to wet sealant remaining on the surface.
   
   c. **Method D.** Pour the mixed sealant directly onto the prepared cracks to fill the reservoir created. Allow the sealant to penetrate into the crack. Re-apply the sealant to the cracks to refill the reservoir after a minimum of 5 minutes. Do not wait until the sealant becomes tack-free before re-filling reservoir. Do not allow any pooling of sealant outside the reservoir on surface and brush the epoxy in the grooves on the deck surface to keep grooves open. Wait a minimum of 5 minutes and apply sand to wet sealant remaining on the surface and in reservoir.

2. **Flood.** Demonstrate Method B using sealant with shortest tack free time on an area not exceeding 100 sq. ft. and obtain approval before starting other flood methods. Determine how much surface area can be treated with particular sealant without having sealant set-up and build thickness to deck and leave grooves filled with hardened sealant. Also, time must be allocated to placement of sand on surface while sealant is still tacky and able to anchor sand to surface. Do not exceed placement lots during deck sealing operations that were determined during trial placements.
   
   a. **Method A.** Distribute the sealant over the surface to be treated within the lot size that can be accommodated for the particular sealant being used. Brush cracks with heavy nap roller. Pull additional sealant material onto crack using squeegee or broom and then re-brush crack with heavy nap roller. Remove excess sealant from deck surface and brush or broom out epoxy from texture grooves. Do not allow the ponded sealant to stiffen, and do not allow sealant to remain in the grooves on the bridge deck.
b. **Method B.** Pour sealant directly on cracks within the treatment lot. Brush sealant into cracks with heavy nap roller. Distribute the sealant over the surface to be treated within the lot size that can be accommodated for the particular sealant being used. Brush cracks with heavy nap roller. Pull additional sealant material onto crack using squeegee or broom and then re-brush crack with heavy nap roller. Remove excess sealant from deck surface and brush or broom out epoxy from texture grooves. Do not allow the ponded sealant to stiffen, and do not allow sealant to remain in the grooves on the bridge deck.

c. **Method C.** Pour sealant directly on grooved cracks within the treatment lot. Distribute the sealant over the surface to be treated within the lot size that can be accommodated for the particular sealant being sued. Brush grooved cracks with heavy nap roller. Pull additional sealant material onto crack using squeegee or broom and then re-brush crack with heavy nap roller. Remove excess sealant from deck surface and brush or broom out epoxy from texture grooves. Do not allow the ponded sealant to stiffen, and do not allow sealant to remain in the grooves on the bridge deck.

**C. Defective Work and Final Cleanup.** Correct all defective work at no cost to the Department. Completely remove all material that did not harden or cure properly before reopening to traffic.

For flood applications where the surface is not sufficiently rough because sand was not distributed properly and timely, remove as directed all hardened sealant from the surface by abrasive blasting. Reapply the surface sealant and sand as directed.

A bridge deck may be opened to traffic when the sealant has cured per the manufacturer’s recommendations and all excess sand has been removed.

5. **Measurement.** This Item will be measured in place by the foot for discrete crack applications and by the square foot of area sealed for flood applications.

6. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided in “Measurement” will be paid for at the unit price bid for “Deck Surface Crack Repair (Discrete Method A)”, “Deck Surface Crack Repair (Discrete Method B)”, “Deck Surface Crack Repair (Discrete Method C)”, “Deck Surface Crack Repair (Discrete Method D)”, “Deck Surface Crack Repair (Flood Method A)”, “Deck Surface Crack Repair (Flood Method B)”, and “Deck Surface Crack Repair (Flood Method C). This price is full compensation for furnishing all materials; cleaning cracks and surfaces; preparing cracks; sealing cracks and surface; applying sand; disposing of debris; and equipment, labor, tools, and incidentals.