

SECTION 1040—CONCRETE BRIDGE DECK REPAIR

1040.1 DESCRIPTION—This work is removing and patching designated areas of deteriorated concrete of the bridge deck. Concrete Bridge Deck Repair is classified into three types as follows:

(a) **Type 1.** Areas where deteriorated concrete extends to a maximum depth of the top of the top mat of reinforcement bars, exposing no more than one-quarter bar diameter.

(b) **Type 2.** Areas where deteriorated concrete extends beyond the depth of the top of the top mat of reinforcement bars or where reinforcement bars are unbonded.

(c) **Type 3.** Areas where deteriorated concrete or patching extends to the full depth of the deck, including deck overhang areas; and areas where curb, barrier, or deck ends need to be patched as part of the repair. Type 3 repairs over adjacent box beams extend to the top of the beam.

1040.2 MATERIAL—

(a) **Patching Material.**

- Class AAA Cement Concrete—[Section 704](#), except use No. 8 coarse aggregate.
- Concrete Bonding Compound—Type II, Grade 2, [ASTM C 881](#) epoxy as specified in [Section 706](#)
- Wearing Surface Material for Patching—[Section 1042.2](#)

(b) **Reinforcement Bars.** [Section 1002.2](#)

1040.3 CONSTRUCTION—

(a) **Deck Sounding.** Provide a chain drag 1 m (3 feet) in width with chain drops spaced every 150 mm (6 inches) for Department use. As directed, provide assistance to the Representative for the purpose of sounding the entire deck surface with the chain drag before and after scarification.

(b) **Preparation of Surface.** The Representative will determine and delineate the type and extent of the repair areas. Outline the areas with a 20 mm (3/4-inch) deep vertical saw-cut before scarifying operations.

Repair work may begin before scarifying operations. If after scarifying, another area or areas of deteriorated concrete are found beyond the initial saw-cut peripheries, make new saw-cuts for repair limits.

Sandblast or waterblast to remove partially loosened chips of concrete. Sandblast, waterblast, or wire brush exposed reinforcement bars to remove rust and corrosion. Remove all portions of damaged or heavily corroded reinforcement bars, and replace with the same type of bars, as specified in [Section 1002.3](#) and as directed.

For Type 2 repairs, remove concrete to a depth that provides a minimum of 20 mm (3/4-inch) clearance around all reinforcement bars in the top mat, regardless of concrete deterioration. If the removal reaches the top level of the lower reinforcing mat, continue the removal until full-depth removal is achieved and perform a Type 3 repair.

During removal for Type 3 repairs, provide shielding to prevent debris from falling below the deck. Prevent damage to underlying beams.

(c) **Equipment.** Power driven hand tools for removal of deteriorated concrete are required and are subject to the following restrictions:

- Do not use pneumatic hammers with more mass (weight) than nominal 15 kg (30-pound) class.

- Do not operate pneumatic hammers or mechanical chipping tools at an angle in excess of 45 degrees relative to the surface of slab.
- Do not place pneumatic tools in direct contact with reinforcing steel.
- Triple-headed tampers fitted with star drills not less than 50 mm (2 inches) in diameter in the tamper sockets may be used in the vertical position.

Use hand tools such as hammers and chisels, or small air chisels to remove final particles of unsound concrete or to provide necessary clearances around reinforcement bars.

(d) Cleaning. Blow all removal areas clean with oil-free compressed air and protect them against any contaminate detrimental to the bond of the patching material.

Satisfactorily repair any damage to the structure beyond the limits of this work due to the construction operations at no expense to the Department.

(e) Concrete Bonding. Coat contact surfaces of Type 1, Type 2, and Type 3 repairs with concrete bonding compound. Do not coat surface to receive a new surface course. Remove concrete bonding compound from surface to receive the surface course at no expense to the Department.

1. Epoxy Bonding Compound. Place concrete against contact surface while epoxy bonding compound is still tacky to ensure bond between contact surface and fresh concrete. Wire brush or sandblast hardened epoxy before recoating with fresh epoxy. Use epoxy-bonding compound as specified in 1040.2(a).

2. Non-Epoxy Bonding Compound. Place concrete against contact surface within the compound manufacturer's recommended time frame. When recommended time frame has expired, follow manufacturer's recommendations for recoating contact surfaces.

(f) Patching.

1. Patching in Preparation of Latex Overlay Placement.

1.a Type 1. Patch areas of repair with the material used for the overlay wearing surface and make the patch concurrently with the overlay operation. Place overlay as specified in [Section 1042.3](#).

1.b Type 2. Construct Type 2 patches before the overlay operation unless allowed to patch simultaneously with the overlay.

Method 1. Patching before Overlay Operation. Patch areas of repair with modified Class AAA cement concrete. Vibrate material in repair areas internally with a pencil vibrator in addition to surface screed vibration.

After patches have attained a minimum compressive strength of 23 MPa (3,300 pounds per square inch), sandblast or waterblast patch surfaces to remove laitance.

Perform scarification either before or after patching, as directed. If scarification is performed before patching, rough-texture patch surfaces by shot-blasting. If scarification is performed after patching, do not begin scarification until the patches have attained a minimum compressive strength of 23 MPa (3,300 pounds per square inch).

If after scarifying, additional areas of deteriorated concrete are discovered, make repairs as directed. Take precautions to prevent contamination of the scarified deck surface.

Method 2. Patching Simultaneously with Overlay Operation. If allowed, patch Type 2 repairs up to 50 mm (2 inches) deep with overlay material, placed monolithically with the overlay. Place overlay as specified in [Section 1042.3](#).

1.c Type 3. Patch areas of repair with modified Class AAA cement concrete. Use removable formwork of sufficient strength to prevent lateral or vertical deflection. Provide side forms including drip-strip and chamfering. Vibrate material in repair areas internally with a pencil vibrator in addition to surface screed vibration.

After patches have attained a minimum compressive strength of 23 MPa (3,300 pounds per square inch), sandblast or waterblast patch surfaces to remove laitance.

Perform scarification either before or after patching, as directed. If scarification is performed before patching, rough-texture patch surface by shot-blasting. If scarification is performed after patching, do not begin scarification until the patches have attained a minimum compressive strength of 23 MPa (3,300 pounds per square inch).

Do not place Type 3 patches simultaneously with overlay.

2. Patching without Overlay Placement.

2.a Type 1. Do not construct Type 1 patches. Remove concrete to a depth that provides a minimum of 20 mm (3/4 inch) clearance around all reinforcement bars in the top mat, regardless of concrete deterioration, and construct a Type 2 patch.

2.b Type 2. Patch areas of repair with modified Class AAA cement concrete. Vibrate material in repair areas internally with a pencil vibrator in addition to surface screed vibration. Finish patches to match the existing deck surface.

2.c Type 3. Patch areas of repair with modified Class AAA cement concrete. Use removable formwork of sufficient strength to prevent lateral or vertical deflection. Provide side forms including drip-strip and chamfering. Vibrate material in repair areas internally with a pencil vibrator in addition to surface screed vibration.

(g) Curing Patches. Cure patches made with modified Class AAA cement concrete as specified in [Section 1001.3\(p\)](#), but do not use liquid membrane curing unless allowed. Do not apply live loads to patches until concrete has reached a minimum compressive strength of 23 MPa (3,300 pounds per square inch).

1040.4 MEASUREMENT AND PAYMENT—

(a) Patching. Square Meter (Square Foot)
For the type indicated.

(b) Reinforcement Bars. [Section 1002.4](#)