Concrete Repair Guidelines

Concrete repairs can be broken down into four basic types, plus special repairs and planing.

Note: It is recommended that investigation into soundness of pavement be performed before a project and specific repairs are decided upon. This investigation should include 'chaining' the pavement, coring and possibly milling some joints to determine the severity of deterioration, and coring near and away from joints to test for freeze-thaw durability.

Concrete Rehabilitation only addresses deficiencies in the structure of concrete pavements, it does not correct the ride.

Type A

Type A repairs consist of joint or crack resealing. These repairs include sawing or routing to prepare the concrete joint or crack faces to ensure adhesion of the sealer and to provide the proper shape factor. Joints wider than 1" may increase noise and slapping.

Type B

Type B repairs generally consist of partial depth milling or chipping to remove deteriorated or delaminated concrete and preparation and placement of the repair. Type B-2D and B-2E repairs include removal to the bottom of the pavement if necessary.

Type C

Type C repairs consist of full depth removal of the concrete at joints or cracks and preparation and placement of the repair.

Type CX repair is used in conjunction with Type C repairs if removal is required beyond the required 3'-6" (1 m) width, but less than 13 feet (4 m) total along centerline.

Type D**

Type D repair is generally used for removal and replacement of one or more concrete pavement panels. It is also used if the length of full depth repair within a panel exceeds 13 feet (4 m) along centerline. NOTE: The first 3'-6" (1 m) of a Type D repair is paid for as a Type C Repair. The Remainder, 9'-6" (3 m) or more, is paid as a Type D.

**For repairs that require early opening times, 3A32HE utilizing a type E admixture has historically worked the best. A summary of mixes and their opening times is included in the repair standards.

Date: February 2005
Dowel Bar Retrofit

The Dowel Bar Retrofit repair is used for establishing load transfer at cracks or joints. This repair may be considered when the concrete is structurally sound and the main deficiency of the pavement is load transfer. If this repair is being considered and the pavement is faulted, planing the pavement is also recommended. Contact the Concrete Office for further details and current specifications.

Concrete Planing

This intent of a Concrete Planing Repair is to improve skid resistance, reduce rutting, promote drainage, and correct the ride in concrete pavements over joints and cracks.

Incentives/Disincentive Specifications may choose to exempt large dips and bumps, to avoid excessive planing, and feather in and out of these areas.

The various repair types are generally used as follows:

Transverse Joints

Type A-1H, and A-1S for Resealing
Type B-2A, B-2B and B-3 for Partial Depth Repairs
Type B-2E, C-1, C-3AS, C-3BS, C-3D and C-3DS for Full Depth Repairs

Longitudinal Joints

Type A-5H and A-5S for Resealing
Type B-2A, B-2B, B-2C and B-3 for Partial Depth Repairs
Type B-2D, B-2E and C-1 for Full Depth Repairs

Cracks

Type A-3H, A-3S, A-4H, and A-4S for Resealing
Type B-1, B-2A and B-2B for Partial Depth Repairs
Type B-2E, C-1 and C-2 for Full Depth Repairs

Special Repairs

C-2 for repair of utility trenches
CRCP-2 for repair of beam expansion joints
Dowel Bar Retrofit for load transfer
**Types of Concrete Repairs**

**Type A-1H**
For sawing and resealing transverse contraction joints with hot pour sealant.

**Type A-1S**
For sawing and resealing transverse contraction joints with silicone sealant.

**Type A-3H**
Saw, or rout, and seal cracks, or those portions of cracks, between 1/8" (3 mm) and 1/2" (13 mm) wide with hot pour sealant. Cracks less than 1/8" (3 mm) wide are generally not repaired.

**Type A-3S**
Saw, or rout, and seal cracks, or those portions of cracks, between 1/8" (3 mm) and 1/2" (13 mm) wide with silicone sealant. Cracks less than 1/8" (3 mm) wide are generally not repaired.

**Type A-4H**
Saw, or rout, and seal cracks, or those portions of cracks, between 1/2" (13 mm) and 1" (25 mm) wide with hot pour sealant. For cracks wider than 1" (25 mm), use Repair Type B-1.

**Type A-4S**
Saw, or rout, and seal cracks, or those portions of cracks, between 1/2" (13 mm) and 1" (25 mm) wide with silicone sealant. For cracks wider than 1" (25 mm), use Repair Type B-1.

**Type A-5H**
Saw and seal/reseal non-spalled portions of untied longitudinal joints with hot pour sealant. It is not intended for tied centerline type joints.

**Type A-5S**
Saw and seal/reseal non-spalled portions of untied longitudinal joints with silicone sealant. It is not intended for tied centerline type joints.

**Type B-1**
For spalled cracks greater than 6 feet (2 m).

**Type B-2A**
For shallow depth of 2" - 4" (50 mm – 100 mm) spot surface repairs that are less than 30 square feet (3 m²). The repair may be along a joint or crack, or at any location within a panel. This repair is also used when Repair Types B-1, B-2C, B-2D or B-3 exceed the 10" (250 mm) minimum dimension because of deteriorated or delaminated concrete. Extra width to accommodate contractor's equipment shall be at contractor's expense.

**Type B-2B**
This repair is similar to Repair Type B-2A except that the minimum area is 30 square feet (3 m²).

**Type B-2C**

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For spalled concrete along a longitudinal edge of a panel. It has a minimum dimension of 6 feet (2 m) along the edge and a maximum depth of T/2. If deterioration extends deeper than T/2, include Type B-2D repair.

**Type B-2D**
Use where deterioration along a longitudinal edge exceeds T/2 in depth. Generally, this deterioration will extend to the bottom of the pavement.

**Type B-2E**
For the ends of joints or cracks where the full depth deterioration, only, extends up to 18" (450 mm) from the end. Generally used in conjunction with a B-2A repair.

**Type B-3**
For spall repair along transverse joints. This repair may also be utilized to repair longitudinal joints, usually centerline joints that were formed with inserts.

**Type C-1**
For "spot" full depth repairs. The detail sheet lists a 6 foot (2 m) maximum dimension along a joint. The minimum and maximum dimensions of these repairs should be 3'-6" x 3'-6" (1 m x 1 m) and 3'-6" x 6' (1 m x 2 m) respectively. If the maximum dimension exceed 6', it is recommended to use either a C-3A, C-3AS, or C-3D.

**Type C-2**
Intended to repair concrete pavement over utility trenches.

**Type C-3AS**
For full depth repair of transverse contraction joints. It differs from the C-3A repair in that a dowel basket is used for alignment of the dowels. A C-3D repair is recommended for most repairs of this type since it is doweled at both ends, helping to ensure that at least one of the ends allows for contraction and expansion.

**Type C-3BS**
This repair is similar to Type C-3AS except that it is an expansion joint, not contraction.

**Type C-3D**
This is the preferred full depth contraction joint repair. It is doweled at both ends to help assure the repair will allow contraction and expansion.

**Type C-3DS**
This repair is similar to Type C-3DS except one side of the repair has an expansion joint.

**Type CX**
This repair is used in conjunction with Type C repairs if removal is required beyond the required 3'-6" (1 m) width, but less than 13 feet (4 m) total along centerline.

**Type D-1**
For full depth replacement of panels in single lanes. It is also used for full depth, partial panel
repair, if the length exceeds 13 feet (4 m) along centerline.

**Type D-2**
For full depth replacement of panels in adjacent lanes. It is also used for full depth, partial panel repair, if the length exceeds 13 feet (4 m) along centerline.

**CRCP-2**
For full depth repairs of expansion joints on continuously reinforced concrete pavement (CRCP) that utilize a wide flange beam for the expansion device.

**Dowel Bar Retrofit**
For establishing load transfer at cracks or joints. This repair may be considered when the concrete is structurally sound and the main deficiency of the pavement is load transfer. The repair saws, or mills, slots, places dowels in the slots, then places patching material in the slots and around the dowel bars. The first dowel bar retrofit project in Minnesota was constructed in 1994 on T.H. 52 near Zumbrota. As of February 1999, there seems to be no major problems with that repair. Several other projects have been constructed in the past couple years as part of a research study and will continue to be monitored also. If this repair is being considered and the pavement is faulted, planing the pavement is also recommended. Contact the Concrete Engineering Unit for further details and current specifications.

**Relief Cut**
The relief cut is not a repair. It is to be used at the direction of the Engineer to prevent a pavement blowup during full depth repair operations. The relief cut consists of making a temporary 4" (100 mm) wide full depth cut prior to making a full depth repair in an adjacent tied concrete lane. The relief cut portion of the joint is then repaired after completion of the adjacent full depth repair.