15-03 DEEP PATCHING

A variety of roadway maintenance repair techniques and materials are used by TxDOT Districts to extend pavement life. This brief documents techniques and materials most used by districts in South and West Texas for "Deep Patching" of pavements damaged by traffic generated by the development of the energy sector of the Texas economy. Other Energy Sector Briefs available include the following:

- 14-03 Shoulder/Edge Repair Techniques
- 15-01 Maintenance Repair Techniques
- 15-02 Shallow Patching
- 15-04 Level-Up Patching
- 15-05 Surface Treatment/ Seal Coat/Chip Seal
- 15-06 Pavement Strengthening

The maintenance methods summarized in these briefs represent current practices of the districts in these two regions of the state. As materials and equipment change, these methods will be altered. Feedback on performance of various maintenance treatments used in the energy sector will also result in change to these methods, materials and techniques. Report 409186-01 "Current TxDOT Practices for Repair of Road Damage Associated with Energy Development and Production" provides additional details for these routine maintenance operations.

This report and related documents are available on the TxDOT Maintenance Division (MNT) SharePoint site at https://txdot.sharepoint.com/sites/division-mnt/SitePages/Home.aspx.

DESCRIPTION

- Removal of a localized area of the pavement to a depth greater than about 4 inches and replace with flexible base course material and/or asphalt bound materials

CONDITIONS FAVORING USE

- Use to repair pavement distress associated with subgrade and base failures caused by traffic loads
- Alligator cracking, rutting in unbound materials and deep pot holes are typical types of distress treated with this maintenance operation
- Purpose of patch is to strengthen the pavement in localized area and provide a relatively smooth riding surface
- Deep patches may be temporary or permanent depending on quality of repair, depth, materials used, traffic levels and weather conditions

PROCEDURE

- Remove loose materials from area to be repaired
- Remove materials to a depth that will allow for a proper depth of repair (depth that will allow the structural strength or load carrying capability of the patch relative to the adjacent pavement to be improved)
- Determine the depth of repair based on the pavement design catalog available on the following link: https://txdot.sharepoint.com/sites/division-mnt/SitePages/Home.aspx.
- Square the sides of the patch
- Tack bottom and sides of the repair area
- Place flexible base and/or asphalt bound pavement materials
- Compact all materials
- Asphalt bound materials should be placed to a depth of a minimum of twice the depth of the asphalt bound materials in the existing pavement or a minimum of 4 inches if used
- Hot mix-cold laid patching materials and LRA mixtures should be placed in shallow lifts for compaction purposes and to allow for volatile loss (multiple lifts may be needed)
- Flexible base materials of good quality can be used provided the structural strength of the pavement is improved as compared to the existing pavement structure

SCHEDULING

- Schedule for warmer, dry weather
- Patching in cool/ damp weather should be avoided if possible

PERFORMANCE

- When hot mix-cold laid or cold mix-cold laid patching materials are used in deep patches, it is difficult for volatiles in these mixtures to escape and rutting/shoving in warm weather is likely
- Small percentages of portland cement can be used in hot mix-cold laid and cold mix-cold laid patching materials to improve their rutting/shoving resistance
- When placing hot mix asphalt as a patching material, depths should be greater than 4 inches when placed on top of flexible base material

COMMENTS

- Follow department and district guidance regarding traffic control plan

MATERIALS/EQUIPMENT/CREW SIZE/PRODUCTION

Typical materials, equipment, crew size and production as reported by districts are shown below.

Deep Patch-South Texas

Materials	Equipment	Crew Size	Production	Comments
HM-CL Type B as surface, at depth use BB with 2 % cement and 2-ST with HFRS-2 (0.40 gal./sq. yd.) and Gr. 3 chip and HFRS-2 (0.35 gal./sq. yd.) and Gr. 4 chip), use HFRS-2 for tack coat	Pneumatic and flat wheel roller, maintainer, backhoe, 3-10 yd. dump trucks, distributor, broom, skid steer, milling machine	12–16	1500 sq. yd./day with 150 to 200 cu. yd. of HM-CL	• Typically mill about 4 inches, compact base, tack with HFRS-2 (0.05 gal/ sq. yd.) • One district reported shoving in hot weather
Excavate 2 to 3 ft., add cement at bottom of excavation, fill with BB mixed with 2 to 3% cement, HFRS-2 tack coat (0.20 gal/sq. yd.), HM-CL Type CC	Pneumatic and flat wheel roller, maintainer, backhoe, loader, 3-10 yard dump trucks, belly dump, distributor	12–16	2 to 4 areas per day depending on size of area repaired and traffic	Remove 2 to 3 ft. of materials
LRA Type AA mixed with cement, HFRS-2 as tack coat and 1-ST with HFRS-2 Gr. 4 or 4S as chip	Dump trucks, haul trailer, loader, maintainer, pneumatic and flat wheel roller, distributor, broom, water truck			Remove and replace Mill 6 to 8 inches
FDR-CM with cement, 1-ST with HFRS-2 or HFRS-2P and Gr. 4 or Gr. 4S	Dump trucks, haul trailer, loader, maintainer, FDR pulverizer/mixer, pneumatic an flat wheel roller, distributor, broom, water truck			FDR-CM, some use of LRA D-S before placing ST
HMA-Type B				Use when possible, difficult to keep hot
Commercial cold patch material				• Used by some districts • Shoving reported by some districts

Deep Patch-West Texas

Materials	Equipment	Crew Size	Production	Comments
FB with 2% cement, ST, HMA	Zipper, small or large milling machine or pulver/mixer			Remove with small milling head, stabilize with 2 % cement, ST or HMA surface, 6 to 8 inches deep
FDR-CM with 6% fly ash or with 3% cement	Small or large milling machine, or pulver/mixer			FDR-CM with stabilizer, 2-ST, 6 to 8 inches
HM-CL, fly ash, cement, FB, CRS-2, Gr. 4 chip	Small milling machine, distributor, tailgate spreader, water truck	2-traffic control, 5-7 for operation	¼ lane mile per day	
LRA, HMA	Milling machine or pulver/mixer			HMA less than 4 in. poor performance

BB-Black Base (hot mixed-hot laid)-Item 292

FB-Flexible Base (aggregate base)-Item 247

FDR-CM-Full Depth Recycling-Cement Modified (2 to 3 percent portland cement)

HMA-Hot Mix Asphalt-Item 340, 341

HM-CL-Hot Mix-Cold Laid-Item 334

LRA-Limestone Rock Asphalt-Item 330

RAP-Reclaimed Asphalt Pavement

ST-Surface Treatment (seal coat/chip seal)

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