

Module 4-4

Partial-Depth Repairs

Objectives

Identify distress types suitable for partial-depth repairs

Identify various materials for repairs

Describe successful construction procedures

Partial-Depth Repairs

Removal of shallow areas of deterioration and replacement with a suitable repair material

Alternative to full-depth repairs when:

- Deterioration is limited to upper one-third of the slab
- Load transfer devices are still functional

Most commonly used to repair shallow joint spalling

Applications

Deterioration must be confined to upper one-third of the slab

Good candidate with joint resealing

Preparation for HMA or bonded PCC overlay

Conduct before undersealing and slab jacking

Conduct before diamond grinding and joint sealing

Limitations

Not candidate for:

- Cracks and spalls due to compressive stress buildup
- Spalls due to dowel bar misalignment or lockup
- Cracks caused by improper joint construction
- Working cracks
- Spalls caused by durability problems
- Joints with ineffective load transfer

Typical Spalling



Questionable Spall Repair



Candidate for Partial-Depth Repair?



Effectiveness

Performance has been acceptable at many sites after 5 to 10 years

Failures often attributed to poor practices

Stringent quality control and inspection

Good construction techniques

Must achieve strong bond between concrete and repair material

Repair Locations and Size

Typically placed along transverse and longitudinal joints

Coring is recommended to determine the extent of deterioration

More economical to conduct one large repair than several small repairs

Areas less than 150 mm long or 40 mm wide are not good candidates

Repair Materials

Factors to consider

- Available curing time
- Ambient temperature
- Cost
- Size of repair

Types of materials

- Cementitious
- Polymeric
- Bituminous

Bonding Agents

Required with some materials to enhance bond with existing pavement

Sand-cements grouts have been successful with PCC repair materials

Epoxy bonding agents have been successful with PCC and proprietary repair materials

Material Properties and Costs

Product	Opening Time, hr	Moisture Sensitive	Cost, \$/m ³
Type III PCC	5.0	No	375
Duracal	1.5	No	280
Set 45	1.5	Yes	1300
Five Star HP	1.5	No	1100
MC 64	2.0	Yes	8500
Percol FL	0.2	No	3550
UPM	0	No	185

Construction Steps

- Locate repair boundaries
- Remove deteriorated concrete
- Prepare joint
- Clean repair area
- Apply bonding agent
- Mix and place repair material

Detection of Deteriorated Concrete



Marking Area for Removal



Saw Cutting



Removal by Jackhammer



Removal by Milling (Partial Width)



Removal by Water Blasting



Sand Blasting



Area Cleaned and Ready



Joint Preparation



Application of Epoxy Bonding Agent



Material Placement

Use small quantities (short curing time)
Follow temperature recommendations
Some epoxy concretes must be placed in lifts

Consolidation

- Internal vibrators
- Vibrating screeds
- Rodding or tamping

Screed and hand trowel

Grout Mixer



Adding Admixture



Preparation of Epoxy Patching Material



Material Placement



Curing

Shrinkage cracks can develop if not cured properly

Hot-weather curing methods include a curing compound, moist burlap, or polyethylene

Cold-weather curing methods include an insulating blanket or tarp

Follow recommendations for proprietary materials

Crack Sealing after Patching



Finished Patch



Summary

Good candidate for deterioration limited to upper one-third of the slab

Weak areas must be thoroughly removed

Good bond with existing concrete is required (may require bonding agent)

Special joint preparation and forming methods are required