

# Concrete Pavement Patching: Know Your Rights



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# Overview

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- Right Treatment (definitions and objectives)
- Right Pavement (project selection)
- Right Time
- Right Methods (construction sequence)

# Patching—Definitions

- Full-depth patches (VDOT Types I and II): cast in-place repairs that extend the full depth of the PCC slab
- Partial-depth patches (VDOT Type III): removal and replacement of small, shallow areas of deteriorated PCC at spalled or distressed joints up to one-third the slab thickness

# Patching—Objectives

- Full-depth patches: restore ride, restore structural capacity, prepare for an overlay
- Partial-depth patches: restore ride, enhance safety, maintain structural capacity, extend service life, restore joint integrity for sealing

Owner objective: a permanent repair that will last as long as the surrounding pavement

# Right Pavement for Full-Depth

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- Structural deterioration
- Joint deterioration
- Utility cut repairs
- Overlay preparation

# Candidate Distresses (JCP)

- Transverse cracking (M, H)
- Longitudinal cracking (M, H)
- Corner breaks (L, M, H)
- Spalling (M, H)
- Blowups (L, M, H)
- D-cracking (M, H)
- Reactive aggregate spalling (M, H)
- Deterioration of existing repairs (M, H)

# Poor Timing

- Structural inadequacy
- Material-related distresses present, such as ASR, D-cracking
- Widespread deterioration (too many joints need repair)
- Uncertainty associated with number of patches
- When it is an expensive project line item

# Good Candidates



# Good Candidates



# Good Candidates



# Bad Candidates



# What are These Candidates For?



# Right Timing and Extent?



# Construction Sequence

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1. Marking the boundaries
2. Concrete sawing
3. Concrete removal
4. Repair area preparation
5. Restoration of load transfer
6. Concrete placement
7. Curing
8. Diamond grinding (optional)
9. Joint sealing

# Selecting Repair Boundaries

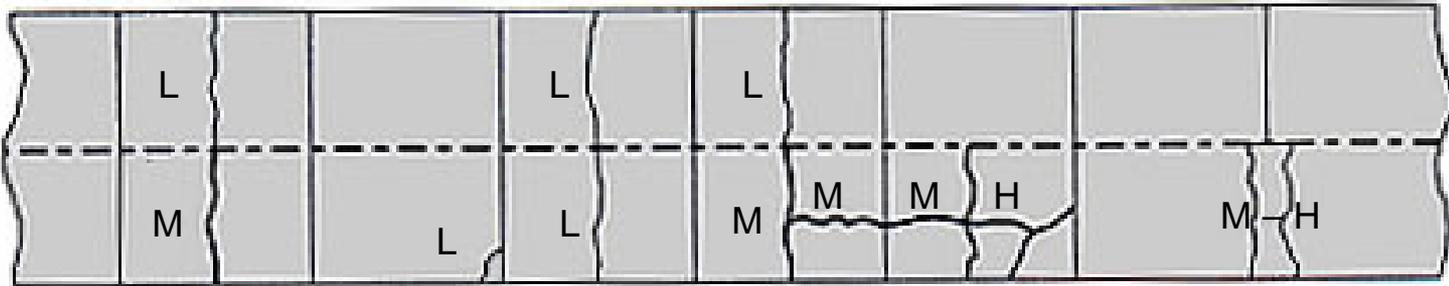
## Repair Dimensions

- Minimum dimensions
  - Use full lane-width repairs
  - Length  $\geq 6$  ft (doweled)
  - Length 6 to 10 ft (nondoweled)
- Long repairs ( $> 10$  to 13 ft)
  - Provide reinforcement or intermediate joint
- Independent repairs in adjacent lanes
- If distress falls within 2 ft of joint, extend repair to joint

# Selecting Repair Boundaries

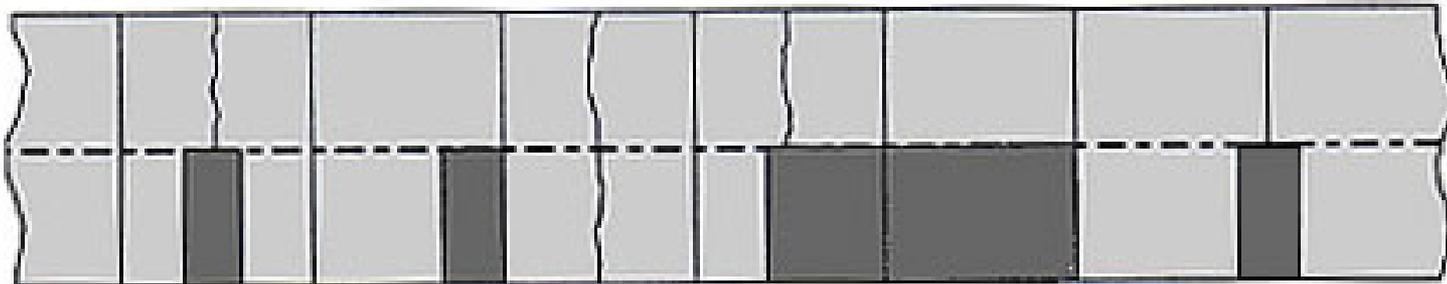
## Example Repairs in JPCP

Before



L, M, H = Low-, Medium-, High-Severity

After

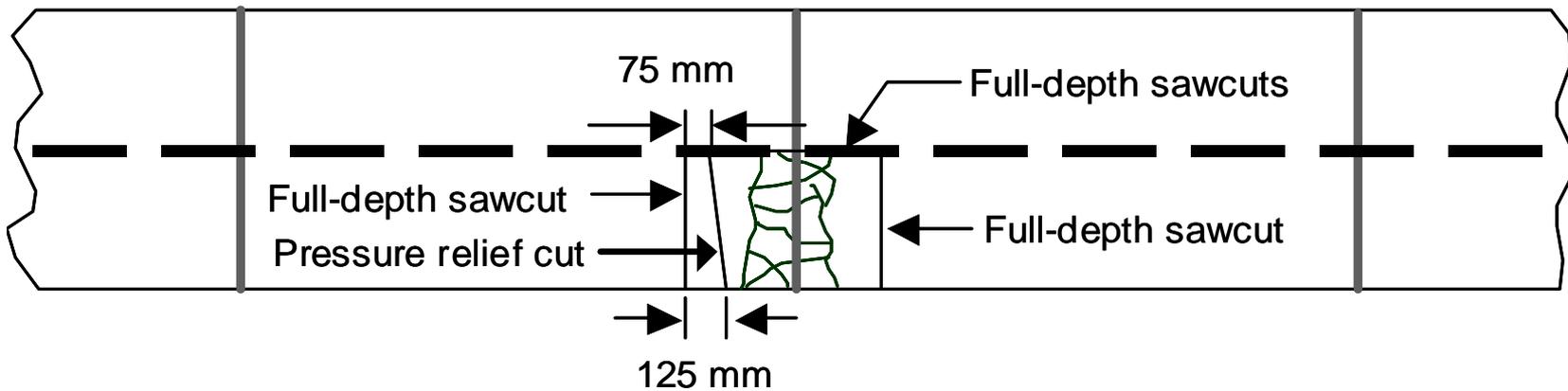
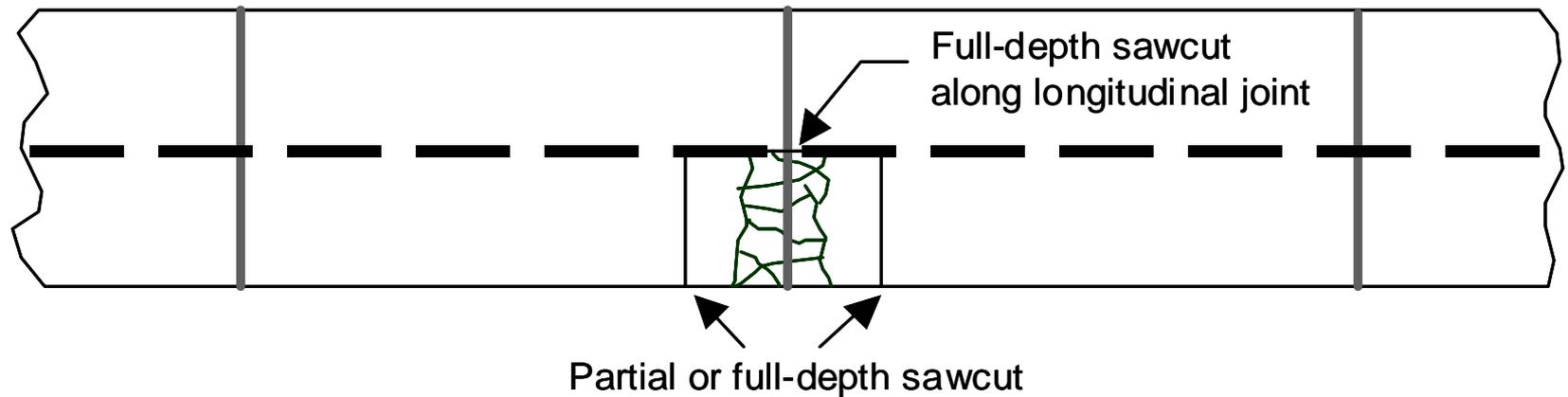


# Concrete Sawing

- Full-depth, diamond-bladed sawing
- Overrun sawcut to minimize slab spalling
- Limit traffic loading on sawed pavement to avoid pumping
- Maintain straight edge along shoulder side



# Layout of Sawcuts



# Concrete Removal

## Breakup and Cleanout Method

- Advantages
  - Simple and straightforward
  - Readily available equipment
- Disadvantages
  - Greatly disturbs subbase
  - Potential to damage slab and underground utilities
  - Relatively slow
  - Safety problems with flying debris

# Concrete Removal

## Concrete Breakup

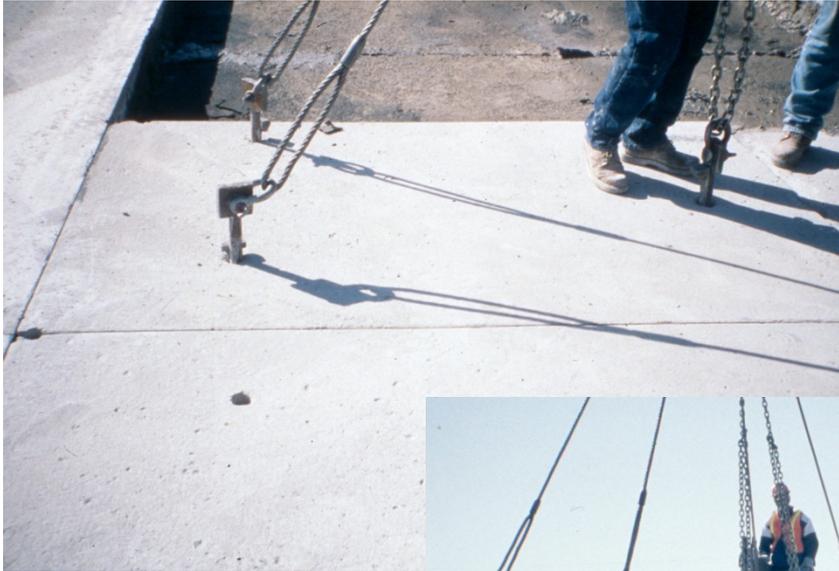


# Concrete Removal Cleanout with a Backhoe



# Concrete Removal

## Liftout Method



# Repair Area Preparation



# Restoration of Load Transfer

## Drilling Holes for Dowels

Smooth steel dowel bars (typ. 1.25 to 1.5 in)



Dowel holes drilled mid-depth on 12-inch centers

# Restoration of Load Transfer Bar Installation Recommendations

- Blow debris and dust from holes
- Place grout or epoxy in holes
- Insert dowel into hole with slight twisting motion
- Install grout retention disks (optional)
- Apply bondbreaker to protruding dowel ends

# Restoration of Load Transfer

## Cleaning Holes



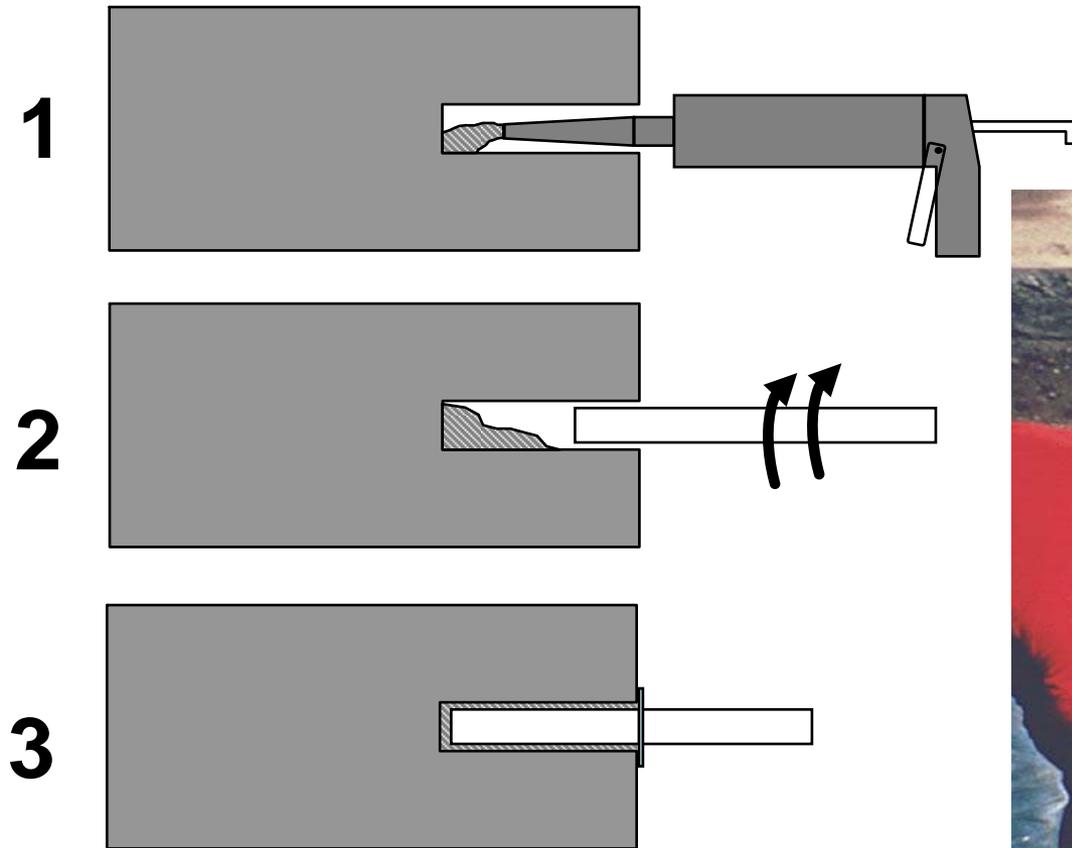
# Restoration of Load Transfer

## Injecting Anchoring Material



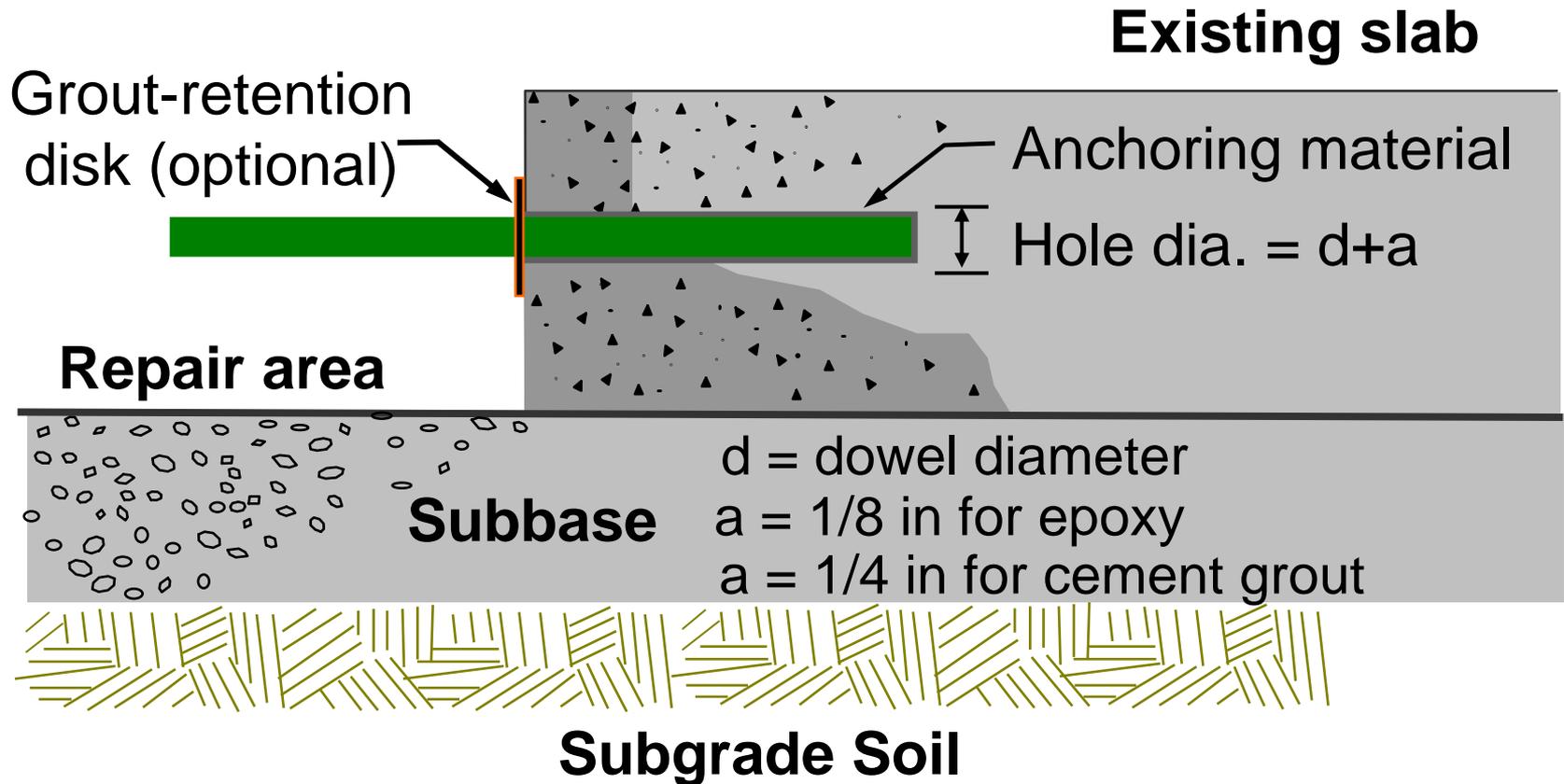
# Restoration of Load Transfer

## Dowel Bar Placement



# Restoration of Load Transfer

## Dowel Bar Placement



# Restoration of Load Transfer Area Prepared with Dowels in Place

## Area Prepared with Dowels in Place



# Longitudinal Joint

## Placement of Bondbreaker Board



# Concrete Placement

- Consolidation and level finish are critical
- Vibrate along edges of repair and in vicinity of dowel bars
- Don't use vibrators to move concrete
- Avoid addition of extra water
- Texture surface to match existing pavement

# Concrete Placement



# Concrete Placement

## Screeding



# Concrete Placement

## Texturing



# Curing

## Application of Curing Compound

- White-pigmented curing compound
- Apply immediately after texturing
- Uniform coverage



# Opening to Traffic

Slab Thick, in	Strength for Opening to Traffic, psi			
	Length < 10 ft		Slab Replace	
	f'c	MR (3 <sup>rd</sup> )	f'c	MR (3 <sup>rd</sup> )
6.0	3000	490	3600	540
7.0	2400	370	2700	410
8.0	2150	340	2150	340
9.0	2000	275	2000	300
10.0+	2000	250	2000	300

**VDOT Policy is 2000 psi**

# Key Factors For Success

- Selection of proper candidate projects
- Properly sized repairs
- Good material removal practices
- Well prepared subbase
- Effective restoration of load transfer
- Selection of appropriate repair material
- Proper material placement, finishing, and curing

Short-cuts may save time in the short run,  
but don't fall within your Rights

# Know Your Rights... and Wrongs



# Know Your Rights... and Wrongs



# Know Your Rights... and Wrongs



# Know Your Rights... and Wrongs



# Some Other Issues

- Warranties
- Type I/II vs. Type III
- Cast-in-place vs. precast
- PCC vs. HMA

# Questions?

Thank you!

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