Concrete Pavement Repairs

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Concrete Pavement Repairs

- Full-Depth Repairs
  - Removal & replacement of deteriorated concrete thru entire slab thickness
  - Joints & mid-panel cracks

- Partial-Depth Repairs
  - Removal & replacement of shallow areas of deteriorated concrete
  - Upper ½ of slab thickness
Common Treatments Accompanying Repairs

- Diamond Grinding
- Joint Sealing
- Others: Dowel bar retrofit, slab stabilization, edge drains
Why Concrete Pavement Treatments?

- Maintain functionality
  - Smoothness
  - Safety
  - Restore structural capacity
- Enhance performance
- Extend life

Managing Your Investment
Managing Your Investment Through Concrete Treatments

- Be practical: use appropriate treatments for specific distresses
- Be proactive: timing is everything
- Be particular: proper design and materials are important
- Be proficient: quality matters
Managing Concrete Pavements in Kentucky

![Graph showing the trend of IRI, Concrete Pavements (in/mi) from 2006 to 2013.]
Full-Depth Repairs
BE PRACTICAL: Select Appropriate Distresses

- Joint Deterioration
- Utility Cuts
- Mid-Panel Cracks
- Corner Breaks
BE PROACTIVE: Proper Timing
BE PARTICULAR: Proper Design & Layout

Traffic Direction

Mid-depth slab

12 ft

2 ft

1 ft typical

6 ft minimum

Smooth dowels 1.5 in dia. typ.
BE PARTICULAR: Durable Materials

- Cementitious materials most common
  - Type I, II, or III
  - Low w/c
  - Accelerators and water reducers
  - 4 to 24+ hour mixes
- Proprietary mixes
  - Opening times < 4 hours
BE PROFICIENT: Proper Installation & Construction

- Layout repair locations
- Saw boundaries
- Remove concrete
- Prepare area
- Provide load transfer
- Place and finish concrete
- Curing
- Opening to traffic
Sawing

- Full-depth, diamond-bladed sawing
- Entire perimeter of repair area
- Limit traffic loading on sawed pavement

![Image of sawing process]

**Diagram:**
- Full-depth sawcut along longitudinal joint
- Full-depth sawcut
Removal

- Breakup and Cleanout
  - Pneumatic hammers
  - Drop hammers
  - Backhoe

- Lift-out (preferred)
  - Pin & chain/lifting equipment

Advantages:
- Quick and easy
- High levels of productivity
- Minimizes damage to base
Load Transfer

- Critical to long-term performance
- Dowel characteristics:
  - Diameter: Typically D/8 or larger
  - Length: Typically 18 inches
  - Corrosion-resistant (epoxy common)
  - Bondbreaker on protruding ends
Drilling Holes for Dowels
Dowel Placement

1

2

3
Repair Installation

Concrete Placement

Screeding/Finishing

Texturing
Curing

- White pigmented curing compound
- Apply immediately after texturing
- Ensure uniform coverage
Opening to Traffic

- Compressive strength
  - 2000-3000 psi
- Flexural strength
  - 300-400 psi
- Thicker slabs can be opened at a lower strength
Performance of Full-Depth Repairs

- Performance generally good to excellent
- Requires proper design and construction:
  - Selection of proper candidate projects
  - Properly sized repairs
  - Good material removal practices
  - Effective load transfer
  - Proper material placement, finishing, and curing
Partial-Depth Repairs
BE PRACTICAL: Select Appropriate Distresses

- Joint spalling
- Surface deterioration
- Watch out for
  - Deep spalls
  - D-cracking, ASR

Joint Spalling

Deep Spall

D-Cracking
BE PARTICULAR: Durable Repair Materials

- Conventional cement-based materials
- Modified hydraulic cements (e.g., calcium aluminate)
- Polymer-based or polymer-modified (e.g., epoxy, polyester, polyurethane)
- Conventional bituminous

Proprietary Materials
- Fast setting
- Durable
- Constructability
Example Proprietary Products

Kwik Bond
PPC 1121

FibreCrete

GAP Patch 330

Delpatch

TechCrete
BE PROFICIENT: Effective Concrete Removal

- **Methods:**
  - Sawing/Chipping
  - Light jackhammer (no sawing)
  - Cold milling/wheel saws
    - Various head shapes & sizes
    - Various orientations
Milling Heads

“V” Shape Milling Head and Pattern

Wheel Saw and Rounded Pattern

Vertical Edge Mill Head and Pattern

30 to 60 degrees
Performance of Partial-Depth Repairs

- 10-15+ years with appropriate use and proper installation
- < 2-3 years if:
  - Used on improper distresses
  - Incomplete removal of deteriorated concrete
  - Poor installation/workmanship
For Additional Info

http://www.cptechcenter.org/
Questions?

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