Concrete Pavement Restoration – Case Study

APWA Northern CA Chapter
Hayward, CA
January 24, 2017

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• Caltrans involved in the development of this guide
  — Robert Hogan
• Caltrans has specifications on many of the techniques
M&R Types vs. Condition/Time
Pavement Preservation Philosophy

Keeping **good** roads in **good** condition!

www.ncenet.com
Concrete Pavement Preservation Treatments

- Slab stabilization
- Slab jacking
- Partial-depth repairs
- Full-depth repairs
- Retrofitted edge drains
- Load transfer restoration

- Cross stitching
- Diamond grinding
- Diamond grooving
- Joint resealing
- Crack sealing
Partial-Depth Repair

• Repair damage isolated to the upper third of slab
• Not for working cracks, locked-up dowels, corroded or high steel
Partial-Depth Repair Process

(TOP VIEW)

3 in. min (75 mm) Compressible insert

(SIDE VIEW)

3 in. min (75 mm) Spall Sawcut

Existing joint

Remove delaminated material

Patch Compressible insert
Cold-Milling for Concrete Removal

<table>
<thead>
<tr>
<th>“V” Shape Milling Head and Pattern</th>
<th>Rock Saw and Rounded Pattern</th>
<th>Vertical Edge Mill Head and Pattern</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="“V” Shape Milling Head and Pattern" /></td>
<td><img src="image2.png" alt="Rock Saw and Rounded Pattern" /></td>
<td><img src="image3.png" alt="Vertical Edge Mill Head and Pattern" /></td>
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<tr>
<td><img src="image4.png" alt="30 to 60 degrees" /></td>
<td><img src="image5.png" alt="Pattern" /></td>
<td><img src="image6.png" alt="Pattern" /></td>
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- “V” Shape Milling Head and Pattern
- Rock Saw and Rounded Pattern
- Vertical Edge Mill Head and Pattern

30 to 60 degrees
Repair Preparation

Plan View

Profile View

- joint
- 3 in
- 1 in
- bond breaker
- patch
- pavement

Engineering & Environmental Services

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Completed Repairs
Full-Depth Repair

- Repair of working cracks, deteriorated joints, broken slabs
- If original pavement is dowelled, so must be the repair
Precast Concrete Repairs

• Attractive alternative to cast-in-place FDR on high-volume roadways

• Caltrans has good experience

• Good performance to date
Diamond Grinding

- Removal of thin surface layer of hardened concrete using closely spaced diamond saw blades
- Results in smooth, level pavement surface
- Longitudinal texture with desirable friction and low noise characteristics
- Comprehensive part of any PCC Pavement Preservation program
Diamond Grinding – Removing Faulting
Diamond grinding can provide a 65% to 70% improvement in Ride Quality
Diamond Grinding Equipment
Types of Diamond Grinding

Conventional Diamond Grinding

Next Generation Concrete Surface

100-104dBA

98-102dBA
Case Study – Local Collector
Case Study – Local Collector

Exhibited:
- Faulting and roughness
- Mid-panel cracking
- Corner breaks
- Spalling
- Utility cuts
Failing Intersection
Slab Repair Identification
Selective Replacement is Critical to Process
Preparation for Concrete Placement
Concrete Placement and Finishing
“Long View” of Portion of Project - Before Grinding
Grinding Operation
Grinding Machine
Dimensions for Diamond Grinding

Width of diamond blades
(2.5 mm - 3.3 mm)

Land area - varies depending on aggregate hardness

2.0 mm typical for hard aggregate
2.8 mm in typical for soft aggregate

In English, typically 50 to 60 blades per foot

Source: FHWA / NHI
Ground Surface Texture
Surface after Grinding

“Fins” Designed to Break off under Traffic
Smooth Ride  After Full Width Grinding
Summary

• Pavement preservation is applicable to older concrete streets
  – Many of these streets are 80 years old or older
• A sustainable approach requires life cycle thinking
• Trade-offs are inevitable
Questions?

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