Concrete Pavement Restoration

What is it
What do we know
Concrete Pavement Restoration

- Improves ride
- Improves safety
- Prevents further deterioration
SMOOTH PAVEMENTS LAST LONGER!
Rough Pavement

Wheel Load

Profile

Distance

wavelength

amplitude

27+ kips

18 kips
Smooth Profile

Profile

Wheel Load

Distance

27+ kips

18 kips
Rehabilitation Timing

- Structural / Functional Condition
- Min. Acceptable Rating
- Age or Traffic

- Restoration
- Resurfacing
- Reconstruction
Restoration - CPR

- First level of response for deteriorating concrete pavements should always be CPR
  - Least cost
  - Best return on investment
  - Least service disruption
Restoration/Maintenance Techniques

- Partial-depth repair
- Full-depth repair
- Retrofitting dowels
- Slab stabilization
- Diamond grinding
- Joint & crack resealing
- Cross-stitching longitudinal cracks/joints
Partial Depth Repairs

- Repairs deterioration in the top 1/3 of the slab.
- Generally located at joints, but can be placed anywhere surface defects occur.
Partial Depth Concrete Removal

• Sawing and chipping
• Carbide milling
  • Transverse
  • Longitudinal
Full-Depth Repair

- **Purpose**
  - Restore structure
  - Restore ride

- **Used for**
  - Joint/crack deterioration
  - Broken slabs
  - Corner breaks
  - Utility cuts
Full-Depth Repair

Corner Breaks

Transverse Cracks
Full Depth Repair

Utility Patches:

Utility Trench
Repair Layout

- Minimum length is 1.8 m (6 ft).
- Check distance between patches and nearby joints.
- Replace the entire slab if there are multiple intersecting cracks.
Load Transfer

Jointed Pavements:

Top View

Side View

Remove loose material and fill any depressions with concrete

Optional Dowels

Patch

12 in. c-c typ. spacing

12 in. typ.

d/2
Drilling for Slab Picking
Saw Cutting Slabs for Removal
Slab Removal
Compacting Base
Placing Concrete
LOAD TRANSFER
RESTORATION

By
Dowel Bar
Retrofit
Purpose of Dowel Bar Retrofit

- Reestablish load-transfer across joints or cracks
  - Load-transfer is a slab’s ability to transfer part of its load to its neighboring slab
- Used in JRC and JPC pavements to limit future faulting
Effectiveness of Load Transfer Restoration

- Ideal projects
  - Poor load transfer at joints or cracks
  - Onset of pumping and faulting
  - Significant remaining structural life
- No durability-related distress
- Often performed with diamond grinding
Preparing the Dowels

- Add joint former
  - Styrofoam
  - Fiber board
- Attach non-metallic expansion cap to one end
- Attach non-metallic chairs (sized for slot)
Diamond Grinding
What is Diamond Grinding?

- Removal of thin surface layer of hardened PCC using closely spaced diamond saw blades
- Results in smooth, level pavement surface
- Longitudinal texture with desirable friction and low noise characteristics
- Frequently performed in conjunction with other CPR techniques, such as full-depth repairs, dowel bar retrofit, retrofit edgedrains
Advantages of Diamond Grinding

- Costs substantially less than AC overlays
- Enhances surface friction and safety
- Can be accomplished during off-peak hours
- Grinding of a rough area does not require grinding of adjacent areas
- Blends patching and other surface irregularities into a consistent, identical surface
Pavement Problems Addressed

• Faulting at joints and cracks
• Built-in or construction roughness
• Polished concrete surface
• Wheelpath rutting
• Unacceptable noise level
• Permanent upward slab warping
• Inadequate transverse slope
Faulted Joints
Joint Resealing
Joint Resealing

• Purpose
  • Minimize moisture infiltration
  • Prevent intrusion of incompressibles

• Results
  • Reduce pumping and faulting
  • Reduce joint spalling and blowups
Cross Stitching

Longitudinal Crack Repair
Cross Stitching

Figure 8.18. Schematic of cross stitching (adapted from IGGA [2010])
CPR Summary

- Many available treatments for PCC pavements
- Each has advantages and limitations
- Performance and cost vary with given conditions
- Applying the right treatment to the right pavement *at the right time*
- No universal method available
How Well Does CPR Work?
Additional Information and Reference Materials

- igga.net
- cptechcenter.org
- resources.acpa.org
  User Name: NW
  Password: CSLIC-NW2387