Distress Identification and Scoping of Concrete Pavements

Andy Bennett
Materials Technology Group
Construction Field Services
Historical Pavement Cross-Section is helpful for determining cause of distress

Jointed Reinforced Concrete Pavement (JRCP) constructed up to the early 2000’s
Jointed Plain Concrete Pavement (JPCP) constructed from the late 1990’s to present.
Continually Reinforced Concrete Pavement (CRCP) constructed from 1958 to 1979.
Unbonded Concrete Overlay on Concrete (UBCOC) constructed from 1984 to present.
JOINT DURABILITY DISTRESS

Re-Seal Joints with Silane pre-treatment if spalling has not occurred.

Mastic with Silane pre-treatment for spalled joints.

Full Depth Repair for extensive spalling across the joint.
TRANSVERSE CRACKING

*Full Depth Repair* if faulting or spalling
*Dowel Bar Retrofit* and/or *Crack Sealing* if stable.
TRANSVERSE CRACKING

Curling and Warping

JPCP, 7 Years after construction: extensive mid-slab cracking and dowel bar looseness due to moisture warping
“Gradient At Set” concept: Slab is flat but large gradient is present at time of set.

Temperatures of pavement slab poured at 7:30 A.M.

C.C. Rhodes, MDOT, 1950
LONGITUDINAL CRACKING

*Full Depth Repair* for loss of base support.
*Crack Sealing* for stable base support.
*Core* ends of crack at transverse joint to arrest continued development.
JOINT and MID-PANEL SPALLING

*Partial Depth Repair* with Non-Cementitious or Mastic material.
CORNER BREAKS

*Full Depth Repair* for large corner breaks with working cracks.
FAULTING
Consider *Diamond Grinding* when IRI is 95 to 120, *Diamond Grooving* when aggregate AWI is less than 260
POLISHED AGGREGATE

Older pavements where surface texture has been removed by traffic over time.

Newer pavements that have been diamond ground for initial ride quality requirements that have been worn smooth by traffic.

Check friction numbers, traffic speed, and wet weather accident information for project selection.

Diamond Grooving is a selection option to increase macro-texture, channel water, and improve lateral tire stability.

High Friction Surface Treatment is another selection option that will greatly improve friction numbers.
EDGE DROP

- Poor Load Transfer across the shoulder.
- Increased surface water entering the shoulder joint.
- Reduces resilient modulus of base at the edge of pavement leading to non-uniform support.
- JRCP and JPCP constructed from on open-graded unbound base.
- Movement of fines from the unbound base.
- UBCOC from pumping erosion of the asphalt interlayer.
PUMPING

Investigate the problem before selecting a repair option.
SHATTERED SLAB
Full Depth Repair
PUNCHOUTS

CRCP constructed on unbound base (all sections remaining are composite pavements).

JRCP constructed from 1983 to 1990 with very open-graded base with no geotextile separator.

*Full Depth Repair* is recommended.
BLOWUPS

*Full Depth Repair with added Expansion* across the entire pavement and shoulder.
Deterioration of previous full depth repairs

Treatment option is a new *Full Depth Repair*
CFS Equipment used for investigating pavement distress