MICHIGAN CONCRETE ASSOCIATION

Concrete Overlays in Michigan:
Performance, Lessons Learned, and Recommendations

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Concrete Overlays in Michigan

- Performance of Concrete Overlays on:
  - Local Roads/Streets
    - with a couple of examples
  - MDOT system
    - overall
- Lessons Learned
- Recommendations

Thin Concrete Overlays - Performance Review 2018

- 48 projects were visited and evaluated by MCA staff.
- Key observations were made:
  - Overall Condition (poor, fair, good, excellent)
  - Overall Ride Quality (poor, fair, good, excellent)
  - Joint Condition
  - Cracks/Corner Cracks
  - Shattered Slabs
  - Shifting Slabs
  - Faulting Slabs
  - Visible Material Related Distress (MRD)

Coolidge Hwy., 13 to 14 Mile Road, Royal Oak

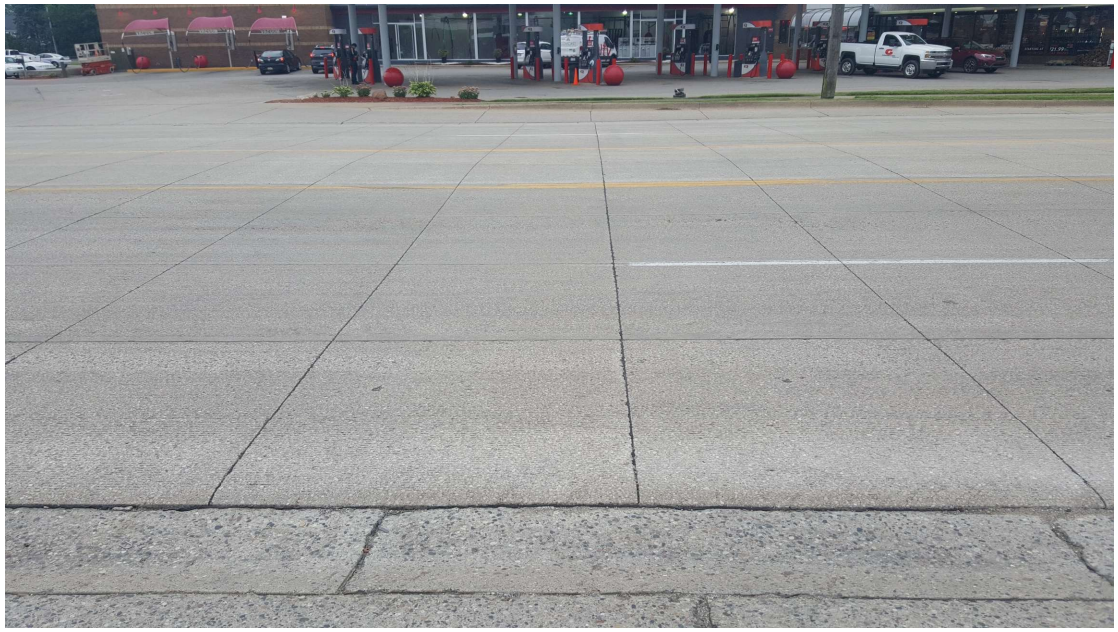
- Built 1983 (35 yrs!!)
- 5-inch conc overlay, 1-inch asphalt separator
- Approx. 10-12 ft transverse joint spacing
- Full depth patches done in 2008

Coolidge Hwy., 13 to 14 Mile Road, Royal Oak

- Condition is fair to poor with fair to poor ride.
- Many shattered and faulting slabs
- Photos and info from 2005 (22 yrs) indicate fair to good condition. Some major full depth repairs done in 2008 (25 yrs).
- Past 10 years has shown a progressive decline in performance as would be expected.
- No visible MRD.

Washington Ave., Matt Urban to 32nd, Holland

- 4-inch nominal thickness
- 1-inch HMA separator layer
- Existing PCC (1940's and 1970's)
- 5.5' joint spacing
- Built in 2013



Washington Ave., Matt Urban to 32nd, Holland

- Expansion joints are working as intended
- Sealed joints – minimize shifting slabs

Little Mack Ave., St. Clair Shores

- Existing 1990's conc, 10"
- Milled & overlaid w/ 4" conc in 2011
- Fabric separator
- Approx. 6' x 6' joint spacing

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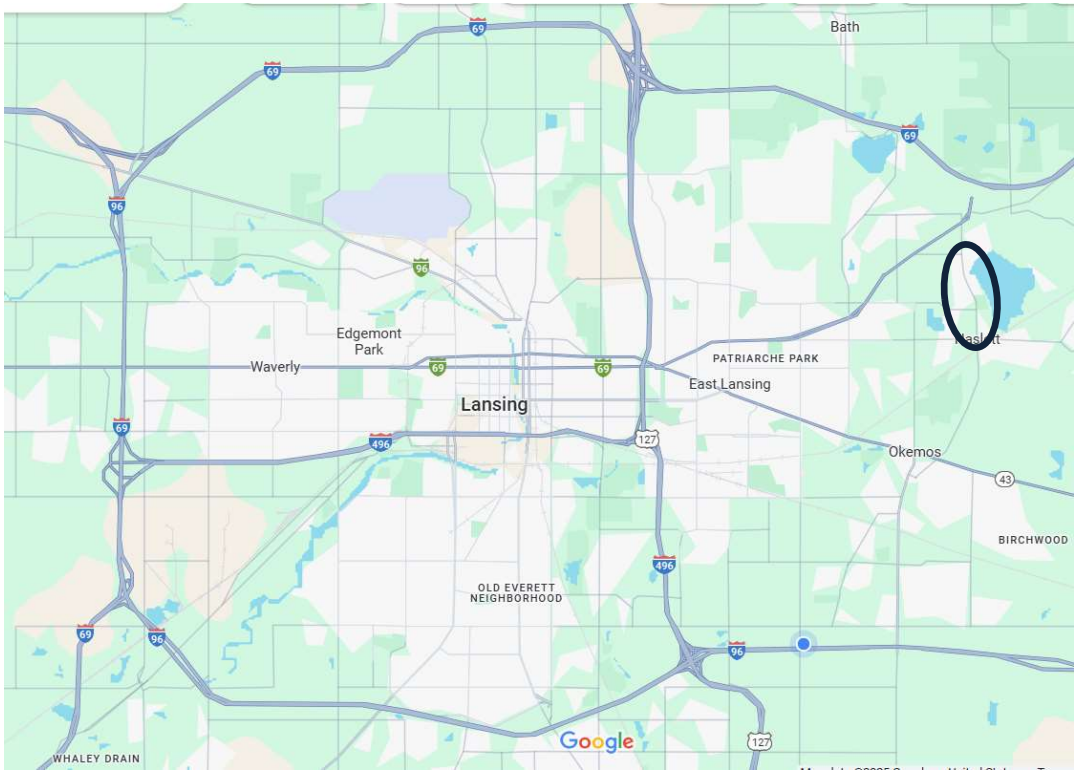
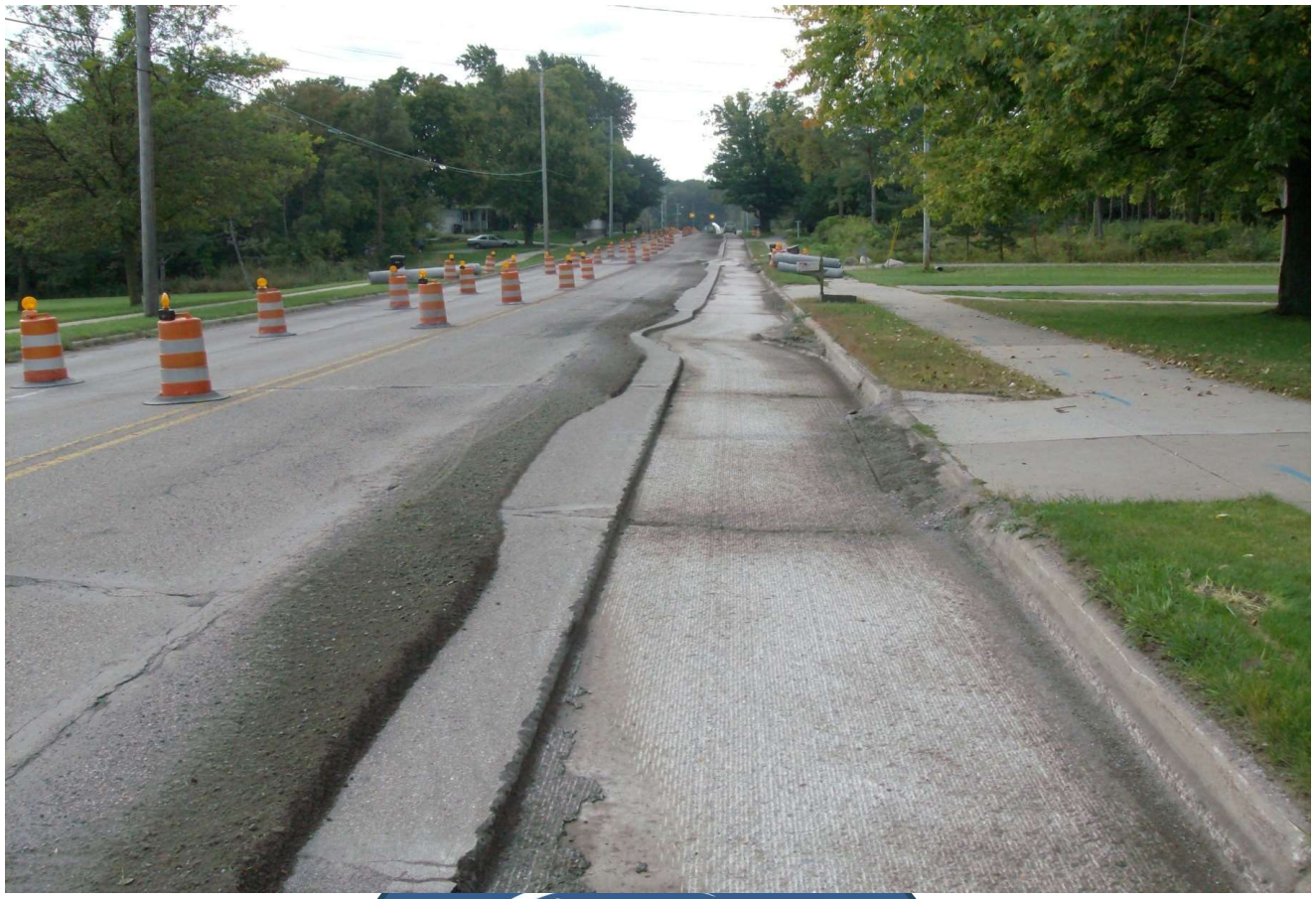
Marsh Rd., Haslett Rd. to Towner Dr., Ingham County

- Paved in 2007
- Existing was ~4" HMA on old concrete pavement
- Milled 4", placed 0.75" HMA separator, and 3.5" concrete overlay
- 5' x 5' panels
- Unsealed joints



Marsh Rd., Haslett Rd. to Towner Dr., Ingham County



Marsh Rd., Haslett Rd. to Towner Dr., Ingham County

Marsh Rd., Haslett Rd. to Towner Dr., Ingham County

- North ¼ of the job did not have old existing concrete under the HMA
- Utilized a 6" x 6' x 6' design on existing aggregate base
- Tiebars only along B joints (edge of pour)

Marsh Rd., Haslett Rd. to Towner Dr., Ingham County

- Open-to-traffic photo from 2007

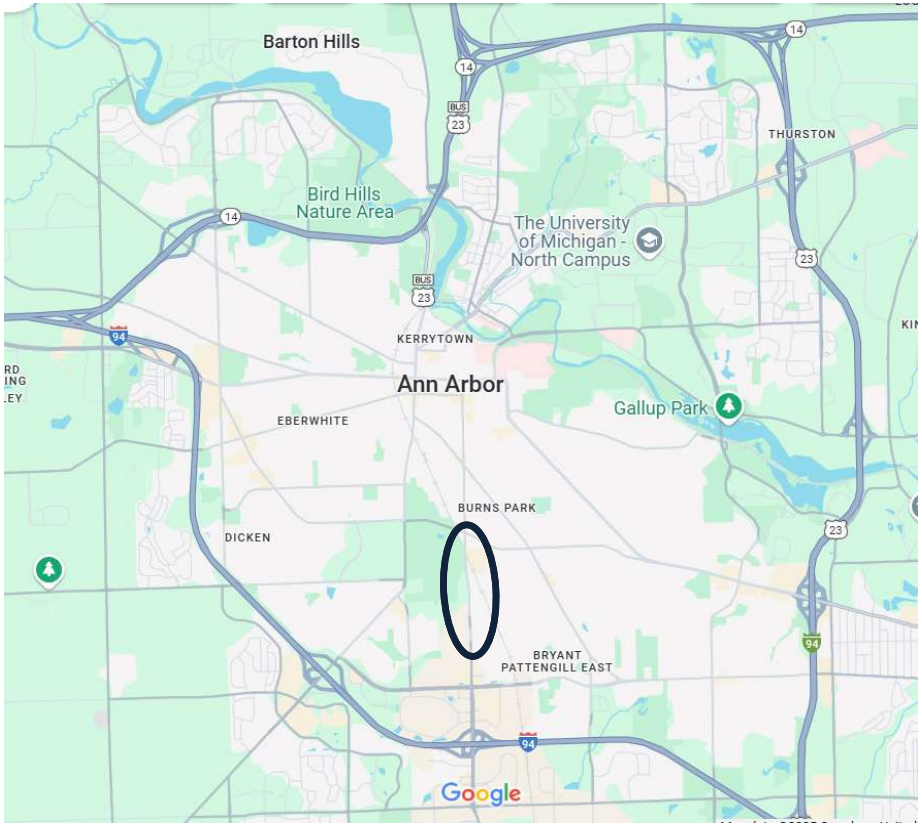
Marsh Rd., Haslett Rd. to Towner Dr., Ingham County

2018

Marsh Rd., Haslett Rd. to Towner Dr., Ingham County

2018

S. State St., Oakbrook to Stadium, City of Ann Arbor



- Paved in 2009
- 4-inch whitetopping (HMA base)
- 1.5 lb/cyd polypropylene fibers
- Optimized aggregate mix
- SCM's (25% slag cement)
- 4' x 4' panels, unsealed joints

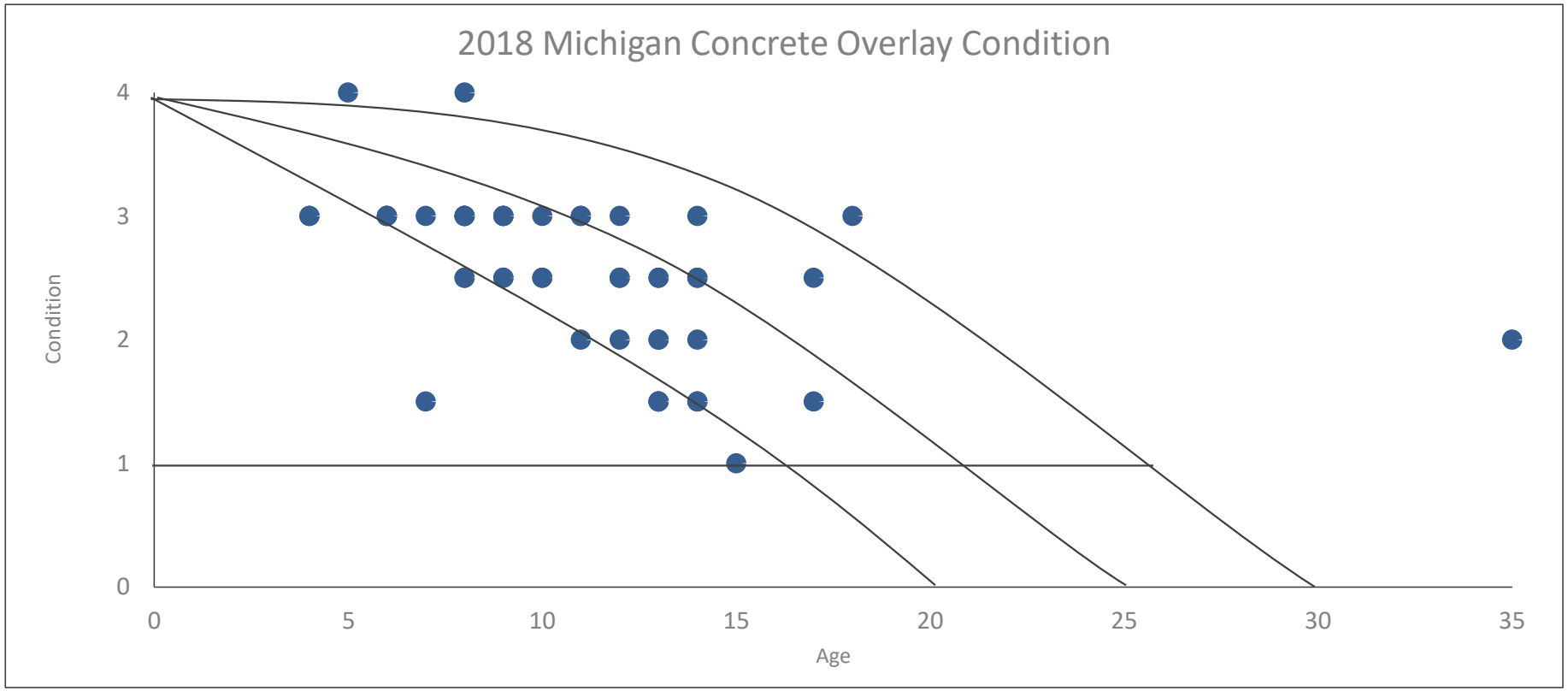
S. State St., Oakbrook to Stadium, City of Ann Arbor

- Heavy commercial route
- Some shattered slabs
- Some repairs have been done
- Mostly good condition

S. State St., Oakbrook to Stadium, City of Ann Arbor

S. State St., Oakbrook to Stadium, City of Ann Arbor

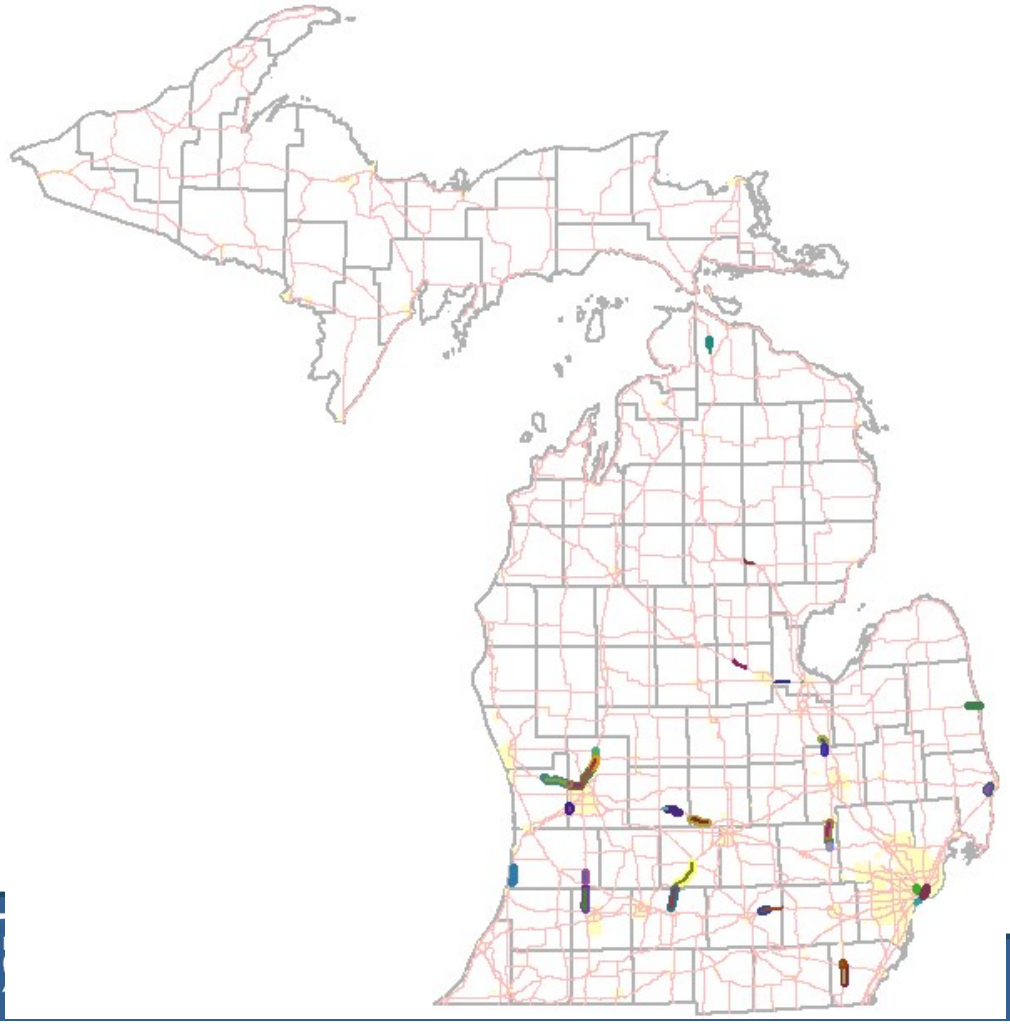
Local Overlay Performance



4 = Excellent 3 = Good 2 = Fair 1 = Poor

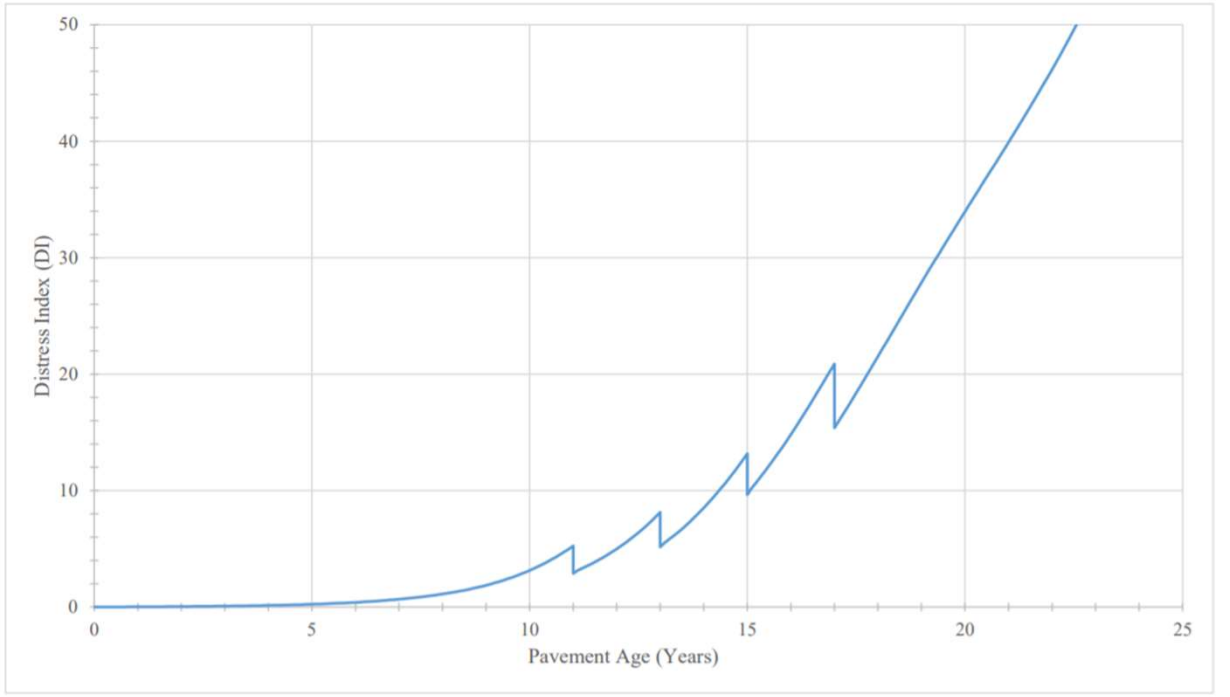
Michigan UCOCP Historical Use

- 21 built from 1932-1954, ranging in thickness from 4"–6" (none still in-service)
- 29 built from 1984-present, ranging in thickness from 4"–8" (27 still in-service)
- 7 on old composites
- 22 on old JRCP or CRC



Performance of MDOT Unbonded Overlays (6”+)

Figure 5-3. Concrete Overlay (6”+) Pavement Service Life Deterioration Curve

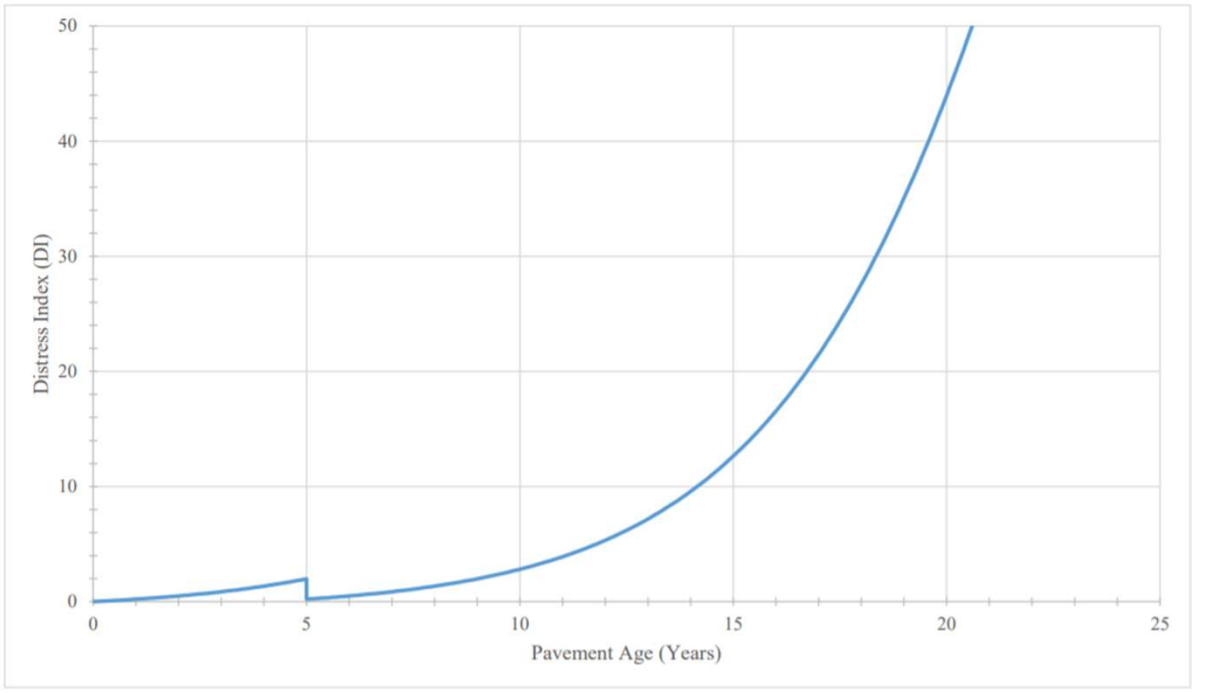


- 23-year service life
- 4 maintenance cycles or minor rehabs
  - CPM fixes
  - full-depth repairs
  - joint resealing

MDOT Pavement Design & Selection Manual, June 24, 2021 edition

Performance of MDOT Thin Conc Overlays (<6")

Figure 5-5. Thin Concrete Overlay Pavement Service Life Deterioration Curve



- 21-year service life
- 1 maintenance cycle / minor rehab
  - CPM fixes
  - full-depth repairs
  - joint resealing

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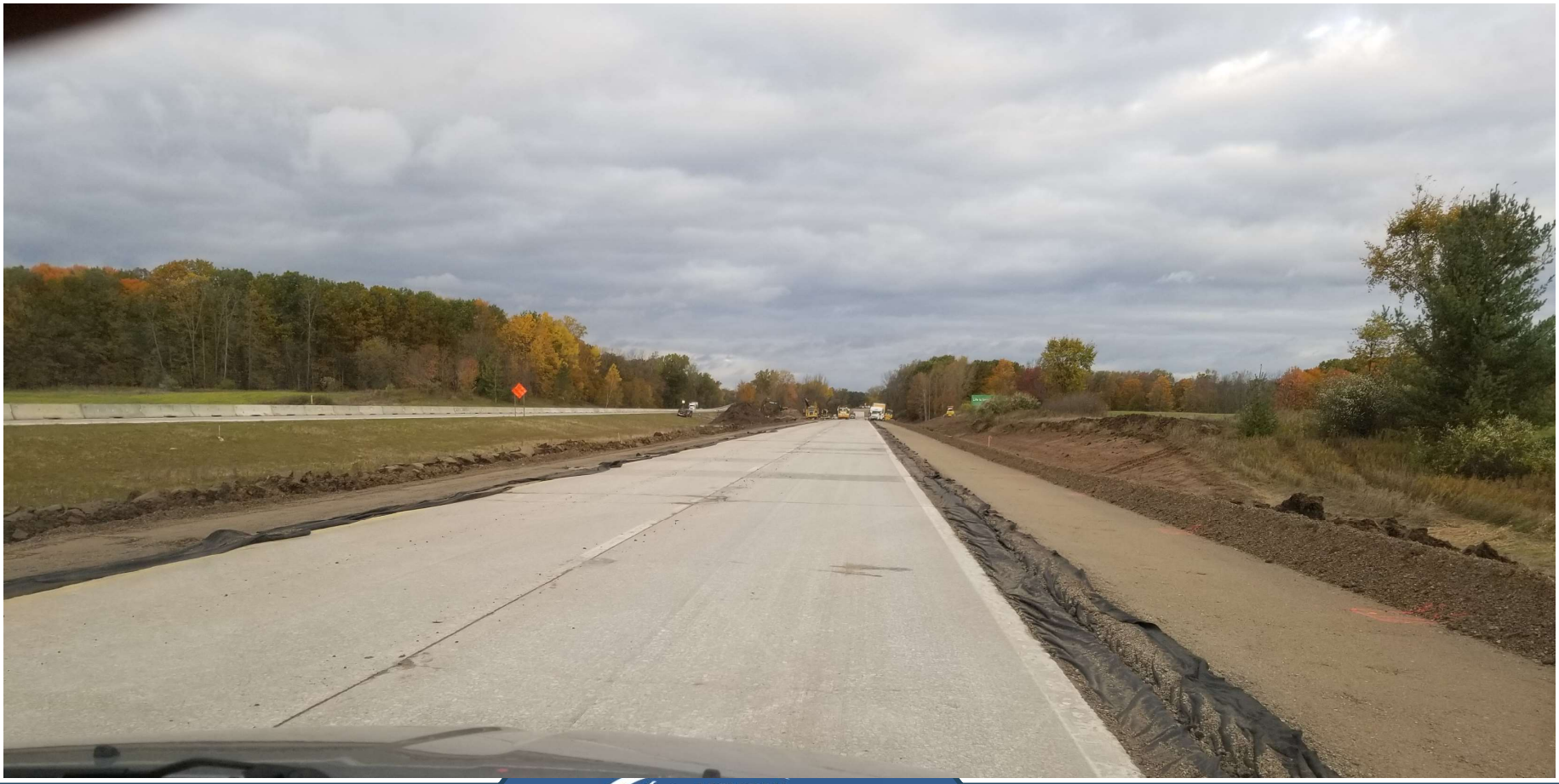
US-10, Clare



US-10, Clare

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General Recommendations for Concrete Overlays

- Drainage path – fabric or HMA separator, edge drains, maintenance
- Pay attention during milling to minimize thin areas
- Pre-overlay repairs not critical; some may be necessary
- 5-inch+ overlays overall performance is good to excellent
- Sealed joints – improve performance, minimize shifting panels
  - Expansion joints, esp. inline (above) existing expansion joints
- Use SCM's to improve durability
- Fibers assist with keeping cracked panels intact
- 6' x 6' panels are best – keep longitudinal joints out of wheelpath

Questions?

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Thank you!!