# IDOT's Pavement Evaluation Process

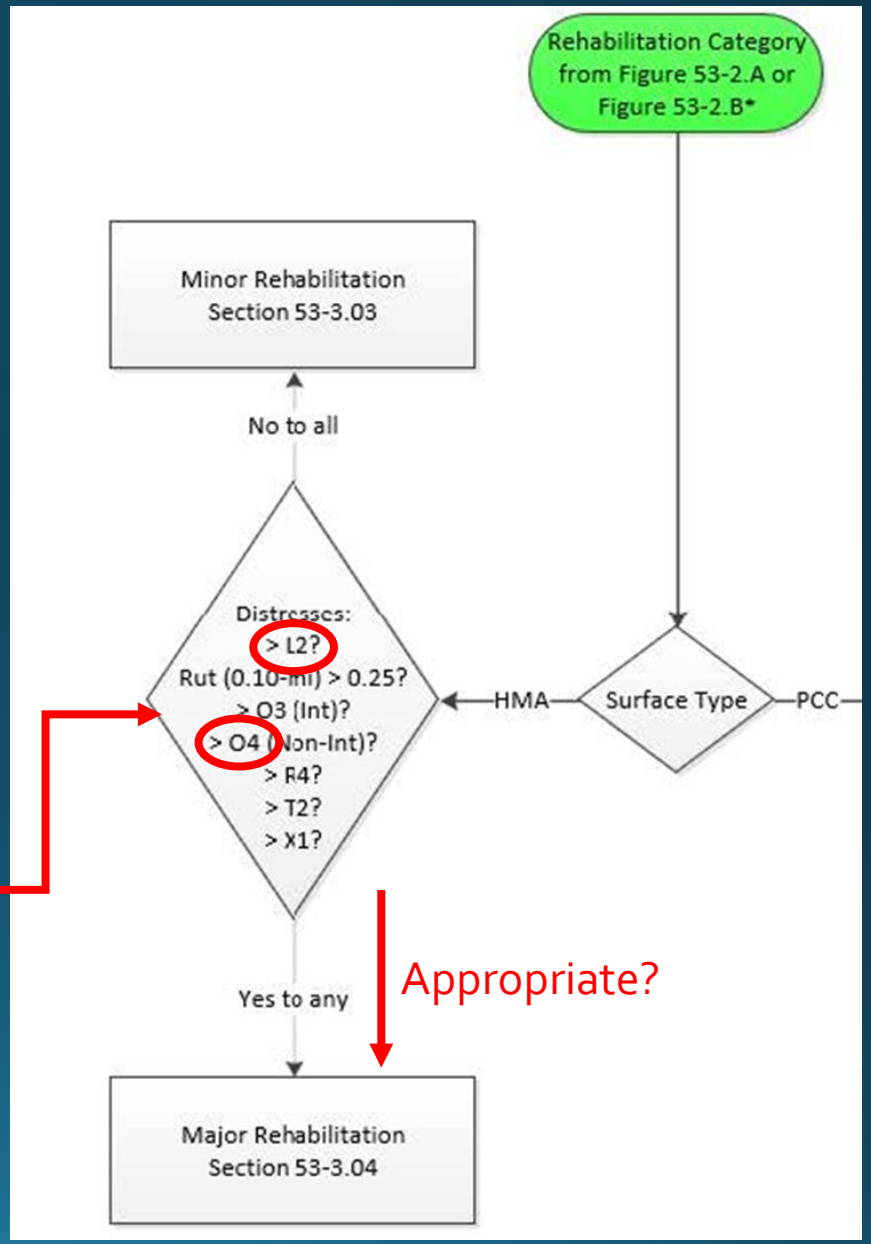
Greg Heckel

Representing
IDOT's Pavement
Technical Working
Group

IL 103 Schuyler County 1950±

# Evaluating Initial Treatment Selection

| Category | Subcategory | Treatments | Service Life | Predicted CRS |
|---|---|---|---|---|
| Do Nothing | | | N/A | 7.6-9.0 |
| Preservation (Section 53-3) | Proactive Maintenance | Crack and Joint Filling,<br>Crack and Joint Sealing,<br>Diamond Grinding,<br>Diamond Grooving,<br>Longitudinal Joint Sealing (Concrete) | 2 - 5 | > 6.0 |
| | Low | Cape Seal,<br>Chip Seal (A-1, A-2, A-3),<br>Half-SMART,<br>Micro-Surfacing | 3 - 7 | 6.6 - 7.5 |
| | High | Longitudinal Joint Partial-Depth Repair,<br>Hot In-Place Recycling [1],<br>SMART Overlay,<br>Ultra-Thin Bonded Wearing Course,<br>Load Transfer Restoration (Transverse Cracking - Concrete) [1] | 7 - 12 | 5.0 - 6.5 |
| Rehabilitation (Section 53-4) | Minor | Bonded Concrete Overlay on Asphalt [2],<br>Cold In-Place Recycling (Requires a Design Exception) [1],<br>Standard HMA Overlay | 10 - 15 | 4.1 - 4.9 |
| | Major | Designed HMA Overlay,<br>Structural Concrete Overlay (Requires an exception) [1] | 10 – 15 | 3.5 - 4.0 |
| Replacement [3] (Chapter 54) | | Replacement of complete pavement structure,<br>New Pavement (HMA or PCC) over Rubblized PCC,<br>Unbonded Concrete Overlay | 30-40 | < 3.5 |
| Contract Maintenance | Reactive Measures | See Contract Maintenance Program Guidelines [4] | Varies | < 5.0 [5] |



# Upcoming Pavement Management and Evaluation Manual

- Standardize a Pavement Investigation Process
- Make the Process Straightforward and Efficient
- Standardize Evaluation Criteria

# Process Development

- Spanned over 5 years
- More than 100 projects
- Multiple Iterative Refinements

# The Big Questions

What is the minimum information required?

How should the information evaluated?

# A Pavement Evaluation is Required When

The TAMP Category in the Program Year is Major Rehabilitation or Replacement.

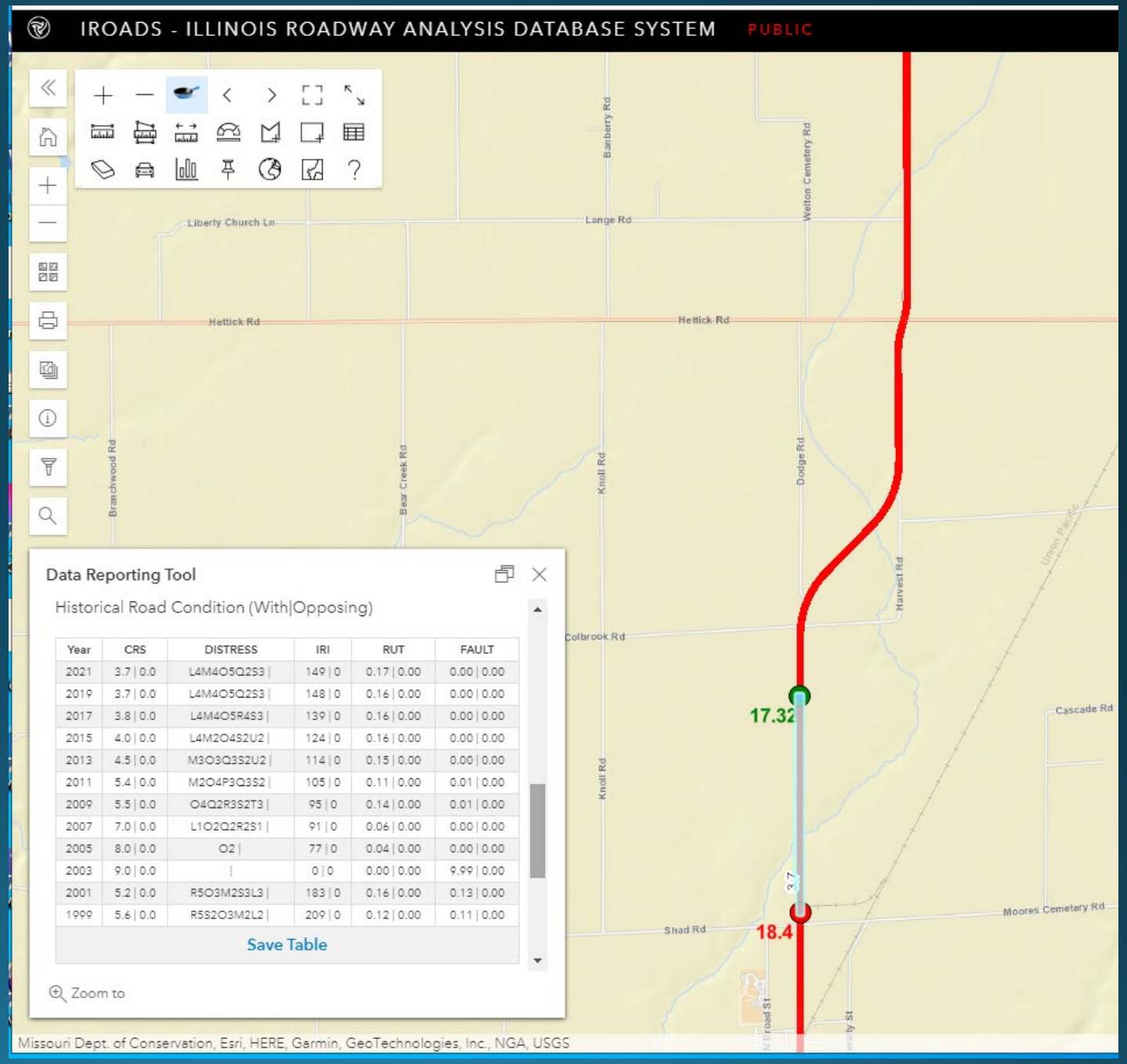
Existing HMA will Remain in Place Following Rehabilitation or Full-Lane Width Preservation in the Following Situations:

- All Interstates
- Roadways with a $TF_{F(20)}$ > 2.0 and with Average CRS Section Rutting > 0.2”

# Process Overview

- Researching Pavement Characteristics
- Field Visual Assessment
- Coring and Lab Testing (If required)
- Evaluating Information
- Developing Recommendations
- Preparing a Pavement Investigation Report

# Researching Pavement Characteristics



# Gather Available Data

- Performance Information
- Traffic Information
- Pavement History and Structure Information
- Desk Video Review

# Performance Evaluation Component

| Recommended Rehabilitation Category | Years to CRS = 5.5 (Interstate) or CRS = 5.0 (Non-Interstate) |
|---|---|
| Replacement (1) | < 8 years |
| Major Rehabilitation | 8 to 11 years |
| Minor Rehabilitation (2) | 12 to 15 years |
| High Preservation | > 15 Years |

(1) Interstates with ADT < 15,000 and Non-Interstates with ADT < 3,000 may be treated with Major Rehabilitation in lieu of replacement.

(2) If IRI is > 170 in./mi, the recommended rehabilitation category should be major rehabilitation instead of minor rehabilitation.

**Figure 5-2.A Rehabilitation Guidance Based on CRS Deterioration Rate**

November 2022 Draft Pavement Management and Evaluation Manual

# Field Visual Assessment

Does the High Severity Structural Distress Really Indicate Probable Pavement Structure Failure?

This one does!

# Probable Failure Characteristics

- Staining from pumping fines is present in a wheel path
- Heaving at transverse cracks exposing broken underlying concrete.
- Cracking area in a wheel path is over about 1 ft wide and has a depression over about 0.5 inches

Transverse crack indicating a high probability of structural failure due to a width wider than 1 ft and a depression depth of 0.5"± in the left wheel path. Notice the existing overlaid patch in the adjacent lane at the top of the photo.

Transverse cracking indicating a low probability of structural failure because there is no staining or heaving, and there is no depression in the wheel path. Maintenance activities in the lower right side likely correct a loss of surface material.

Alligator crack indicating a high probability of structural failure due to a width wider than 1 ft and a depression depth of greater than 0.5 inches in the right wheel path. The cracking offset corresponds to widening and indicates a high probability of widening failure.

Alligator cracking indicating a low probability of structural failure because there is no staining and there is no depression in the wheel path. Maintenance activities likely correct a loss of surface material. The cracking is likely related to HMA surface lift deterioration.

**FIGURE 4-3.B Examples of HMA Surfaced Cracking Distresses Both Indicative and Not Indicative of Potential Structural Failure**

# Visual Assessment Evaluation Component

| Recommended Treatment Category | Pavement Structure Section Area Affected by Distresses Indicating Probable Structural Failure | Pavement Structure Section Area Affected by Existing Permanent Patches |
|---|---|---|
| Replacement (1) | > 4% | > 3% |
| Major Rehabilitation | 1% to 4% | < 3% |
| Minor Rehabilitation | < 1% | <0.5% |
| High Pavement Preservation | < 0.25% | < 0.25% |

(1) Interstates with ADT < 15,000 and Non-Interstates with ADT < 3,000 may be treated with Major Rehabilitation in lieu of replacement.

**Figure 5-3.A. Treatment Category Guidance Based on Potential Structural Failure Area**

November 2022 Draft Pavement Management and Evaluation Manual

# Pavement Coring is Required When

The Field Visual Assessment indicates a probably pavement structure failure area exceeding 1.0% and the ADT > 2,000.

Sampling HMA for lab testing is required when it will remain in place according to the earlier criteria.

# Evaluating Distresses with Coring

- Determine if the pavement adjacent to the failure is in satisfactory condition or beginning to fail.
- Determine the depth and type of deteriorated materials.
- Is the pavement structure thick enough for the current traffic?
- Does the subgrade provide adequate support?

# Core Layout

- Targeted to evaluate specific characteristics.
- Based on pavement research and field visual assessment.
- Core location spacing depends on the affected pavement section length and frequency of the distress being evaluated.

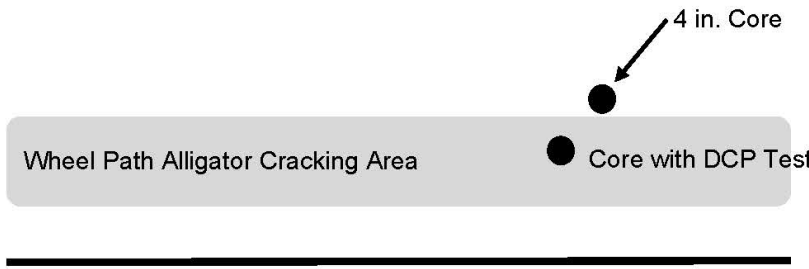



**Figure 4-4.C. Typical Core Location for Alligator Cracking Not Corresponding to a Pavement Structure Joint**

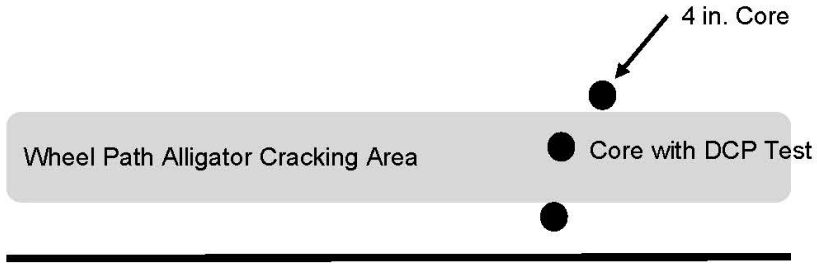
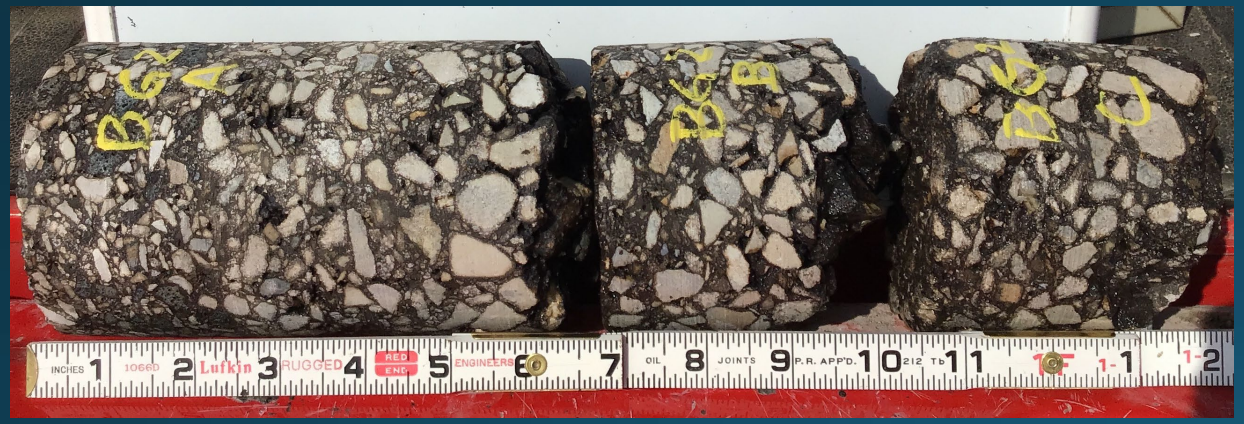



**Figure 4-4.D. Typical Core Location for Alligator Cracking Corresponding to a Longitudinal Pavement Structure Joint**

November 2022 Draft Pavement Management and Evaluation Manual

# Visually Evaluating A Core

82% Intact – Deterioration 6" - 7" & 9" – 10.5"



100% Intact – No Deterioration

46% Intact – Deterioration 0" - 7" & 10" – 11"

# Core Condition Evaluation Component

| TAMP Category | Total Pavement Percent Recovered Intact (1) |
|---|---|
| Replacement | < 75 % |
| Major Rehabilitation | 75% to 94% |
| Minor Rehabilitation | > 94% |
| High Preservation | 100% |

(1) Total pavement thickness excludes cement or asphalt stabilized aggregates used for subbase, brick bedding, and aggregate base course or granular embankment.

**Figure 5-4.C. Recommended TAMP Category Based on Material Condition**

November 2022 Draft Pavement Management and Evaluation Manual

# Mitigating Deterioration

| Total Pavement Thickness After Rehabilitation, in.[3] | Flexible Traffic Factor[1] | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.5 | 1 | 2 | 3 | 4 | 6 | 8 |
| | Intact Thickness Required Measured from Top of Proposed Rehabilitation, in.[2] | | | | | | |
| 8 | 8 | 8 | | | | | |
| 9 | 6.5 | 8 | 9 | | | | |
| 10 | 5.5 | 7 | 8.5 | 10 | 10 | | |
| 11 | 4.5 | 6 | 7.5 | 9 | 10 | 11 | 11 |
| 12 | 4 | 5.5 | 6.5 | 8.5 | 9 | 10 | 11 |
| 13 | 4 | 4.5 | 6 | 7.5 | 8.5 | 9 | 10 |
| 14 | 4 | 4 | 5 | 6.5 | 7.5 | 8.5 | 9 |
| 15 | 4 | 4 | 4 | 6 | 6.5 | 7.5 | 8.5 |
| 16 | 4 | 4 | 4 | 5 | 6 | 6.5 | 7.5 |

(1) This table is not valid for flexible traffic factors greater than 8, CIR, or PCC Overlays.

(2) Methodology: Modified AASHTO. Determined SNf and SNc from Class II equivalent flexible and rigid traffic factors using IBR = 3. Utilized the equation SN = (Intact*0.44) + ((Total – Intact)*0.20), where 'SN" is the average of the SNf and SNc, "Intact" is the thickness required above deterioration following rehabilitation, and "Total" is the thickness of the pavement structure following rehabilitation. Intact pavement coefficient = 0.44. Deteriorated pavement coefficient = 0.20. Coefficients are estimated values.

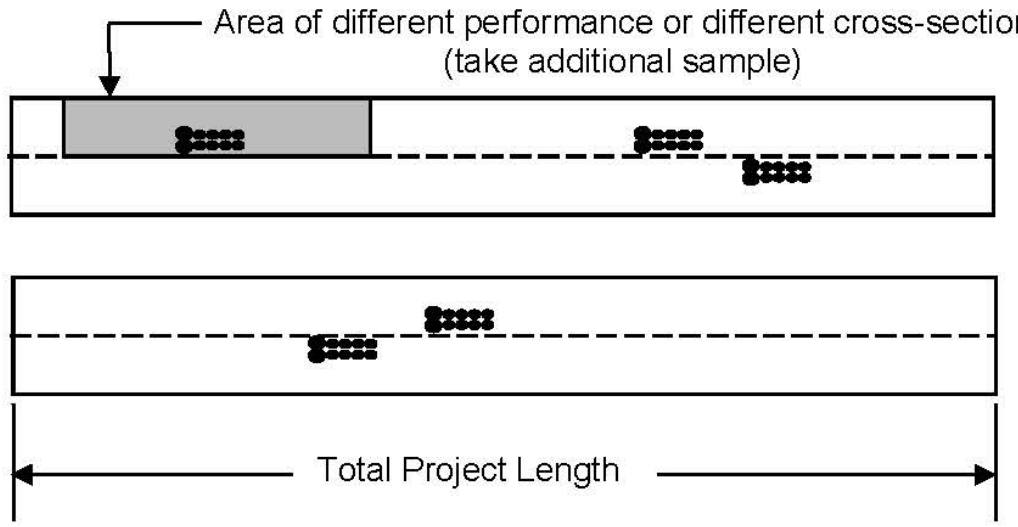
(3) Total pavement thickness excludes cement or asphalt stabilized aggregates used for subbase, brick bedding, and aggregate base course or granular embankment.

**Figure 5-4.D. Intact Pavement Structure Thickness Required Following Rehabilitation**

November 2022 Draft Pavement Management and Evaluation Manual

# Coring and Testing to Evaluate HMA Remaining In Place

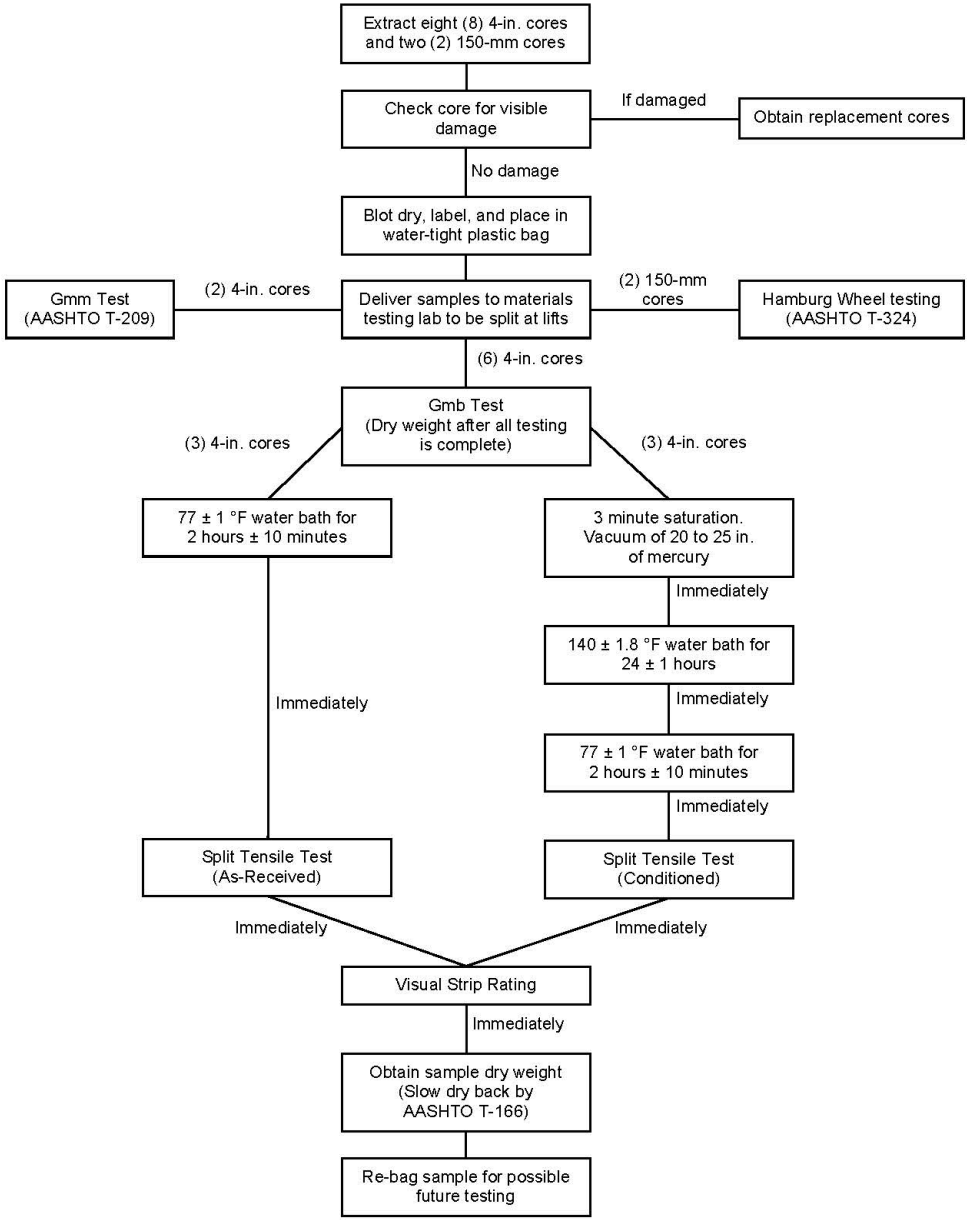

# In the past…




**TYPICAL CORING LOCATIONS FOR 4-LANE FACILITIES**

**Figure 53-3.F**

July 2014 BDE Chapter 53 - Discontinued




**MATERIAL TESTING FLOWCHART FOR CORES TAKEN FROM EXISTING PAVEMENTS**

**Figure 53-3.E**

# The Refinement

- Prioritize Conditioned Split Tensile Testing with Coarse Aggregate Visual Strip Rating.
  - Density and Unconditioned Split Tensile Testing are not required.
  - Reserved Hamburg Wheel testing for pavements with $TF_{F(20)} > 40$
- More coring locations, but fewer cores at each location.
  - One core location in both directions spaced at 1 mile intervals.
  - On multi-lane facilities, core the lane with the highest truck usage.
  - Two 4” cores at each location, unless HW is required.

# Evaluating CST with VSR

| Depth of Layer Tested After Rehabilitation or Preservation | Flexible Traffic Factor | | | | |
|---|---|---|---|---|---|
| | > 40 | 20 - 39 | 8 - 19 | 4 - 8 | < 4 |
| | Minimum Average Conditioned Split Tensile Strength, psi | | | | |
| 0 – 4 in. | 70(1) | 60(1) | 50(1) | 50(1) | 50 |
| 4 – 6 in. | 60(1) | 50(1) | 50 | 50 | 40 |
| 6 – 8 in. | 50 | 50 | 50 | 40 | 30 |
| 8 – 10 in. | 50 | 50 | 50 | 30 | 20 |
| 10 – 12 in. | 50 | 40 | 40 | 20 | (2) |
| 12 – 14 in. | 40 | 40 | 30 | (2) | (2) |

(1) If the corresponding coarse aggregate visual strip rating is 3, the material is unacceptable to remain in place regardless of CST value.

(2) Material at this depth does not significantly contribute to required pavement structure.

**Figure 5-4.E. Conditioned Split Tensile Strength Evaluation Guidance**

November 2022 Draft Pavement Management and Evaluation Manual

# Developing Refined Treatment Recommendations Based on Investigation Components

1. Core Information - Conditioned Split Tensile Test
2. Visual Assessment – Percent Probable Pavement Structure Failure Area
3. Core Information – Percent Intact
4. Performance – CRS Deterioration Rate and IRI

# Using Evaluation Information to Develop Mitigation Strategies

- Adjusting Milling Depth
- Adjusting Overlay Thickness
- Patching
  - No Patching
  - Partial-Depth Patching
  - Full-Depth Patching
- Localized Pavement/Widening Replacement
- Cold-In-Place Recycling

# Questions?

Greg Heckel, P.E.
District 6 Materials Engineer
Gregory.heckel@illinois.gov
217-785-5330