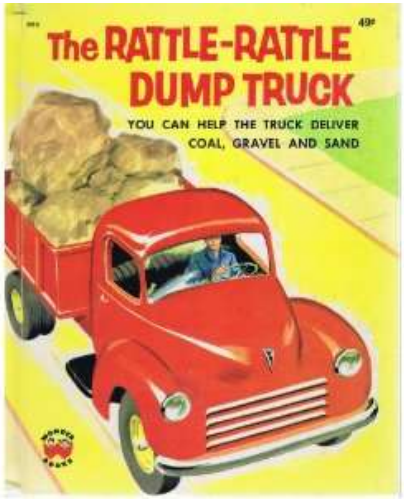
HIGH-PERFORMANCE INTERSECTIONS



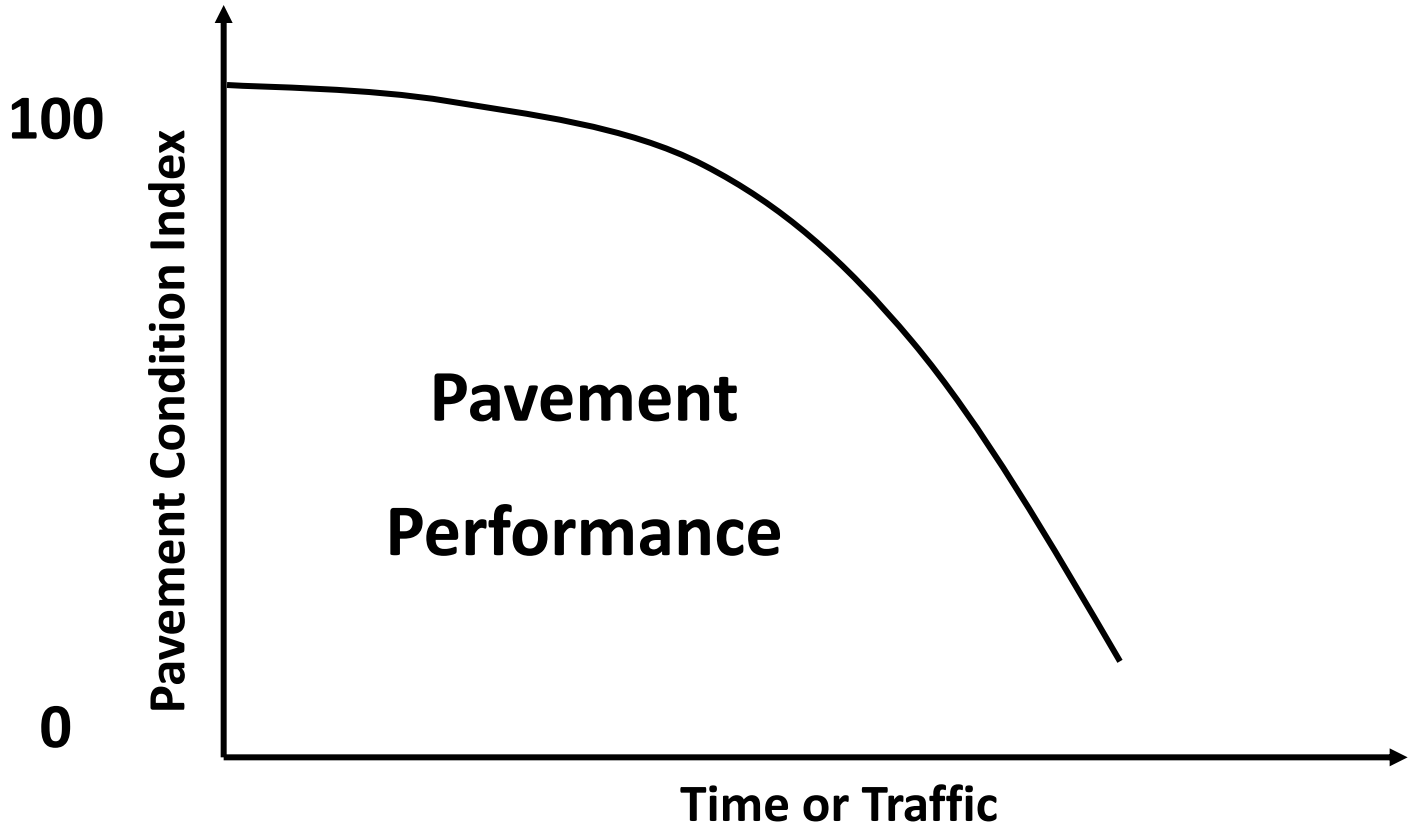
Tranlation:

- **EASL's**

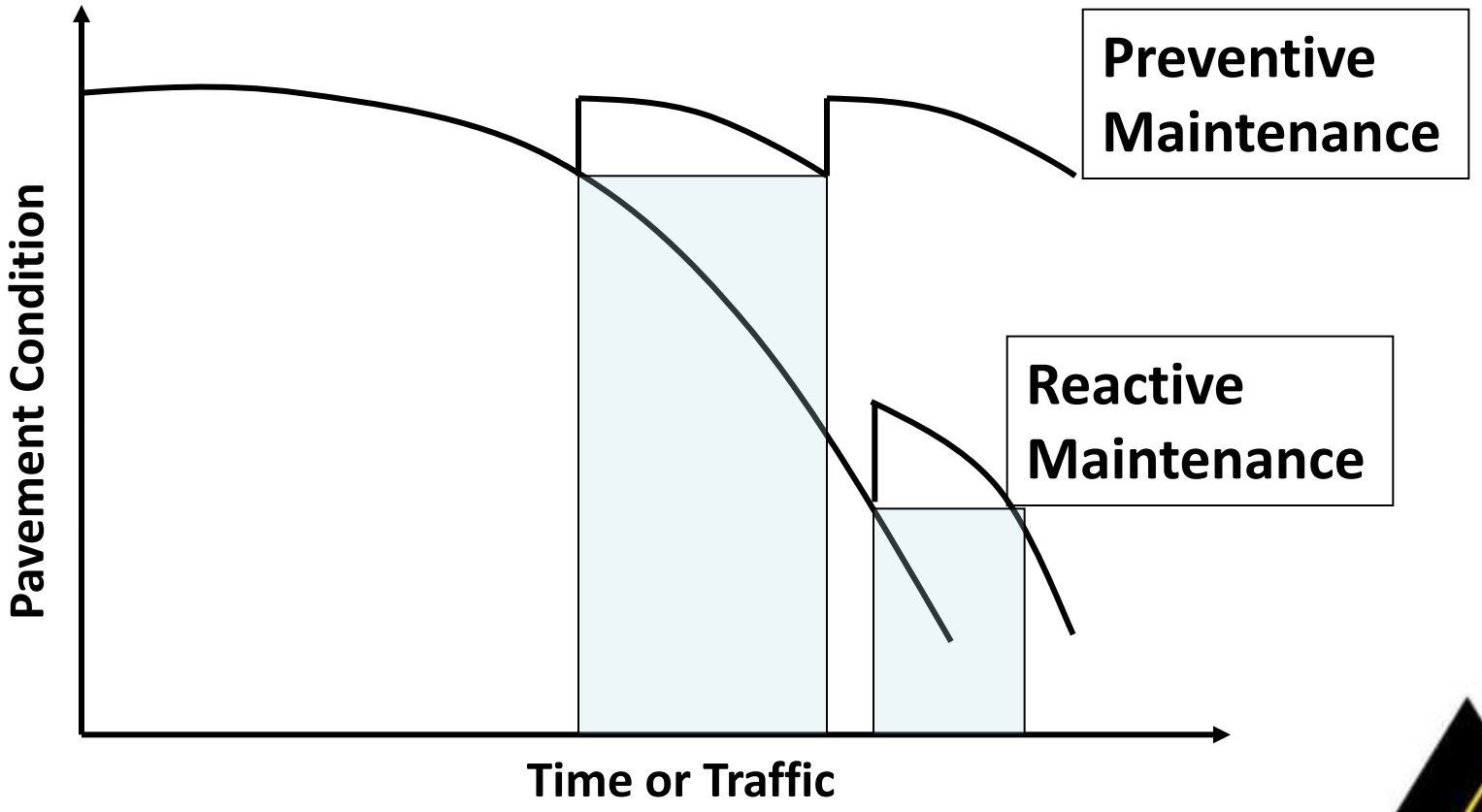
- **Average Daily Traffic**

High Performance Intersections

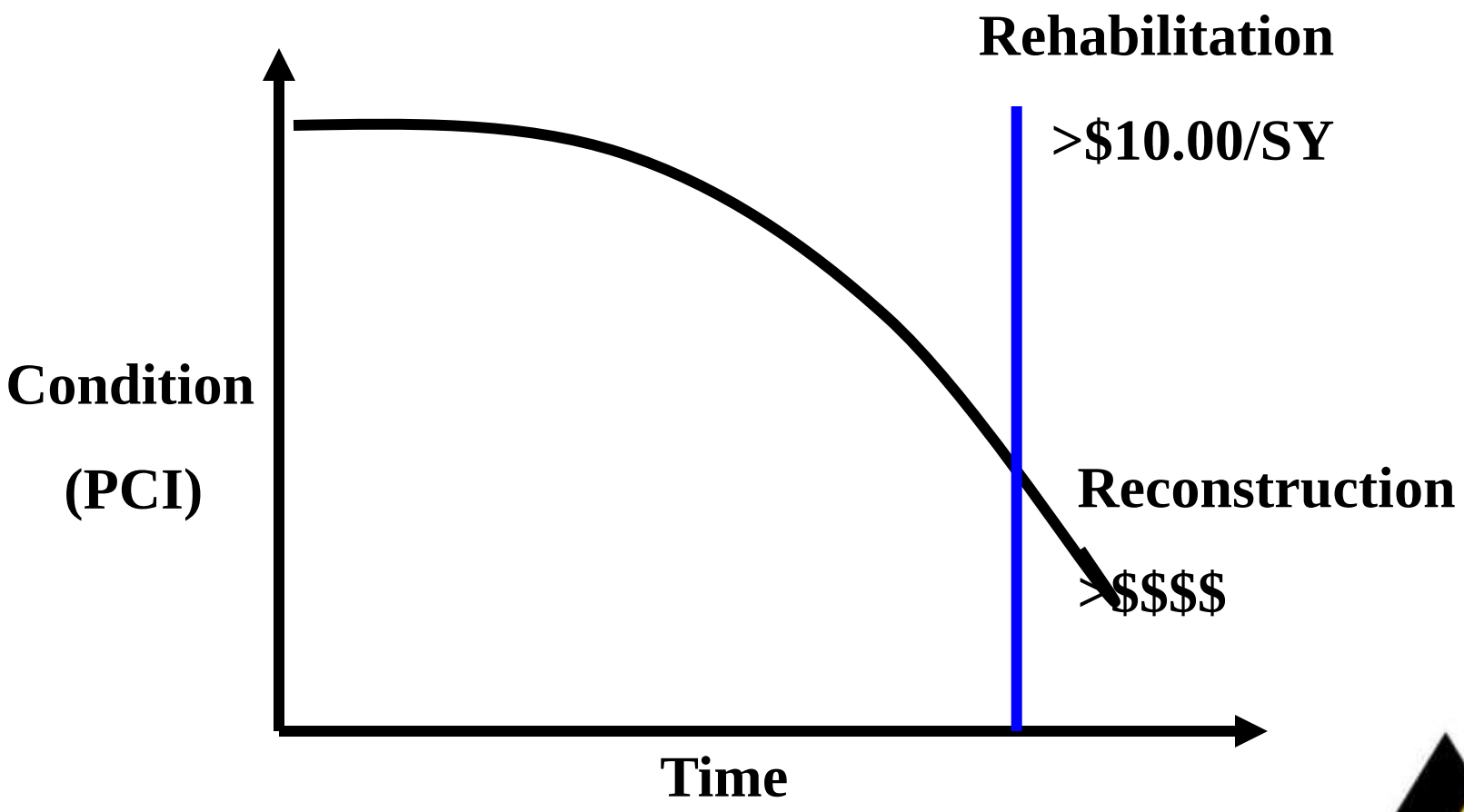
Pavement Condition



Pavement Condition



High Performance Intersections



High Performance Intersections

The Challenge

Slow moving or standing loads subject pavements to higher than normal stress conditions

High-stress locations also include

- **Climbing lanes**
- **Truck weigh stations**
- **Rest areas**
- **Other slow-speed areas**

High Performance Intersections

The Challenge

- **Special attention to these areas can ensure that high-stress areas deliver the same outstanding performance as other asphalt pavements.**

High Performance Intersections

The Challenge

Compounding factors:

- **Increasing:**
  - **Traffic volumes**
  - **Percentage of trucks**
  - **Maximum loads**
  - **Tire pressures**
    - **Super single tires**
- **Decreasing**
  - **Revenues**
    - **It's not just initial cost**
    - **Full Service Life**
  - **Loss of experienced personnel**
    - **Smaller staffs**
    - **Work together ensure success**

High Performance Intersections

Have a Strategy

Recognize:

Intersections may need to be *treated differently* than posted-speed pavements.

High Performance Intersections

5-Point Strategy

- Form a team of local experts
  - Owner/Agency
  - Industry
  - Academics
- Assess the problem
- Ensure structural adequacy
- Confirm the materials, mix design, & quality control
- Practice proper construction techniques

High Performance Intersections

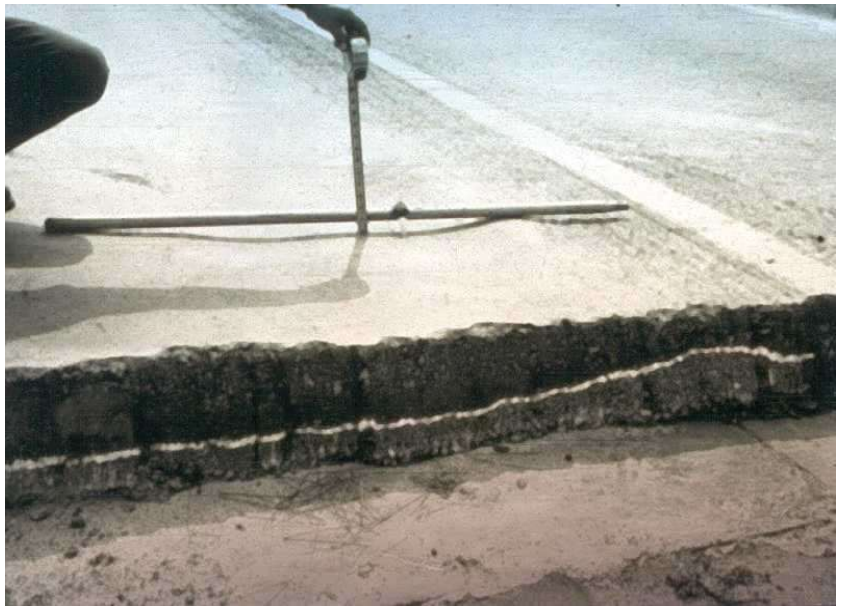
Condition Assessment

- Identify type / extent of pavement distress
  - Visual survey
  - Sampling and testing
  - Trenching
- Determine cause(s) of distress
  - unstable mixture
  - base failure
  - consolidation by traffic

High Performance Intersections

Trenching

- Reveals the type and vertical extent of deformed layers
- Define limits distress
  - GPR
  - Cores

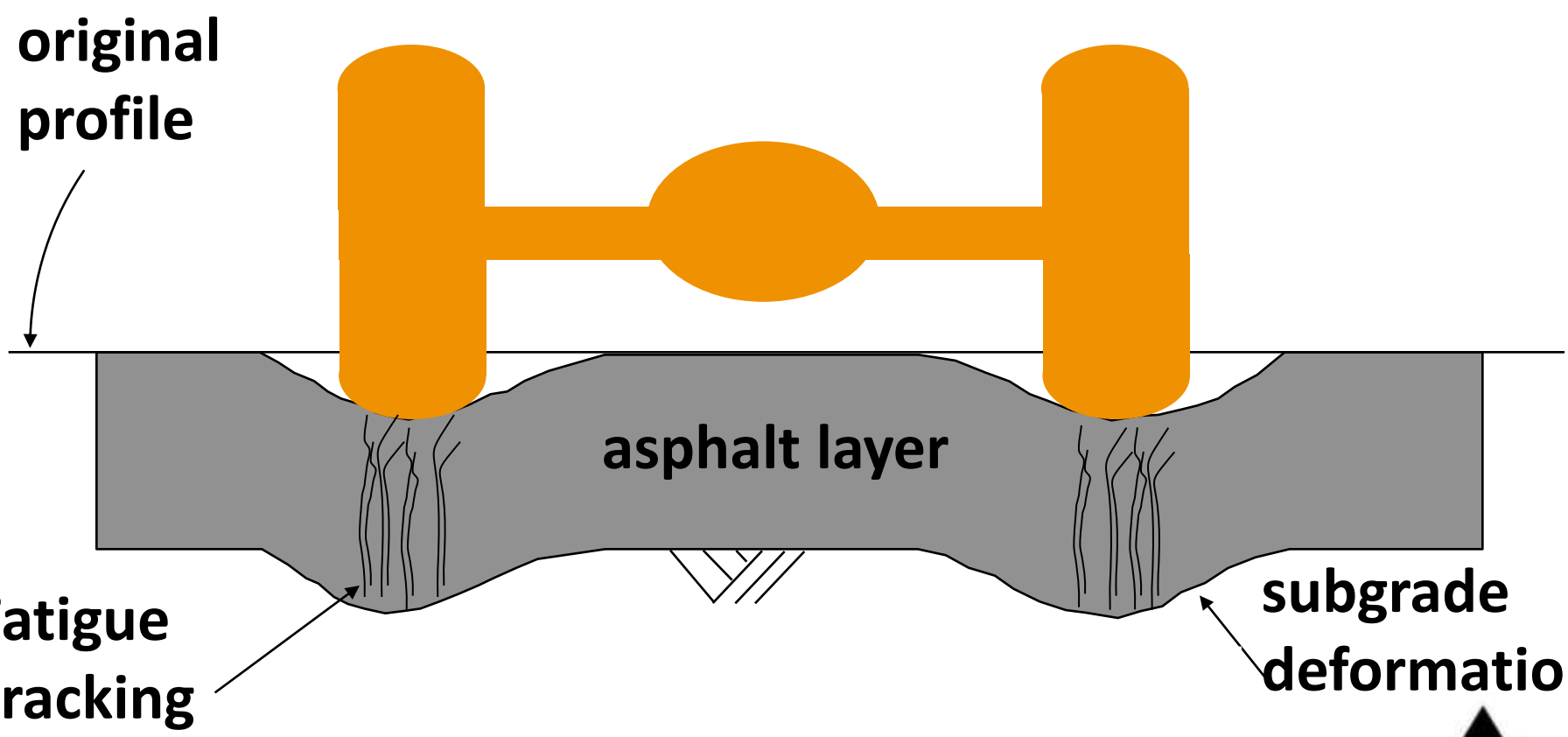


Replace all deformed layers

Permanent Deformation

High Performance Intersections

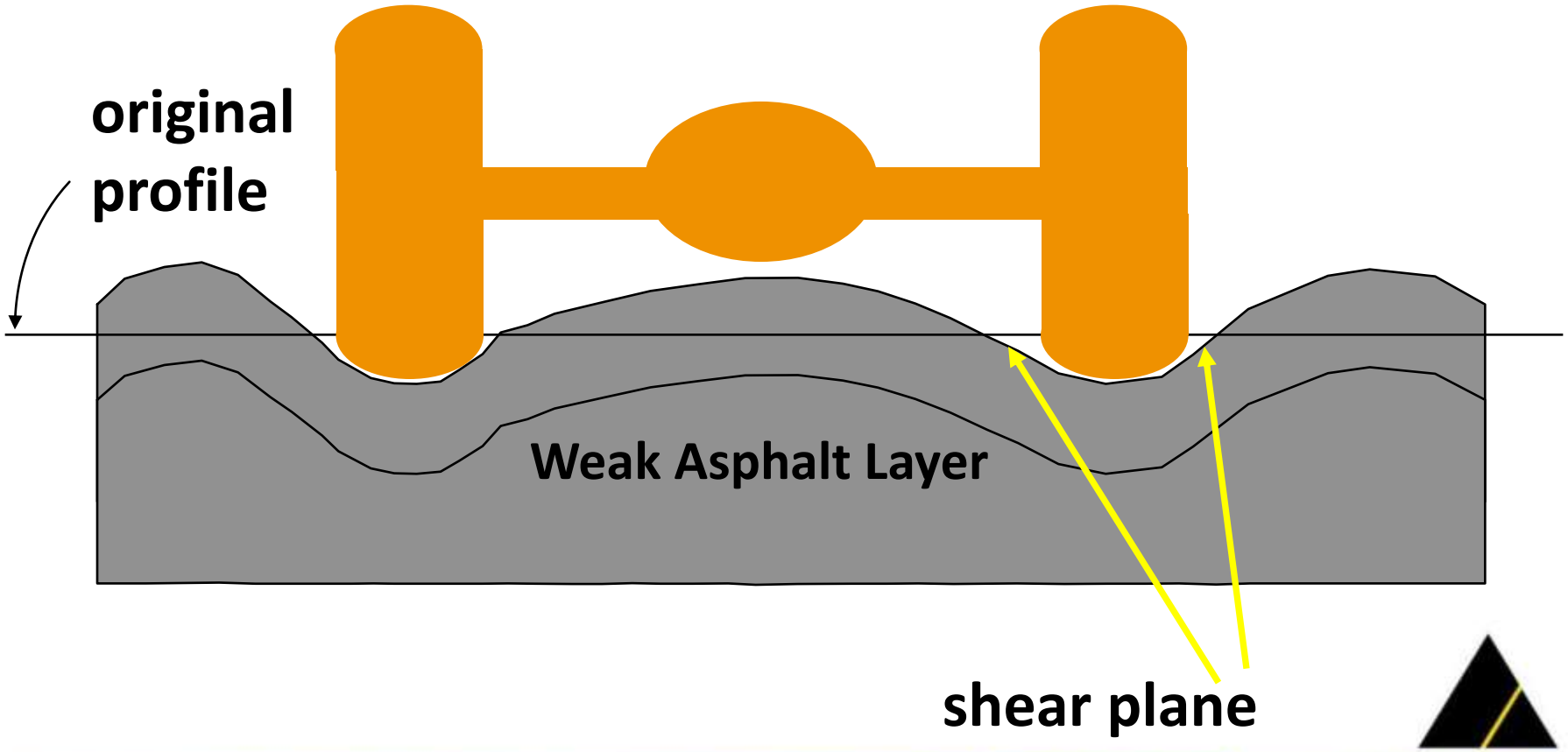
Rutting in Subgrade or Base



Weak Subgrade Or Underlying Layer

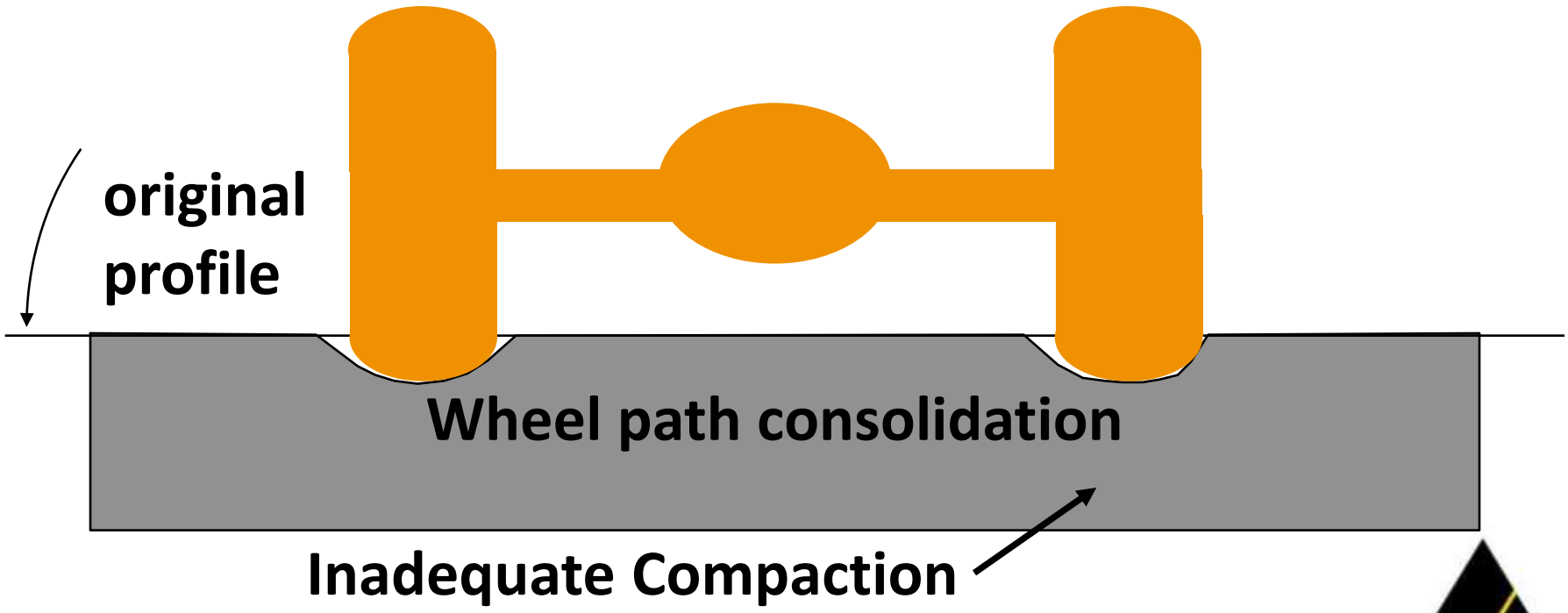
High Performance Intersections

Plastic Flow



High Performance Intersections

Rutting in Asphalt Layer



Ensuring Structural Integrity

- Structural Capacity to meet traffic needs
  - Existing pavements
    - Evaluate structural capacity of in-place material
    - Remove/replace any weak or failed areas
  - New Pavement Structure must be able to support present and future loads
- Mechanistic Design Software
  - Asphalt Institute
  - AASTHO's MEPDG

Selecting Materials

High Performance Materials

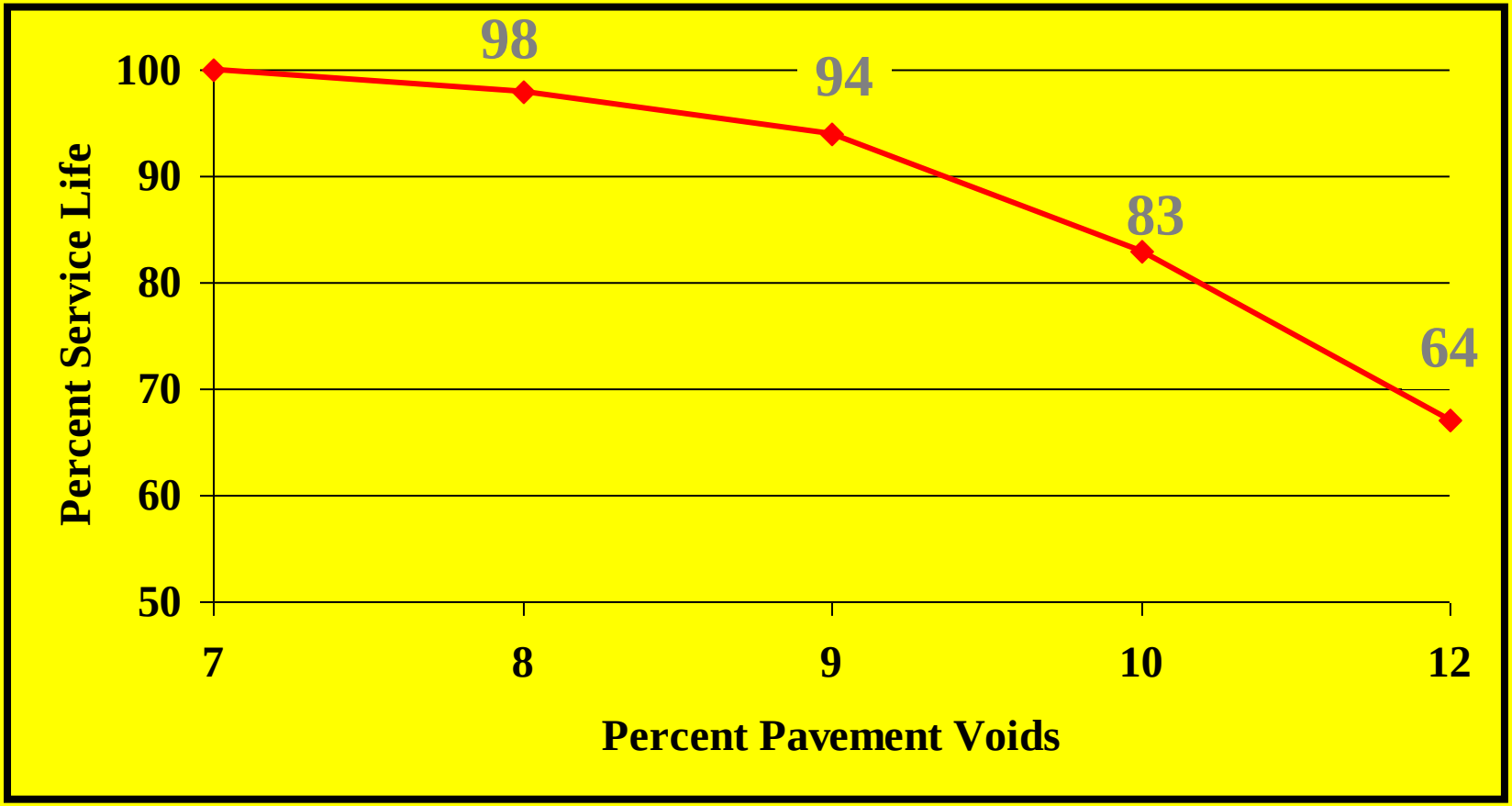
- Evaluate local aggregates for economics
- Supplement with imported aggregates
  - Full replacement may be necessary
- Additional testing
  - Hamburg wheel
  - Field test strips

High Performance Intersections

Construction Best Practices

- Avoid segregation
  - Physical
  - Thermal
  - Use Material Transfer Vehicle
- Longitudinal Joints
  - Best Practices Synthesis; AI coop agreement w/FHWA
  - Soon to be published, plus a 4hr seminar
- Achieve target density
  - Density gauges to set rolling patterns and confirm
  - Intelligent Compaction

Effect of In-Place Voids on Life



WA DOT Study

High Performance Intersections

Poor Construction Practices

High Performance Intersections

asphalt institute

High Performance Intersections

5-Point Strategy

- Form a team of local experts
- Assess the problem
- Ensure structural adequacy
- Confirm the materials, mix design, & quality control
- Practice proper construction techniques

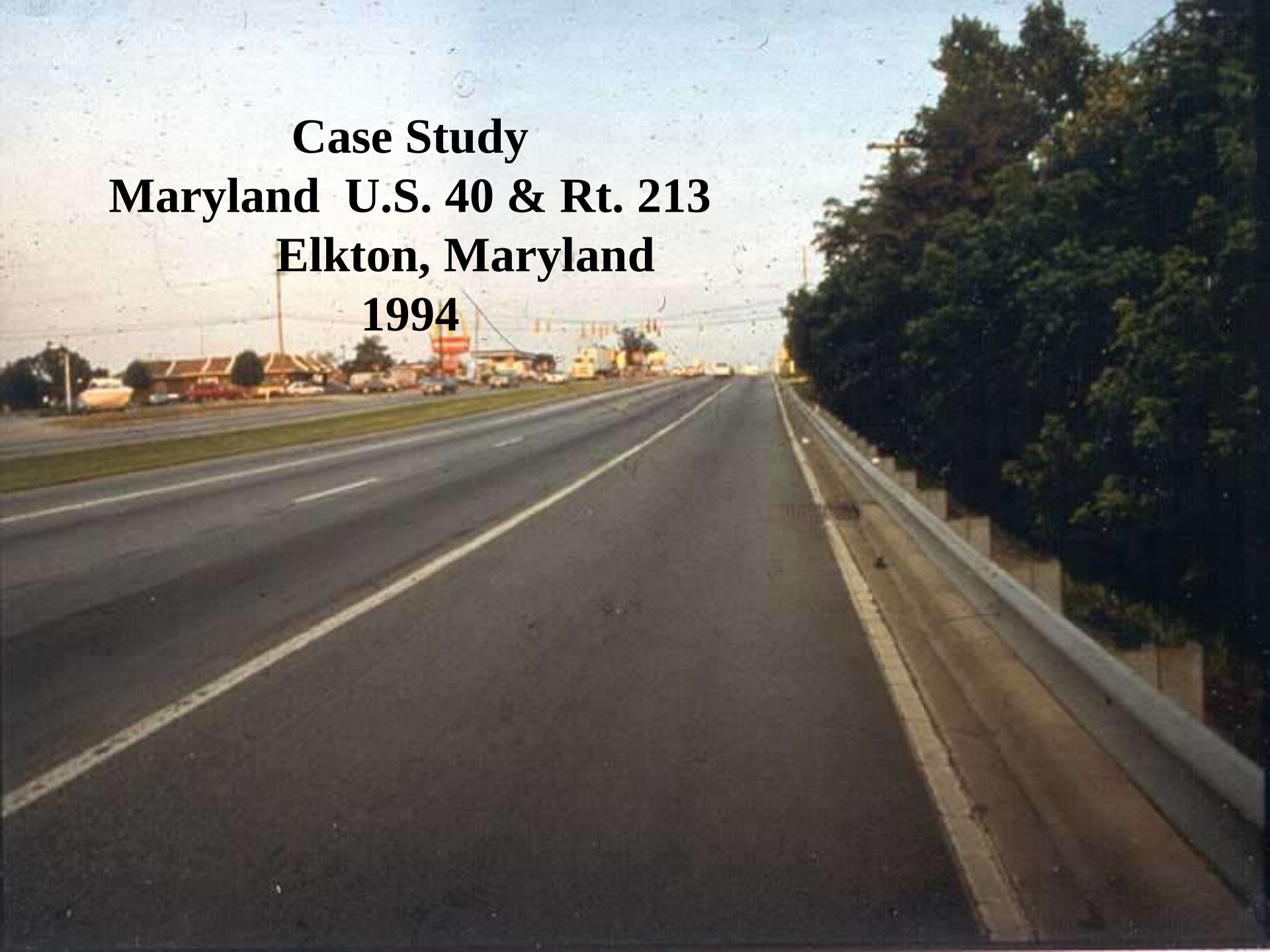
High Performance Intersections

Three Case Studies

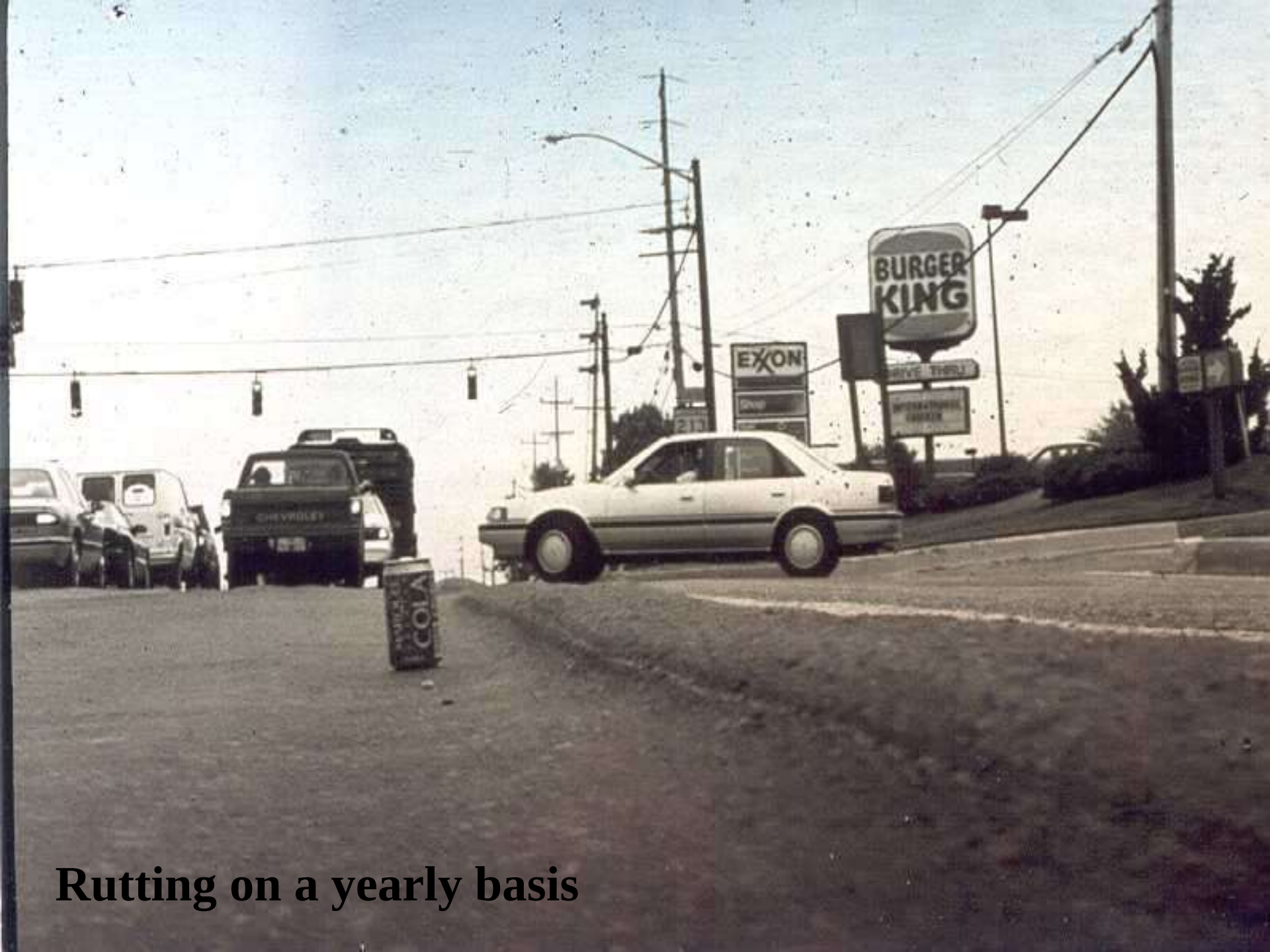

City of Indianapolis
PAVED WITH REGULAR MIX,
AGE 2 YEAR

Replacement Project
2 years old

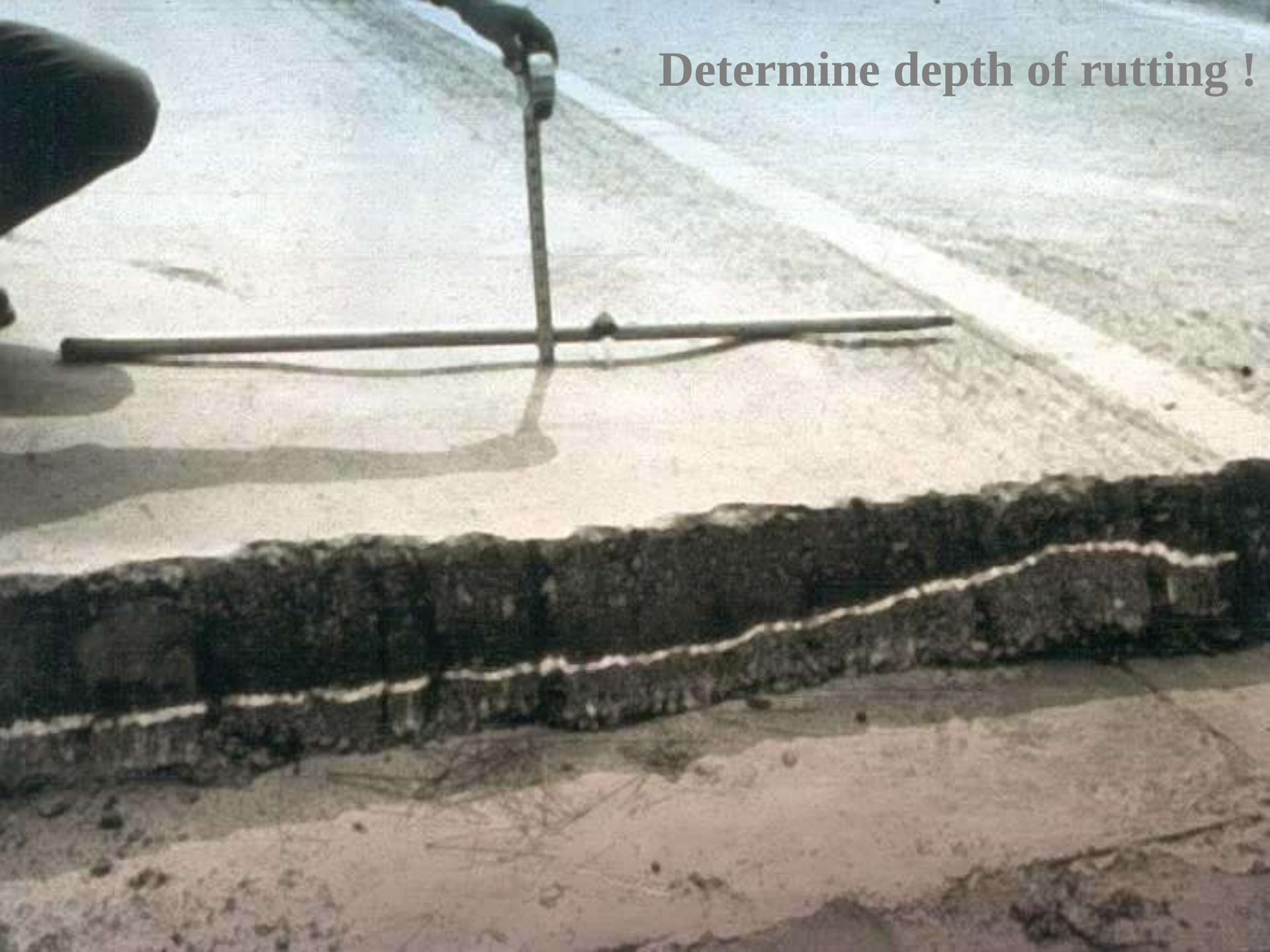
Replacement Project
12 years old

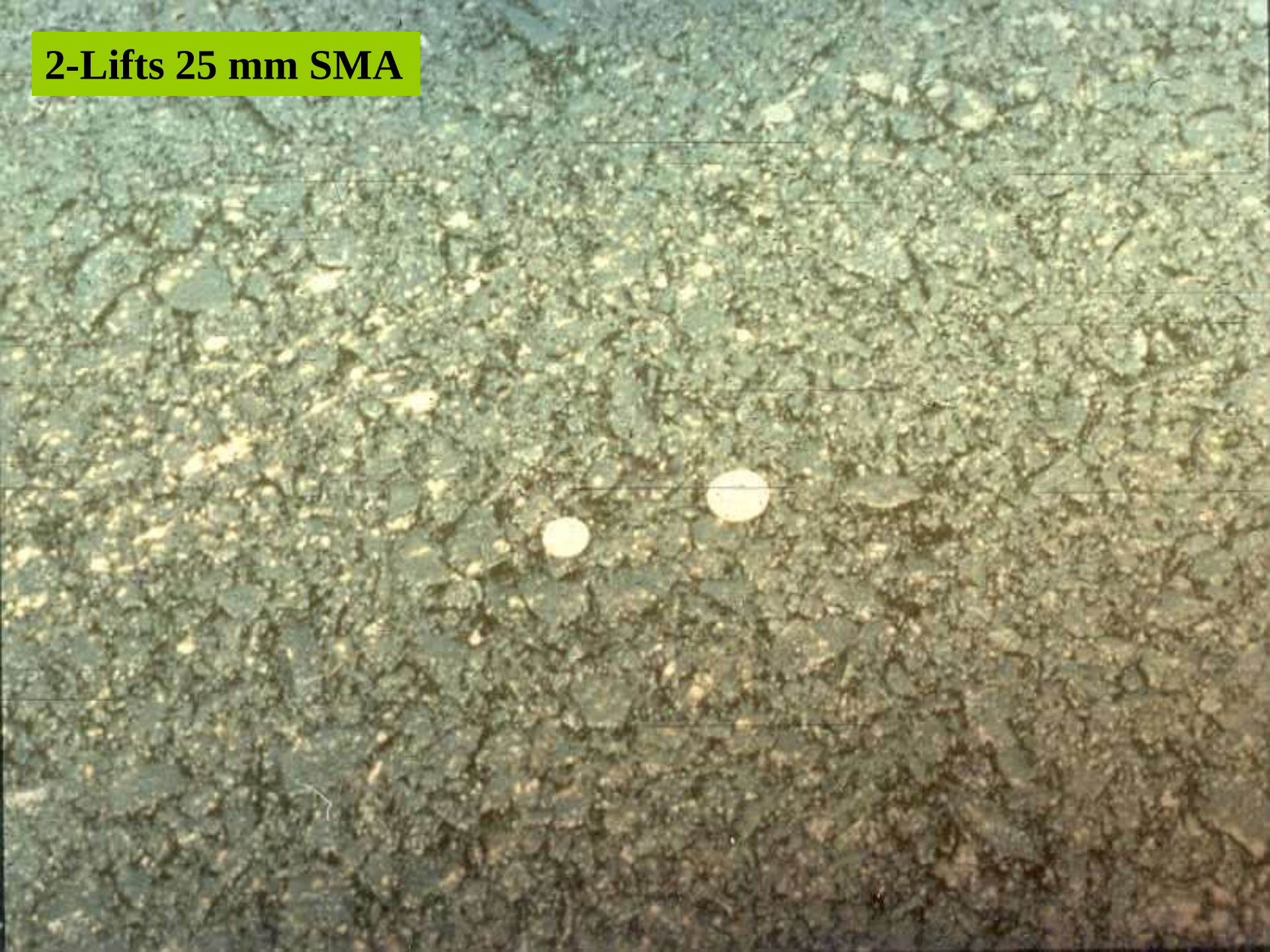

Case Study
Maryland U.S. 40 & Rt. 213
Elkton, Maryland
1994


EXXON
Rt. 213 - 13,900 ADT
U. S. 40 - 29,200 ADT (12%)



Rutting on a yearly basis

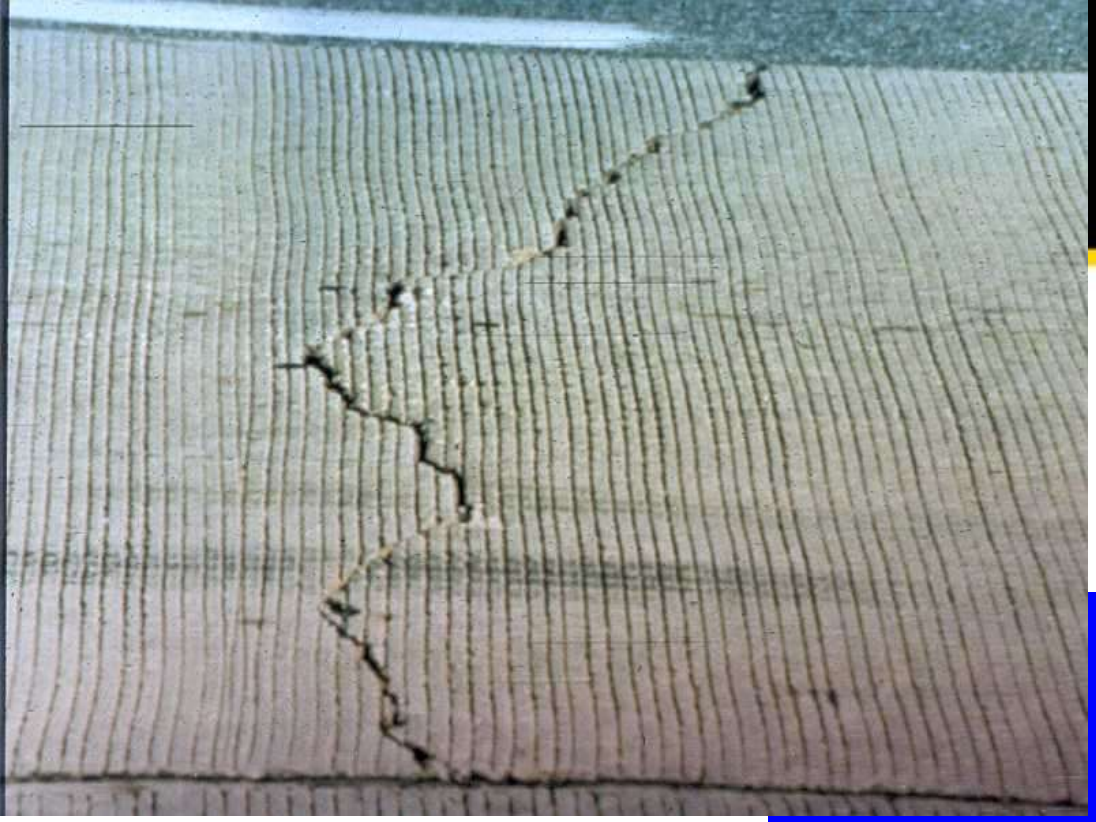

Determine depth of rutting !


2-Lifts 25 mm SMA

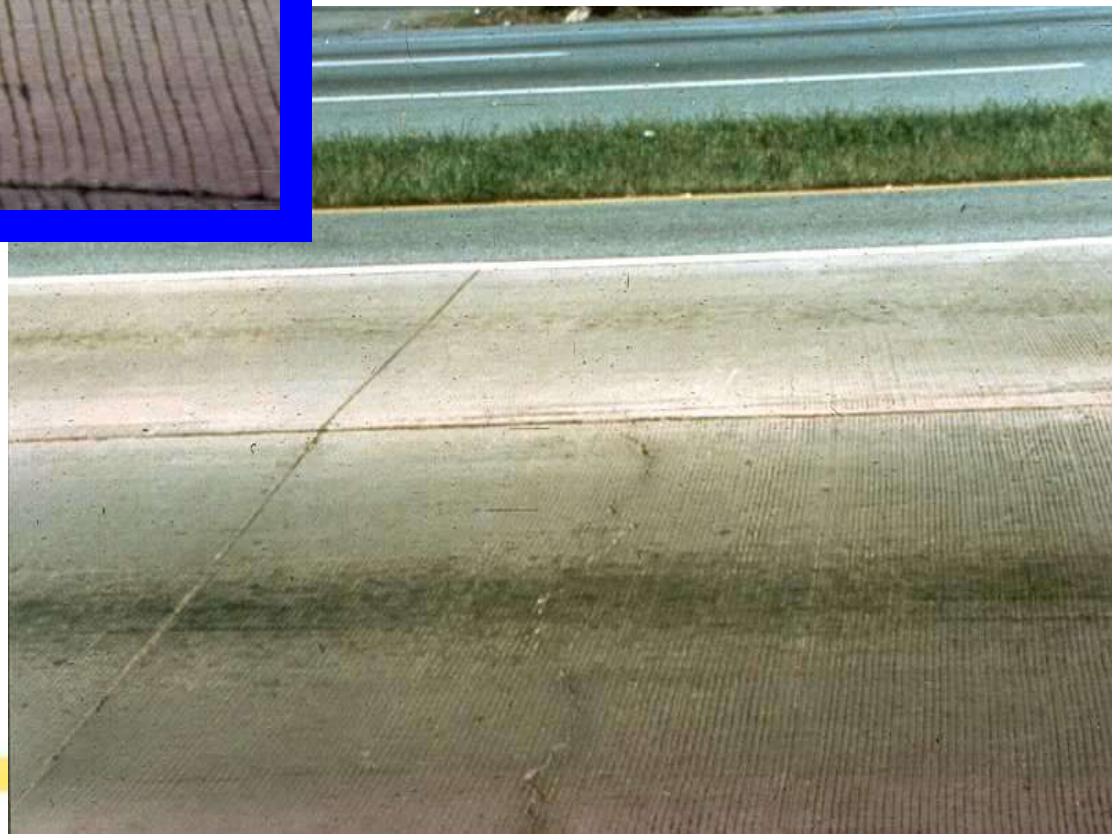

1-Lift 19 mm SMA


CROWN


CROWN



asphalt institute



Removing pcc

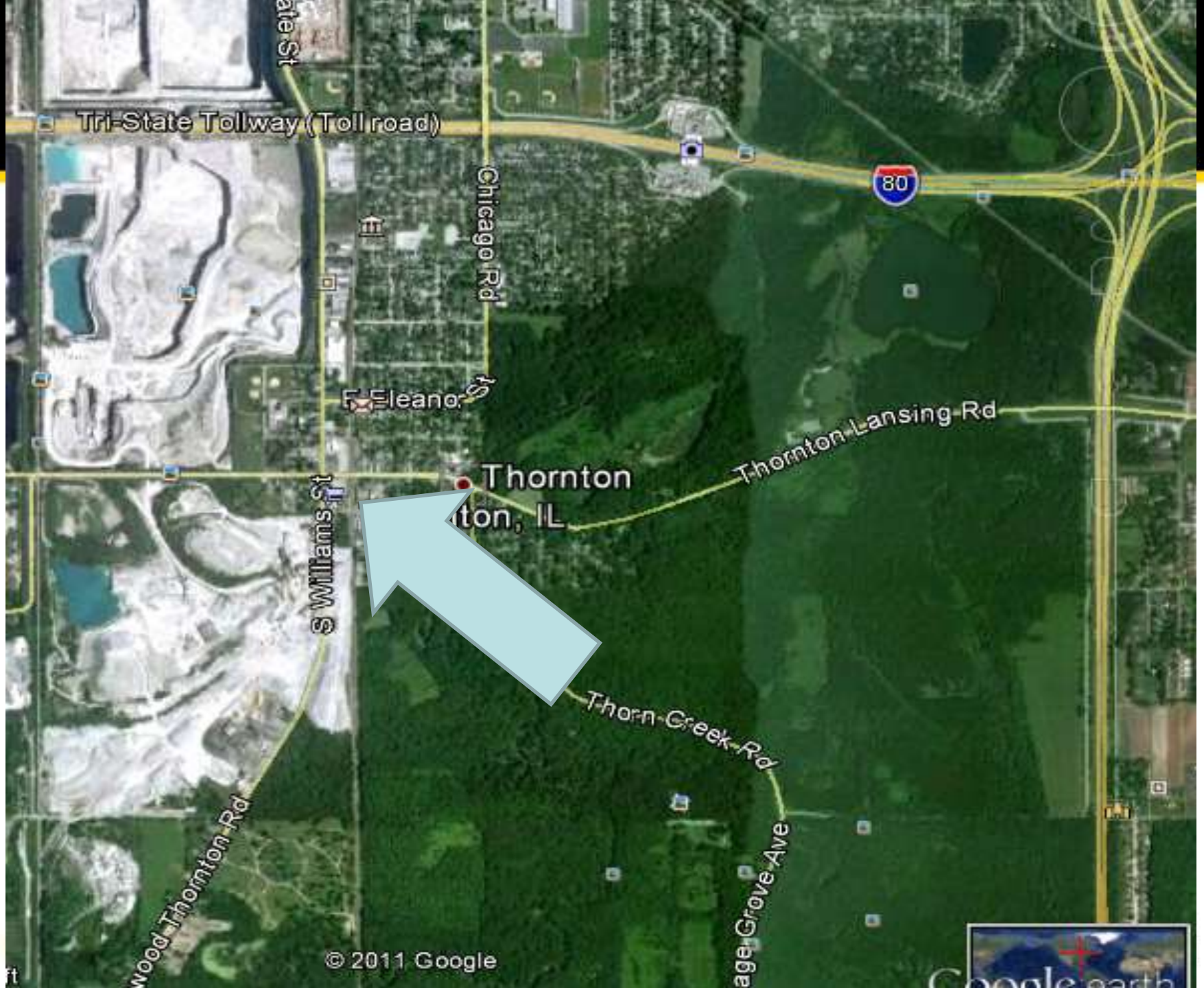
July 2000

July 2000
Replacing pcc w/ SMA

High Performance Intersections

18 years later

- **Minor**
  - **¼ inch Ruts**
  - **L/T Joint distress**
  - **Reflective Cracking**


Tri-State Tollway (Toll road)
80
Chicago Rd
E Eleanor St
Thornton Lansing Rd
Thornton
S Williams St
Thorn Creek Rd
Wood Thornton Rd
© 2011 Google

High Performance Intersections

Background

- **IDOT mill one year & fill the ruts the following year**
- **1998 Rehab established an Evaluation Team**
  - **“Tough Mix Team”**

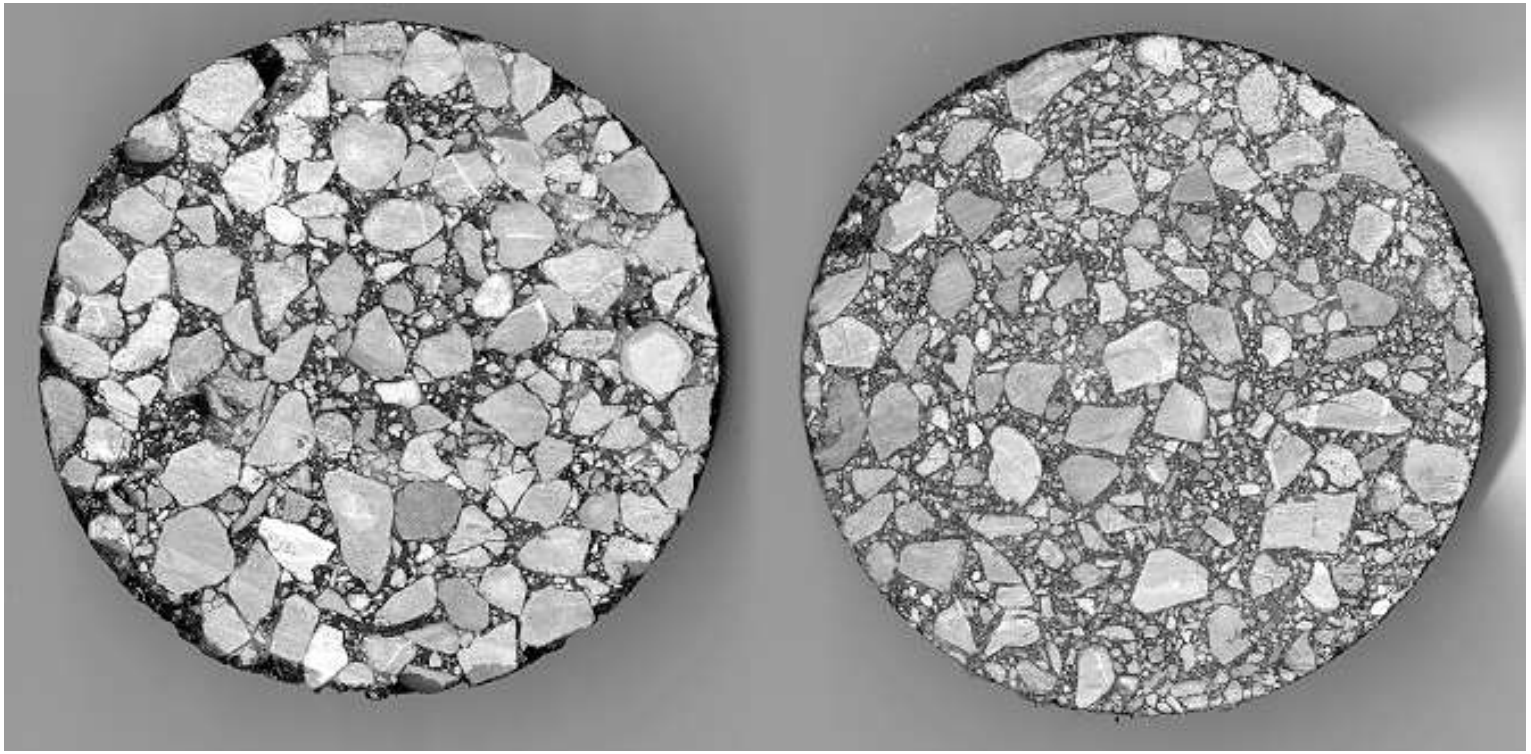
High Performance Intersections

Evaluation

- **Lower layers were plastic deformation**
- **Prior repairs left in place**
- **Last overlay was SMA**
  - **Consistent thickness**
  - **Deformed plastic mix.**

High Performance Intersections

Material Selection



SMA vs Dense-Graded

High Performance Intersections

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World's Strongest Intersection

asphalt institute

14 years later

Williams & Margaret in Thornton, IL

slag Successes

News and Information about the Iron and Steel Slag Industry

MEMBER PROCESSORS

AMSI, INC.

AUSTRALIAN STEEL MILL SERVICES

BEELMAN TRUCK CO.

BLUE CIRCLE CEMENT

BROKEN HILL PROPRIETARY, LTD.

C.J. LANGENFELDER & SON, INC.

CLUGSTON GROUP LTD.

DOFASCO INC.

EDW. C. LEVY CO.

GAGNERAUD INDUSTRIES

HECKETT MULTISERV

HOLNAM INC.

IMS WAYLITE

INTERNATIONAL MILL SERVICE

LAFARGE CANADA

LAFARGE CORP.

Largest Stone Matrix Asphalt project in USA spans 6 lanes for 8 miles

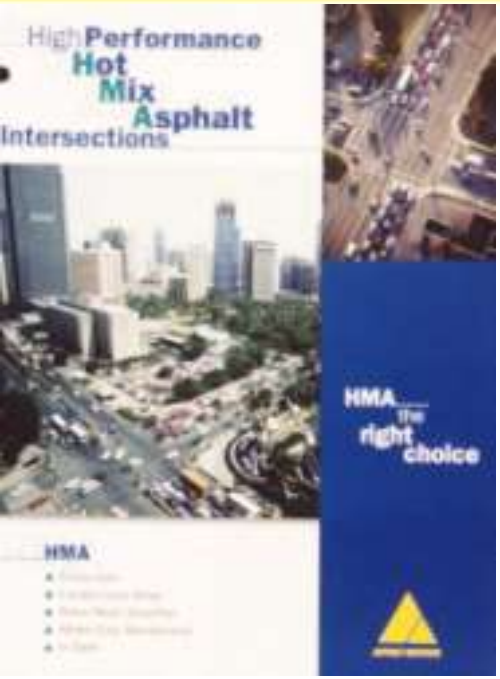
THE LEVY COMPANY of Portage, Indiana, supplied the steel slag for busy I-94, Bishop Ford Expressway, and its heavy loads

I-94, Bishop Ford Expressway, Chicago

When the Illinois Department of

High Performance Intersections

asphalt institute

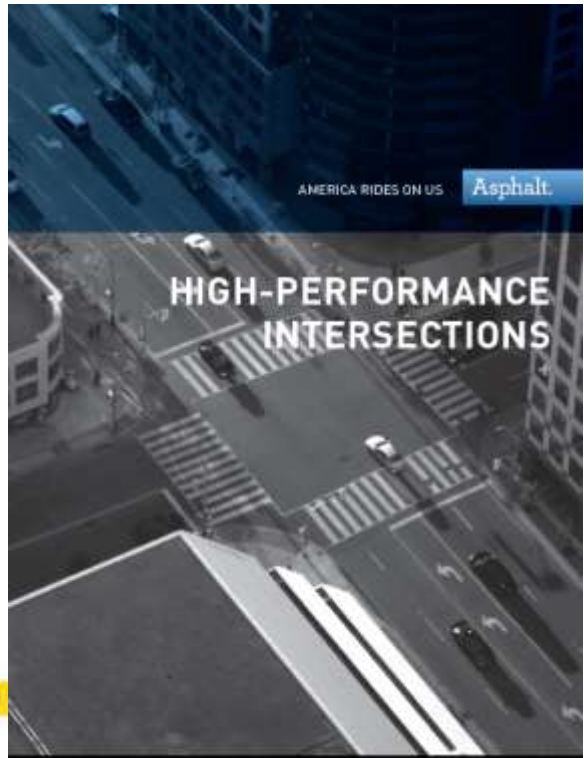


Asphalt Institute

www.asphaltinstitute.org

Asphalt Pavement Alliance

www.asphaltroads.org



We're dri

Thanks!

Wayne Jones, PE

Senior Regional Engineer