

Introduction To Transportation Asset Management For Elected Official

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Michigan
Local Technical
Assistance Program



Please Silence Your Cell Phone



Introductions

You are a diverse group!
Tell us who you are.

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Course Learning Objectives

- **Overview of asset management activities in Michigan**
- **Understand the “mix of fixes” concept**
- **Provide a basis for project selection from a pavement management standpoint**
- **Benefits of using asset management principles**
- **Overview of asphalt pavement maintenance types**

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Introduction To Transportation Asset Management For Elected Official

What Is Asset Management?

What is Transportation Asset Management?

“An ongoing process of maintaining, upgrading, and operating physical assets cost effectively, based on a continuous physical inventory and condition assessment”

Source: Act 499 of the Public Acts of 2002.



Asset management for a car

New Car

- Regular oil changes,
- Flush radiator
- Wash/wax regularly
- Repair paint chips
- Change belts,
- Change transmission fluid



Asset management for a car

Aging Car

- Charge AC
- Repaint
- Engine overhaul
- New tires



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Asset management for a car

Old Car

- Only critical maintenance
- Only critical repair
- Not worried about auxiliary features that fail
- Keep it running until it can be replaced



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Not worried about scratches on this one!



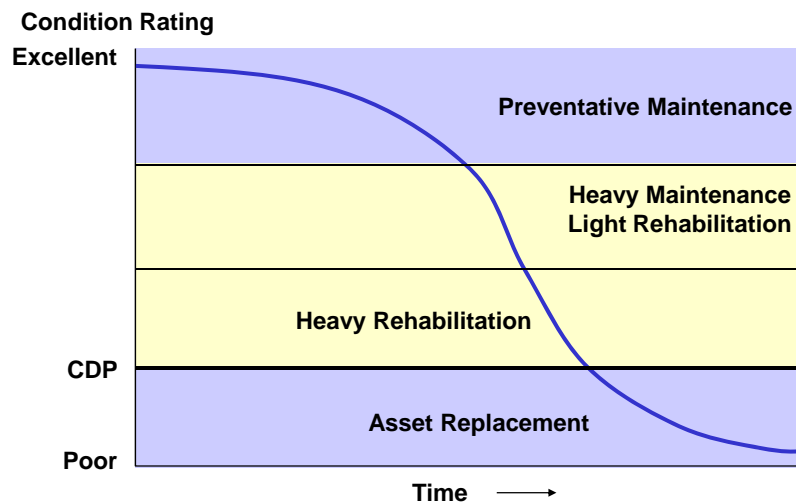
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Innovative Repair Strategies



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Window of Opportunity



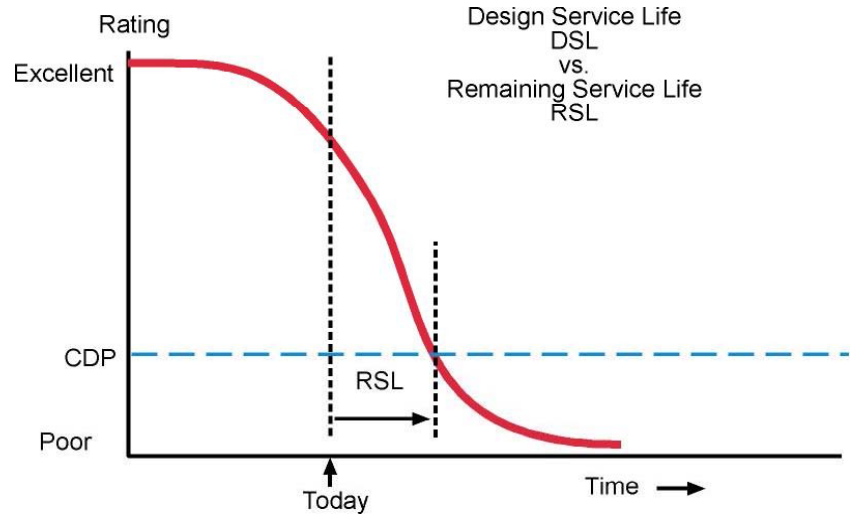
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Key Pavement Management Definitions

- **CDP - Critical Distress Point**
 - The CDP is the point where the pavement distress changes from needing preventive maintenance to needing structural improvement.
- **RSL - Remaining Service Life**
 - RSL is the time in years from the present where the pavement reaches the point where distresses are structural in nature (CDP) and preventive maintenance treatments are no longer beneficial.
- **ESL - Extended Service Life**
 - ESL is the time in years added to the current RSL based on the type of fix used. It does not represent the longevity of the treatment

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Pavement Deterioration Curve



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Approaches To Managing Assets

Worst First

- Select worst roads
- No preventative maintenance
- Reconstruct
- Rehabilitation

Mix of Fixes

- Select roads in good shape for PM projects
- Many miles of Low cost treatments
- Reconstruction if money permits

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The Mix of Fixes: What is it?

- Applying the right fix at the right time in the right place
 - Extensive preventive maintenance – Priority.
 - Rehabilitation when really needed.
 - Reconstruction is No Longer the priority.
 - Long term view - No knee-jerk reactions.
 - Capitalizes on “windows of opportunity” .
-

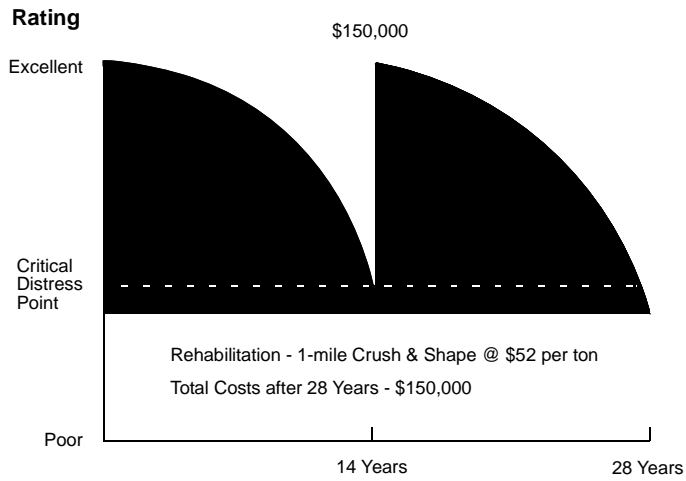
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Cost Effectiveness of Treatments

Fix Type	Cost \$ per Lane Mile	Added Life	Cost per Year of Added Life
Crack Seal	\$4,000	1 yr.	\$4,000
Seal Coat & Crack Seal	\$20,000	5-9 yr.	\$4,000
Overlay	\$100,000	8-12 yr.	\$12,500
Crush & Shape	\$150,000	14 yr.	\$10,700
Reconstruction	\$300,000	15 yr.	\$20,000

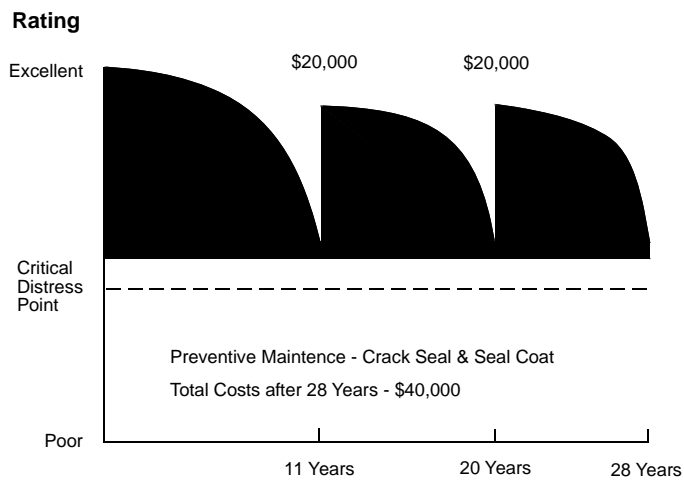
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Rehabilitation at 14 yr. \$150,000



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Chip Seal at 11 and 20 yr. \$40,000



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Comparison

No Preventative Maintenance –

Total Cost \$150,000

End Condition – Poor

Using preventative maintenance –

Total Cost - \$40,000

End Condition - Fair

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Why is it important?

● Registered Vehicles 18% ↑ ● Total Miles of Roadway 2% ↑

● Licensed Drivers 13% ↑ ● VMT 21% ↑

Capital Expenditures 75% ↑

CE Adj. for Inflation 14% ↓

Growth in Transportation from 1996 through 2006

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Why is It Important?

- In the next 20 years ?
 - VMT 50% ↑
 - Freight tonnage 100% ↑

FHWA

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How Can Asset Management Help You?

- Transition
 - Project Management → Systems Management
- Lower long-term preservation costs
- Improved
 - service to customers
 - cost-effectiveness
 - use of available resources
 - credibility & accountability for decision-making
 - communication with elected officials & the public
 - justification for additional resources
- Provides flexibility in use of Act 51 funds (Cities)

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Questions?



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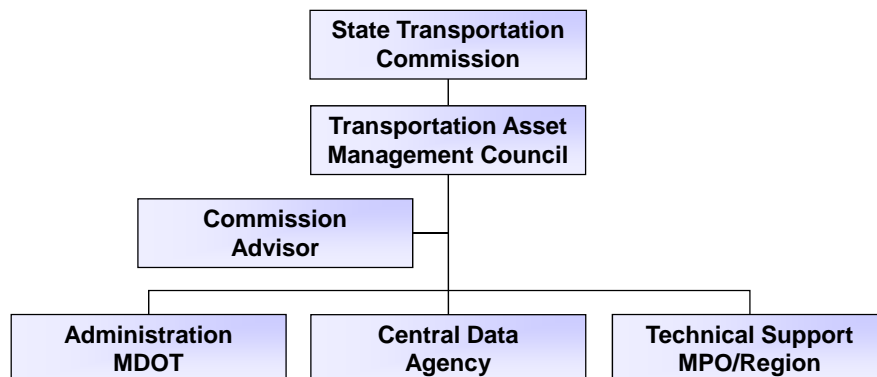
What's Happening In Michigan?

Act 499 of the Public Acts of 2002

- **Defined asset management**
- **Established Transportation Asset Management Council**
- **Identified roles and responsibilities of TAMC and member agencies**

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Organizational Chart



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Michigan Transportation Asset Management Council



Carmine Palombo
MTPA



Bob Slattery
MML



Susan Mortel
MDOT



Kirk Steudle
MDOT



Bill McEntee
CRAM



Steve Warren
CRAM

Michigan Transportation Asset Management Council



Don Disselkoen
MAC



Jerry Richards
MTA



Spencer Nebel
MML



Dave Bee
MAR



Rob Surber
CGI

TAMC Mission

Advising the State Transportation Commission on a statewide asset management strategy and the necessary procedures and analytical tools to implement such a strategy on Michigan's highway system in a cost-effective, efficient manner

Source: MCL 247.659a

TAMC Objectives

- **Surveying & reporting the condition of roads and bridges**
- **Assessing completed and planned investments**
- **Support asset management tools and procedures**
- **Asset management education program**

What is the TAMC Trying to Do?

- **Move from needs studies to managing pavements and bridges**
 - **See the system as the customer sees it**
 - **Continue direction of ISTEA and TEA-21**
 - **Work cooperatively rather than competitively**
 - **Report road and bridge condition to the legislature**
-

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Questions?



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Nuts and Bolts of Asset Management

Managing Physical Assets

Steps

- **Inventory**
- **Condition (rating)**
- **Predicting future condition**
- **Managing network**

Inventory – What do I own?

- **Type of roads**
 - Asphalt
 - Concrete
 - Sealcoat
- **How many lane miles of each?**
- **What types of roads are they – functional class**
- **Where are they - Map**

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Condition – What shape is it in?

- **Subjective – “Good - Fair - Poor”**
- **PASER – Pavement Surface Evaluation and Rating**
- **PCI – Pavement Condition Index**
- **Measurements of physical aspects**
 - Rutting
 - Roughness
 - FWD data (pavement rigidity)
- **Picking a Rating System**
 - Sustainable
 - Be descriptive about the asset
 - Aid in decision making

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What Does Michigan Use?

- **PASER – Pavement Surface Evaluation and Rating**
- **Visual survey—based on sound engineering principles**
- **Measure of surface distress**
- **Reported on a scale of 1-10**
- **Asset Management Council combines into three categories**
 - **Routine maintenance (8 - 10)**
 - **Capital preventive maintenance (5 - 7)**
 - **Structural improvement (1 - 4)**

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PASER Ratings

Routine Maintenance—PASER 8, 9, 10



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PASER Ratings

Capital Preventive Maintenance—PASER 5, 6, 7



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PASER Ratings

Structural Improvement—PASER 1, 2, 3, 4



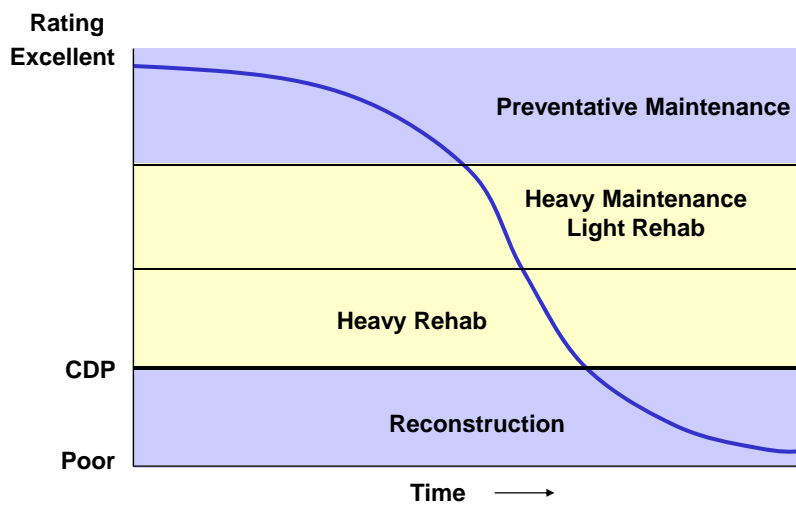
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Predicting the Future

- Rules of thumb
- Past experience
- Professional opinion
- Model historical rating data

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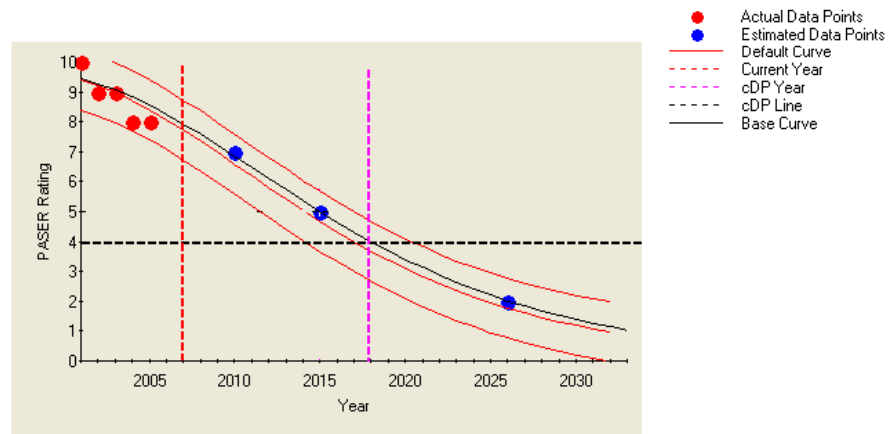
Window of Opportunity



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Future Condition What will happen tomorrow?

Comperetz Growth Model Unforced Through Zero



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Windows of Opportunity PASER Rating System

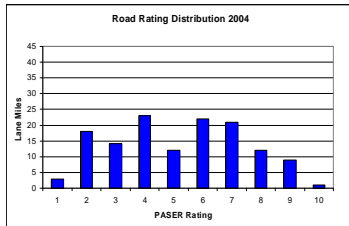
RATINGS ARE RELATED TO NEEDED MAINTENANCE OR REPAIR

Rating 9 & 10	No maintenance required
Rating 8	Little or no maintenance
Rating 7	Routine maintenance, cracksealing and minor patching
Rating 5 & 6	Preservative treatments (sealcoating)
Rating 3 & 4	Structural improvement and leveling (overlay or recycling)
Rating 1 & 2	Reconstruction

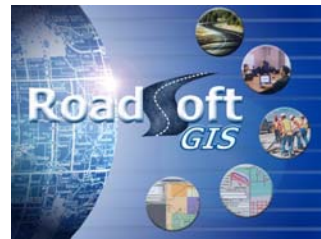
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Network Level Measure

- Historical distribution



- Management System - RoadSoft



- NCPP Network Health



National Center
for Pavement
Preservation

Network Level Vs. Project Level

Project: Moving pieces

Network: Winning game

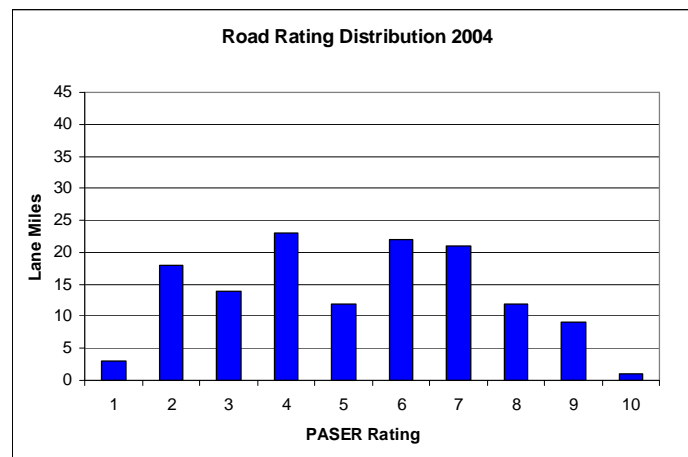


Service Cycle

- How big is the network?
- How much of the network do I do work on?
- How long will it take to “touch” the entire network?
- Is this longer than the expected life of my pavement?
- **EXAMPLE**
 - 500 lane mile road network
 - Do 10 lane miles of work each year
 - Takes $500/10 = 50$ years to touch all of the network
 - Asphalt pavement only last 15 years

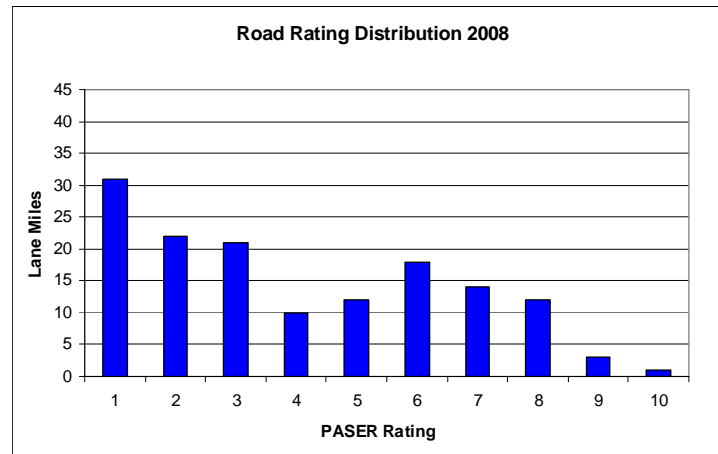
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Historical Distribution



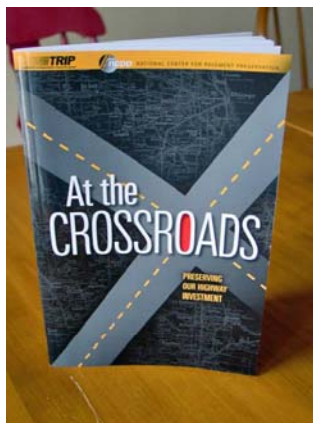
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Winning or Loosing?



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National Center for Pavement Preservation



<http://www.pavementpreservation.org>

NCPP Network Condition Health

- # Of Lane Miles in your network
 - Same number of RSL lost each year
 - How it works . . .
 - Programmed Activity (reconstruction, chip seal, etc.)
 - Fix Cost (per lane mile)
 - Extended Service Life (ESL)
 - # of Lane Miles Fixed
 - Result
 - Lane Mile/ Years per Fix
 - Total for Entire Network
-

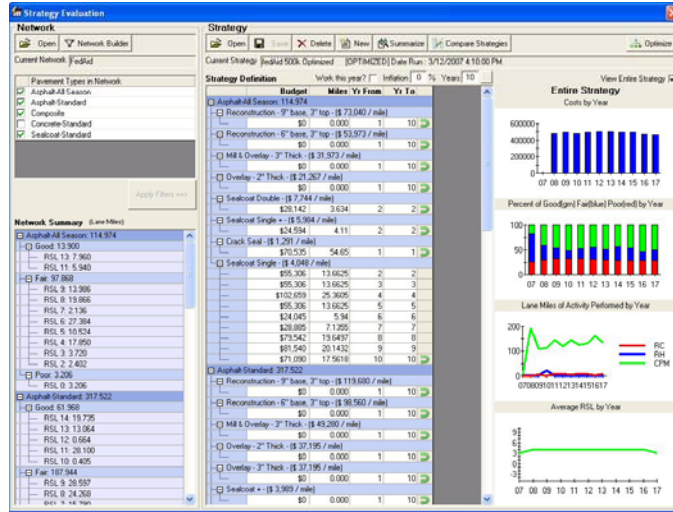
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NCPP Network Condition Health MI Example—625 Lane Mile Network

Programmed Activity	Fix Cost per Lane Mile	ESL Years	# of Lane Miles of Fix	Lane Mile Years	Total Cost
Reconstruction	\$530,000	15	4	60	\$2,120,000
Rehabilitation	\$170,000	14	6	84	\$1,020,000
Mill & Overlay	\$68,000	8	5	40	\$340,000
Non Struc. OvL	\$32,000	2	7	14	\$224,000
Crack Seal	\$4,800	1	6	6	\$28,800
				204	\$3,732,800

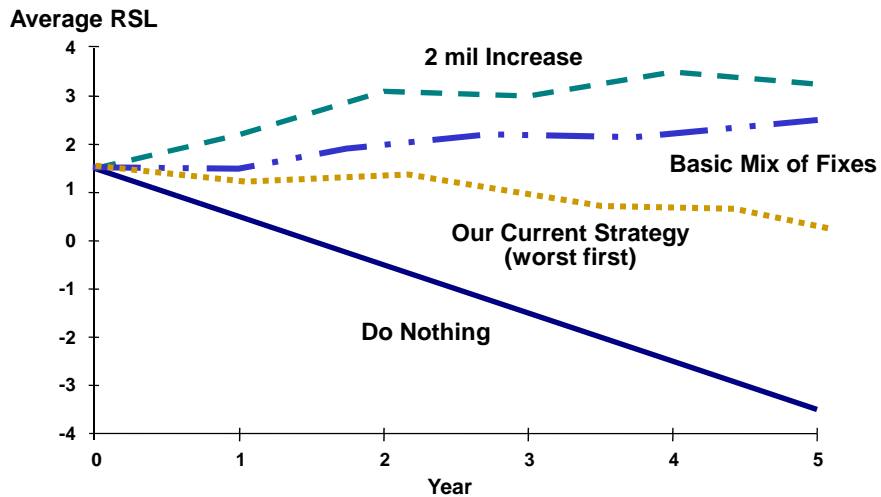
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Network Level Strategy Analysis Using RoadSoft-GIS



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Future Condition – Critical to telling your story



Source: Michigan Tech Transportation Institute.

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Questions?



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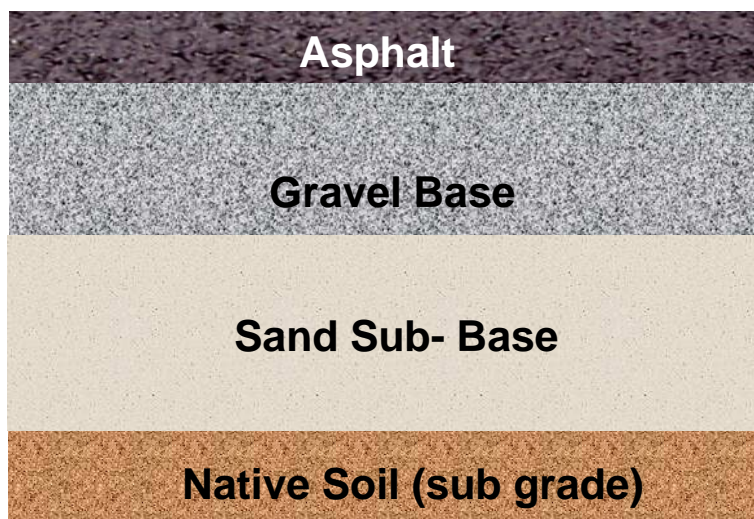
Pavement Basics

What Destroys A Pavement?

- **Water**
 - Weakens structure
- **Traffic**
 - Excessive loading
 - Excessive volumes
- **Environment**
 - Temperature extremes
 - Oxidation

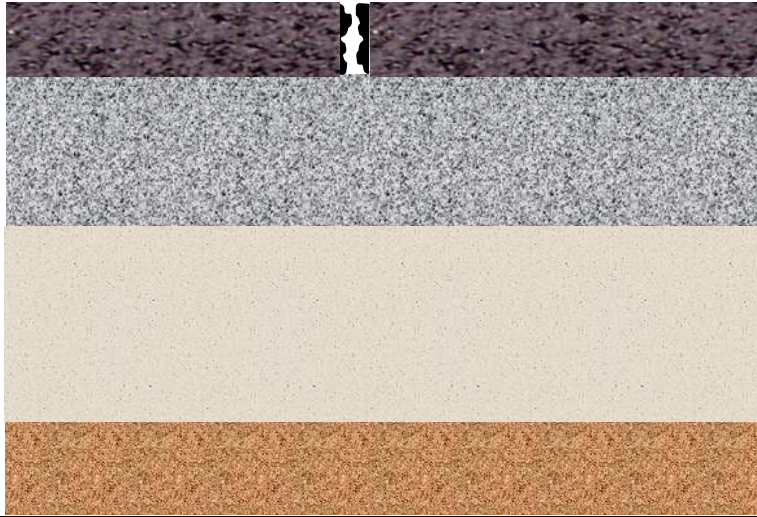
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Typical Pavement Layers



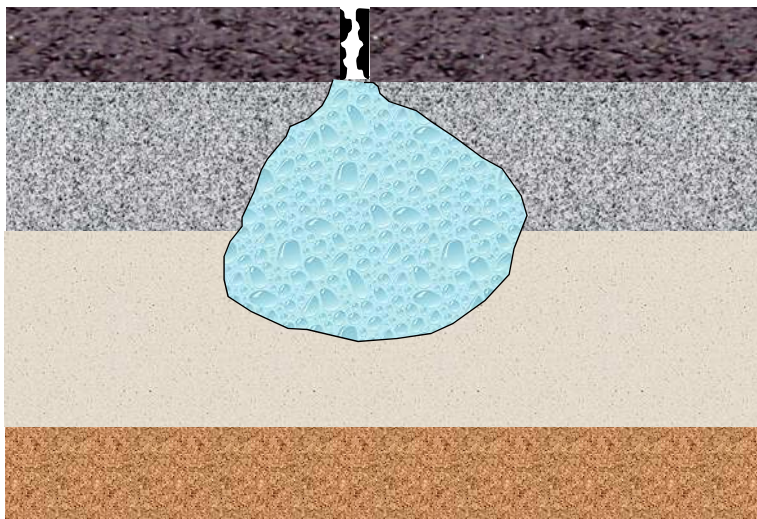
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First Distress



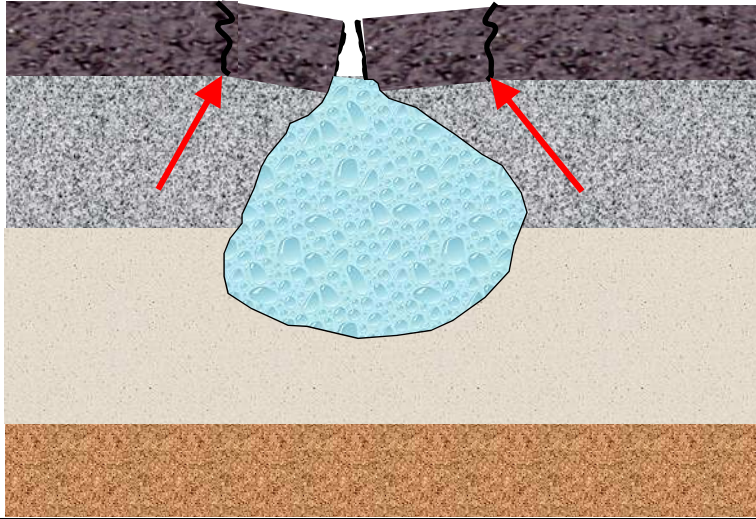
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Water Intrusion



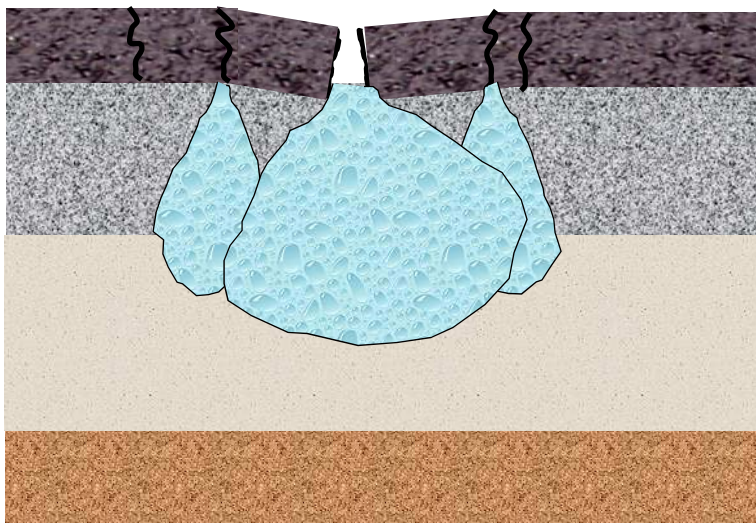
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Base Weakening & Loss of Support



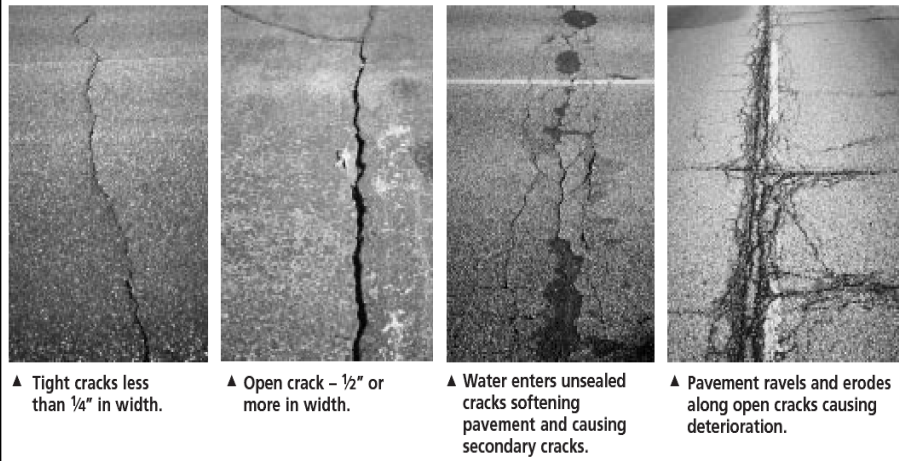
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Distress Propagation



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What Destroys A Pavement? Water



Graphic From Asphalt PASER Manual

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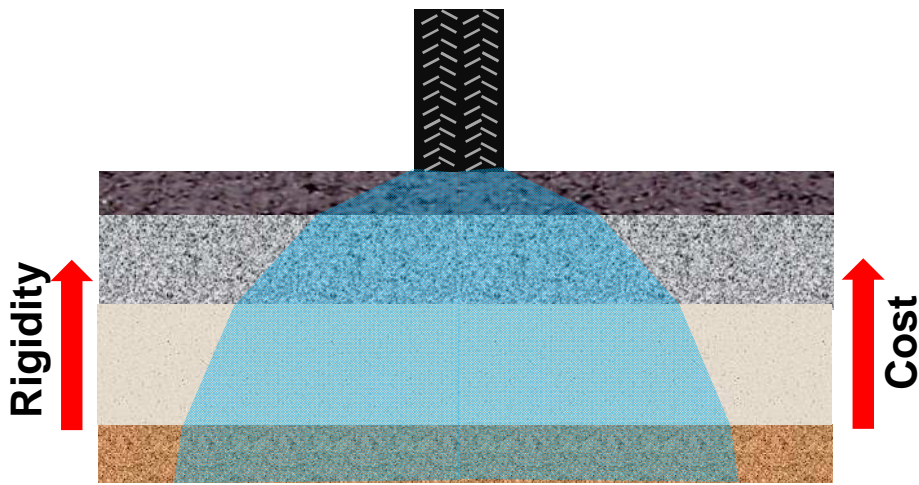


What Destroys A Pavement? Traffic



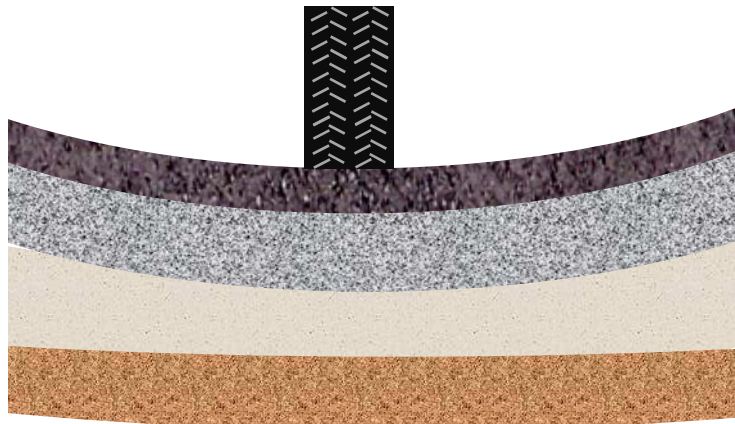
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Load Distribution



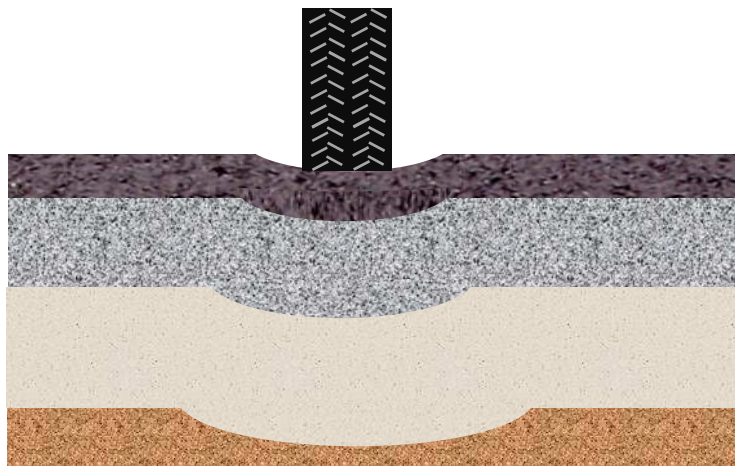
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Traffic



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Failure



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Wheel Path Cracking & Rutting



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Environment



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What Destroys A Pavement? Environment



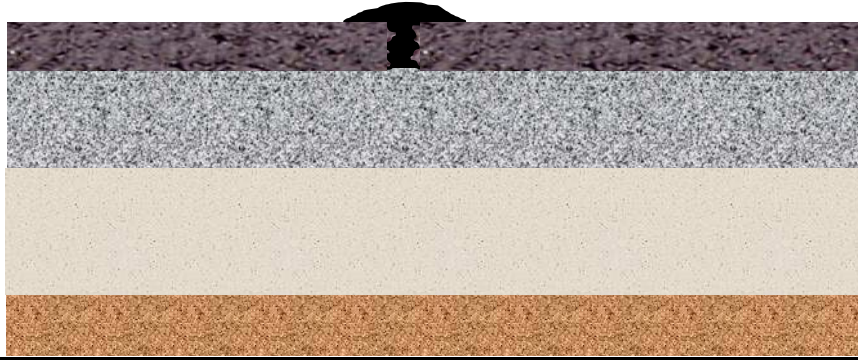
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Solutions — Crack Seal



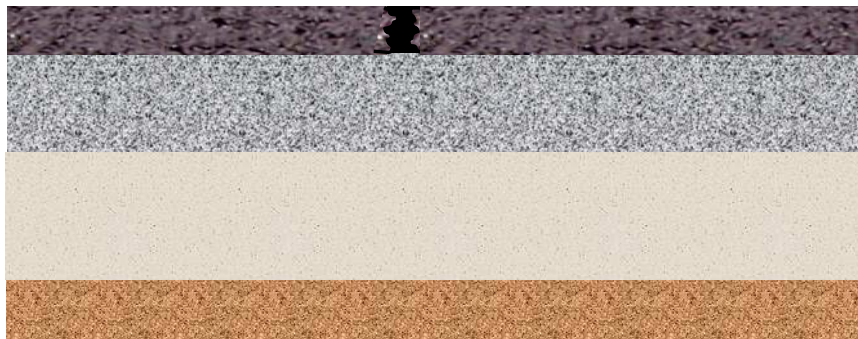
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Overband Crack Sealing



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Crack Filling



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Solutions — Crack Seal

- Fills crack with asphalt sealant
- Seals pavement from water and debris
- Lasts 1 to 2 years
- Used for discrete cracks under $\frac{3}{4}$ " wide

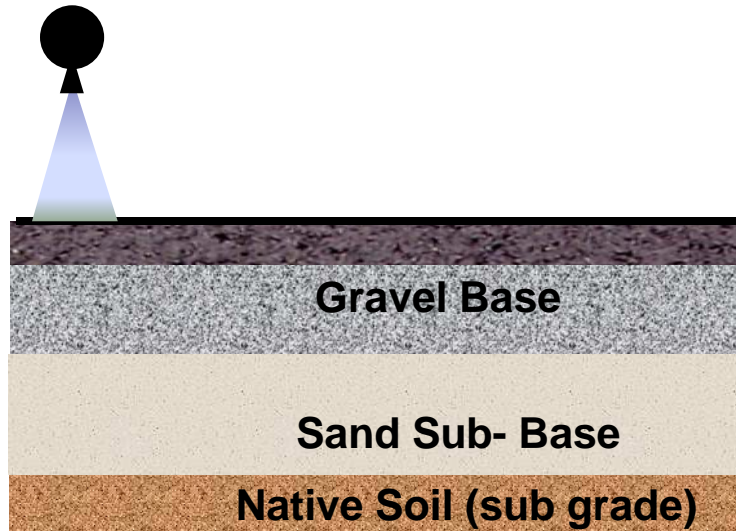
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Solutions — Fog Seal



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Fog Seal



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Solutions — Fog Seal

- Asphalt emulsion surface coating
- Lasts 1 to 2 years
- Can not fill larger than hairline crack
- Use for good to very good pavements
- Can be used with chip seals

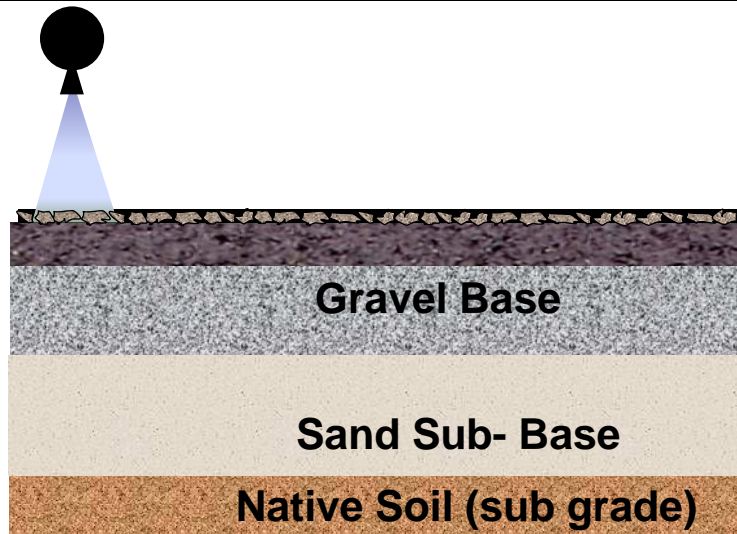
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Solutions — Seal Coat (Chip Seal)



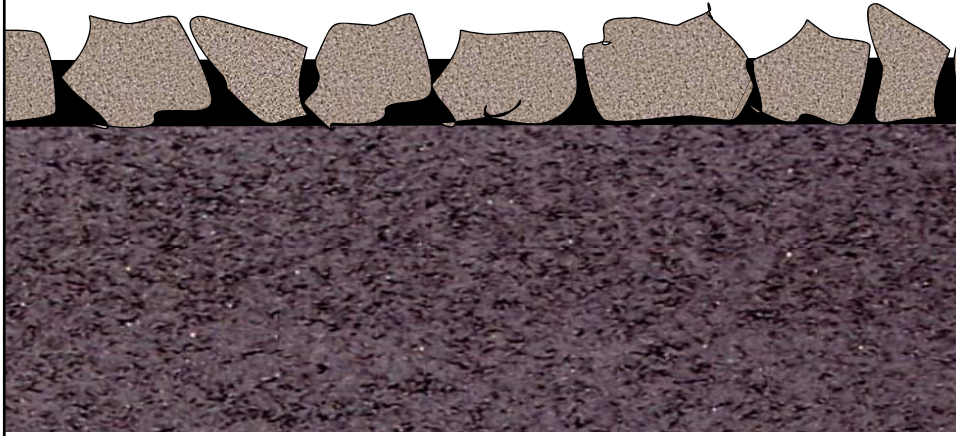
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Chip Seal

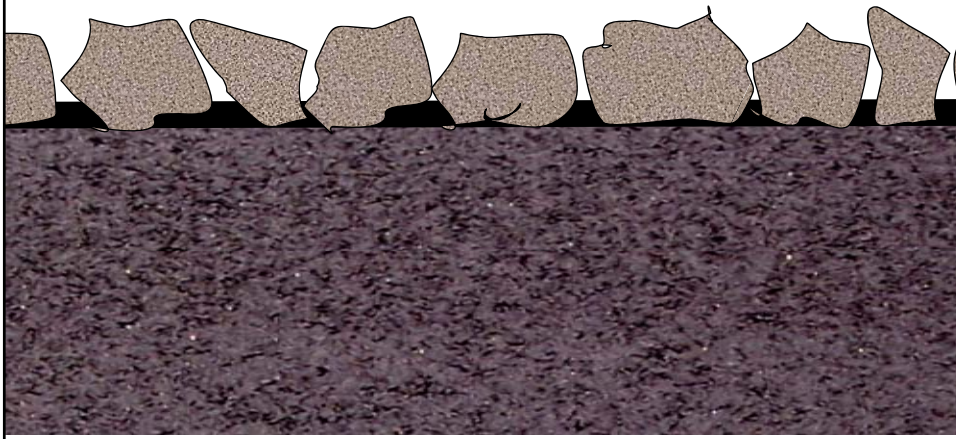


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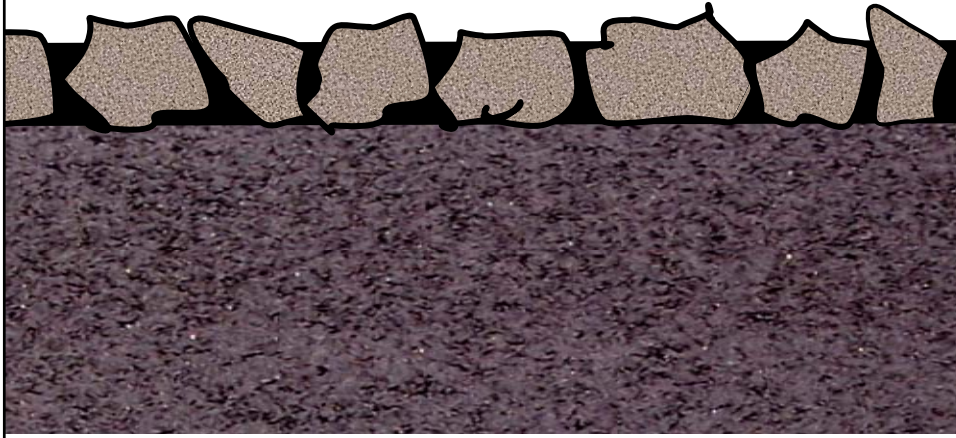
Chip Seal



Chip Seal With Poor Embedment



Chip Seal With Fog Seal



Solutions — Seal Coat

- **Liquid asphalt followed by aggregate chips**
- **Single or double application**
- **Seals pavement from water and debris**
- **Increases surface friction**
- **Lasts 6 years or more**

Solutions — Slurry Seal & Micro-surface



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Micro Surface & Slurry Seal



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Solutions — Slurry Seal

- **Asphalt emulsion, fine aggregate and portland cement**
 - **Seals pavement from water and debris**
 - **Seals small cracks**
 - **Requires heat to set**
 - **Lasts 3 to 5 years**
-

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Solutions — Microsurfacing

- **Polymer modified asphalt emulsion, aggregate and portland cement**
 - **Seals pavement from water and debris**
 - **Fills ruts corrects pavement slope**
 - **Chemical set process**
 - **Can last 7 or more years**
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Solutions — Overlay



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Overlays



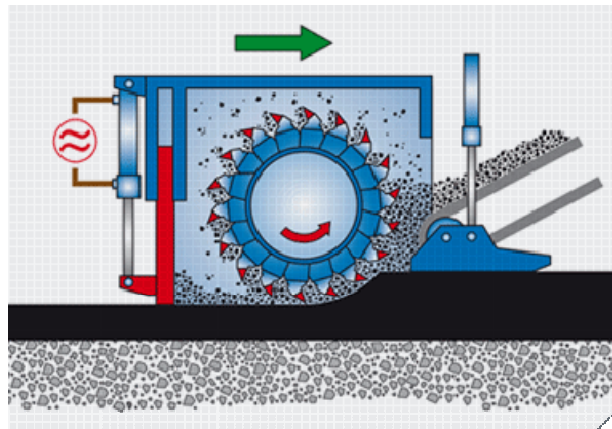
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Solutions — Overlay

- Hotmix asphalt layer $\frac{3}{4}$ " to 1- $\frac{1}{2}$ " thick
- Can be use in conjunction with milling
- Can correct surface imperfections
- Increases surface friction
- Lasts 5 to 10 years or more (many variables)

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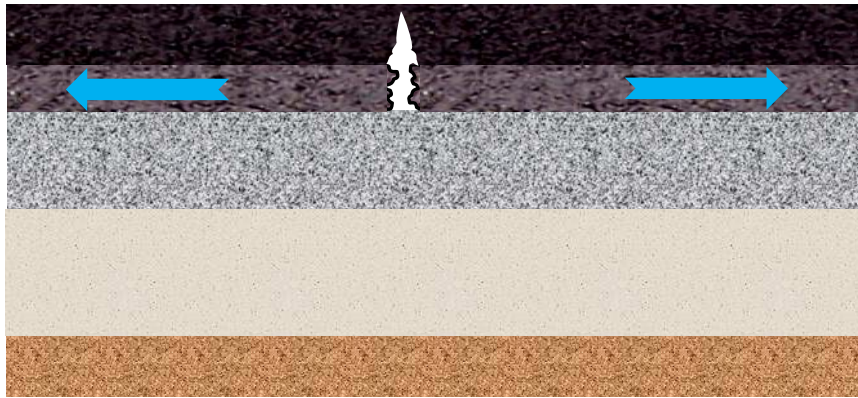
Solutions — Mill and Overlay



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Reflective Cracking

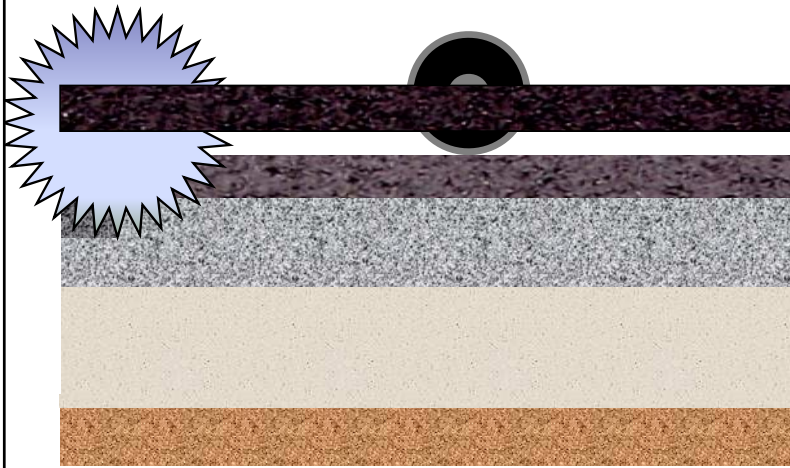


Solutions — Crush and Shape



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Crush and Shape



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Solutions — Crush and Shape

- **Pulverize distressed asphalt surface and mix with base**
- **Can correct profile imperfections**
- **Can add structure to pavement**
- **Primarily for rural roads (no curbs)**
- **Close to a reconstructed pavement**

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Solutions — Reconstruction



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Solutions — Reconstruction

- **Removing pavement to base or sub base**
- **Opportunity to correct geometric problems**
- **Utilities should be upgraded**
- **Most costly option**

Introduction To Transportation Asset Management For Elected Official

Closing Points

Points to Walk Away With

- Asset management is for all types of agencies
- As times get worse . . . You need it the most
- There are many resources available—USE THEM
- The process promotes transparency in decision making
- Communicates the “real” situation to the public and elected officials
- Provides documentation to justify budget increase proposals

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**Michigan
Transportation Asset Management Conference**

**Asset Management - Putting practice on the pavement
with treatments, strategies, and practices.**

- Listen as other agencies around Michigan explain how transportation asset management works for them.
- Talk to your peers who are using transportation asset management to improve the way they manage their roadway assets.
- Learn how a transportation asset management approach can support and improve your agency's decision making.

At the Michigan Transportation Asset Management Conference, you'll learn what is happening in Michigan, and you'll hear how agencies like yours are applying principles of transportation asset management in practical ways to stretch shrinking maintenance dollars.

For More Information
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May 19, 2009
East Lansing, Michigan

June 4, 2009
Marquette, Michigan

Save the Date

**ASSET
MANAGEMENT**

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Additional Training in 2009

Asset Management for Elected Officials-Half Day-16

Asset Management Workshop-Full Day-4

Individual RoadSoft modules—90 minute Webinars

PASER Training-Full Day-8

Contact Information



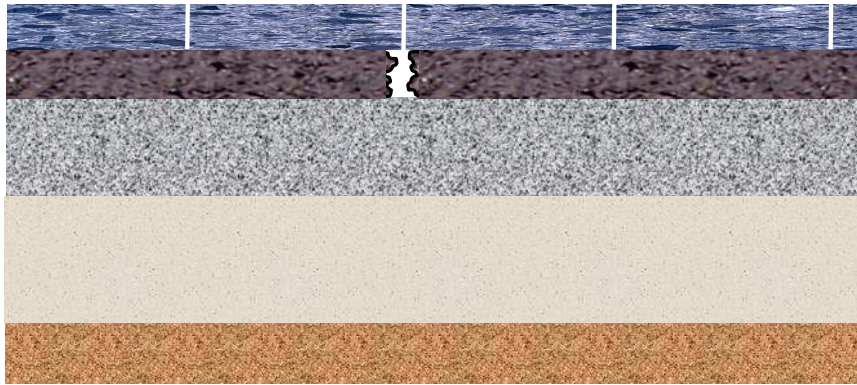
Michigan's
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White Topping

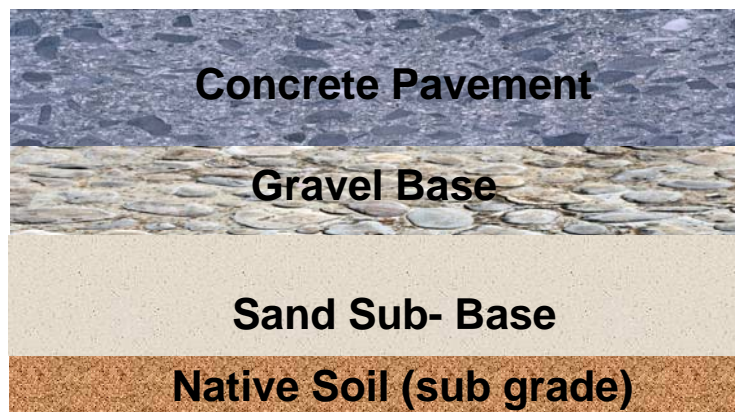


Solutions — White Topping

- Thin concrete overlay 4" on asphalt
- Hard armoring, but little structure
- Needs joints every 4 to 6 feet square
- Great for rut resistance

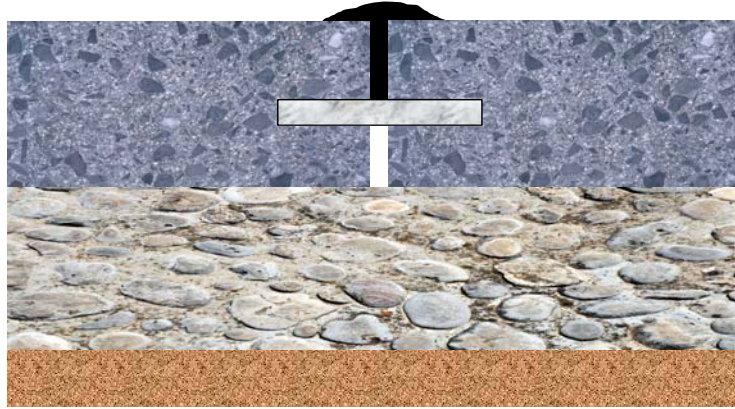
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Concrete Pavement



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Joint and Crack Sealant



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Deformations Blowups

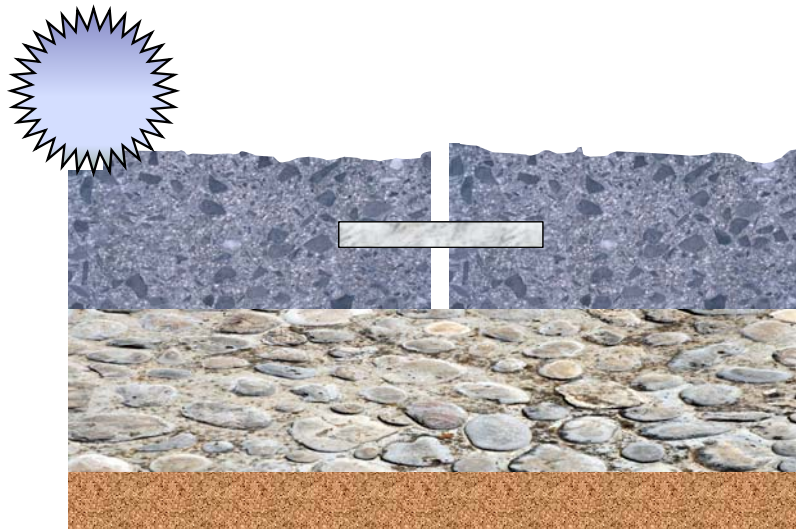


Solutions — Crack & Joint Seal

- Fills crack with rubberized asphalt sealant
- May use silicone or other “longer life ”sealant
- Seals pavement from water and debris
- Lasts 2 to 3 years

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Diamond Grinding



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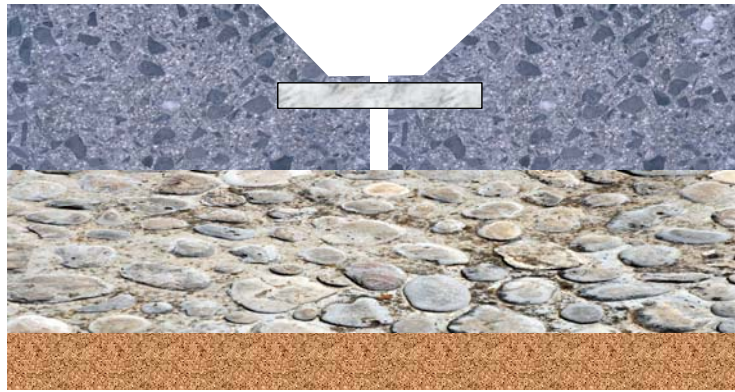


Solutions — Diamond Grinding

- **Removes surface defects**
- **Reduces concrete thickness and embedment**
- **Restores ride and texture**
- **Removes impact forces to joints**
- **Usually used in combination with others**

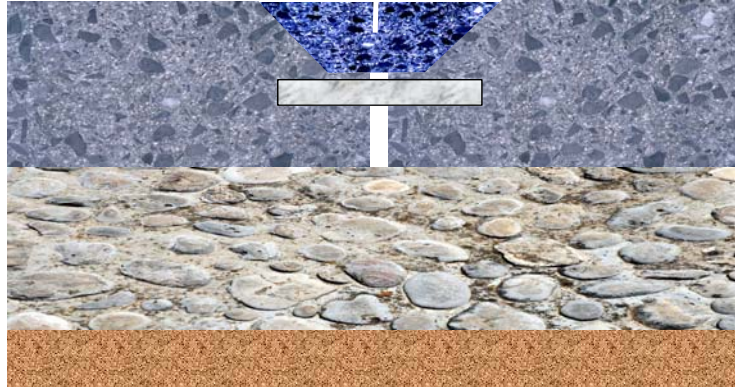
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Partial Depth Joint Repair



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Partial Depth Joint Repair



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Surface Distress Shallow Reinforcement

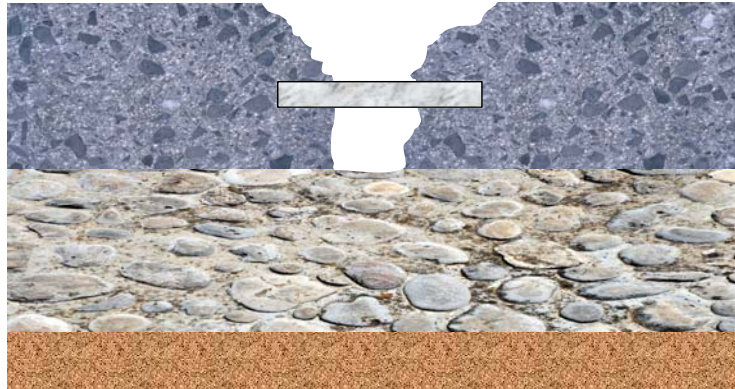




Solutions — Partial Depth Repair

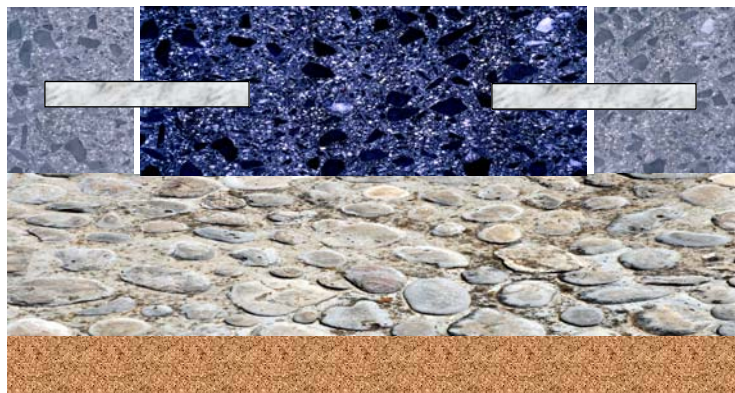
- **Used on surface spalls or joint spalls**
 - **Uses polymer modified concrete**
 - **Restores ride and removes impact loading**
 - **Stabilizes area**
 - **Aids in ability to seal pavement**
 - **Lasts 3 to 5 years**
-

Full Depth Joint Repair



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Full Depth Joint Repair



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Transverse Crack – Severely Spalled

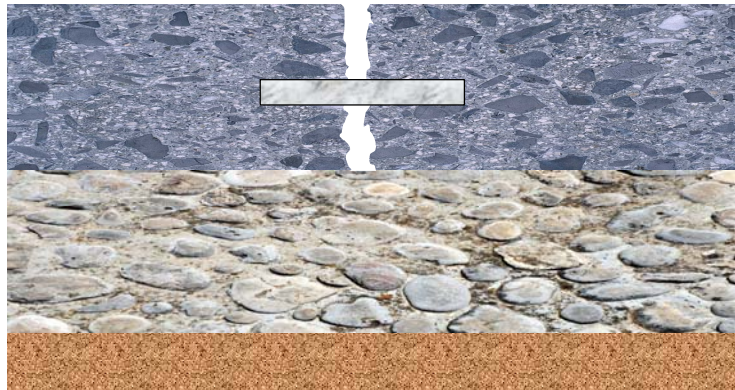


Solutions — Full Depth Repair

- **Used on badly deteriorated joint or cracks**
- **Uses polymer modified concrete**
- **Replaces joints with structural unit “link slab”**
- **Aids in load transfer and sealing joints**
- **Lasts 5 to 8 years**

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Dowel Bar Retrofit



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Transverse Crack

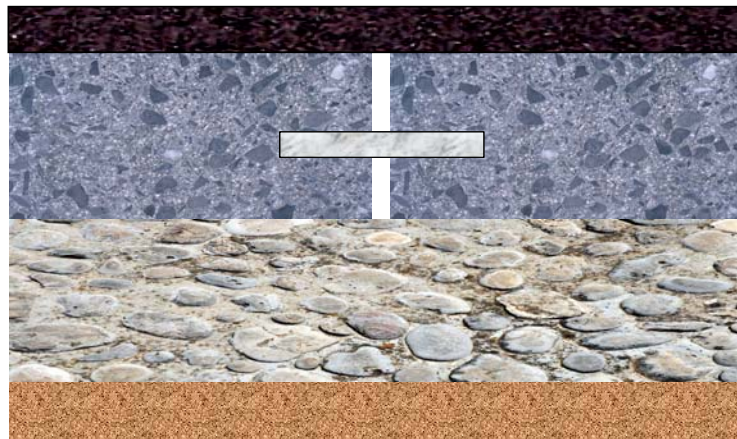


Solutions — Dowel Bar Retrofit

- **Used on open “working” cracks**
- **Cut in load transfer dowels**
- **Aids in load transfer and sealing joints**
- **Minimizes faulting**
- **Lasts 5 to 8 years**

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Asphalt Overlay (Composite)



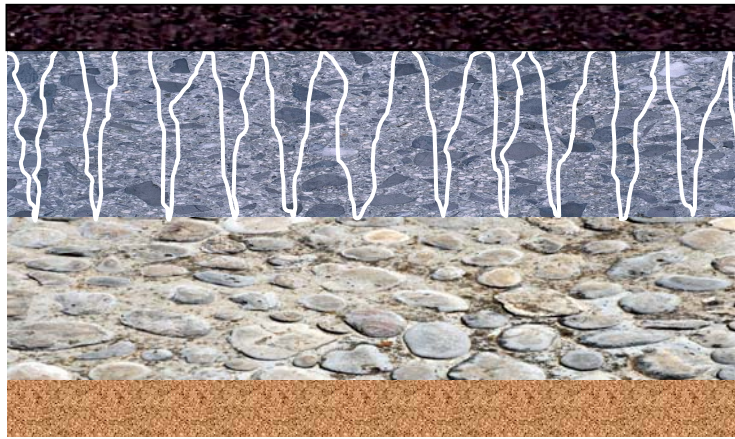
132

Solutions — Asphalt Overlay

- Patching and repair of existing usually necessary
- Reflective cracks in first year
- Aids in sealing pavement
- Used as a “short term” fix for ride and surface
- Lasts 5 to 8 years

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Crack and Seal or Rubbelize



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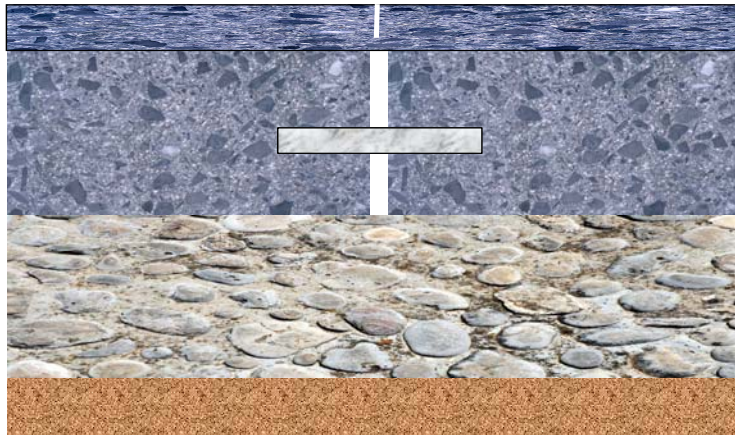


Solutions — Crack and Seat / Rubbelize

- Cheaper than removing concrete
- Minimizes reflective cracking
- Reuse of majority of structural components
- Limits future options of repair
- Lasts 10 or more years

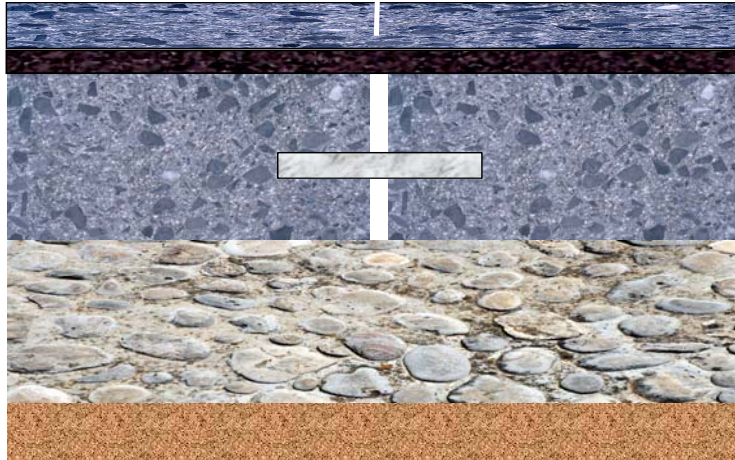
137

Bonded Concrete Overlay



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Unbonded Concrete Overlay



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Solutions — Concrete Overlay

- **Can be bonded or unbonded**
- **Joints must be cut on cracks and joints**
- **Patching of existing usually necessary**
- **Reuse of majority of structural components**
- **Lasts 10 to 15 or more years**

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