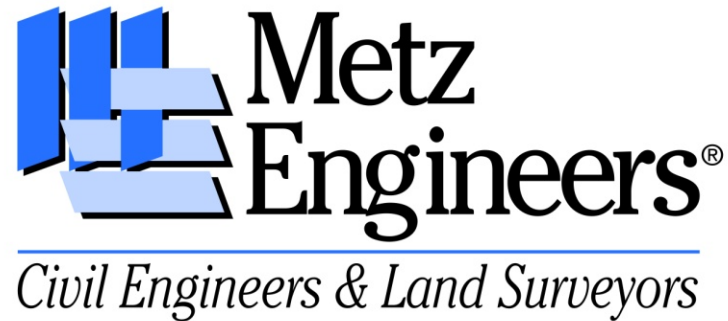


MAINTAINING ASPHALT PAVEMENT

Prepared by:
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Principal



Metz Engineers, since 1912

BASED IN LANSDALE, PA

**30+ YEARS OF MUNICIPAL ENGINEERING - ROAD
CONSTRUCTION, RECONSTRUCTION, DRAINAGE,
CONCRETE, CONSTRUCTION ADMINISTRATION
AND INSPECTIONS**

**50+ YEARS EXPERIENCE OF BUILDING
DEVELOPMENT STREETS, SEWERS, CURB AND
SIDEWALK**

Essentials of a Good Road

- Keep water away from the road.
- Build on a firm foundation.
- Use the best soils available.
- Compact soils well.
- Design for winter maintenance.



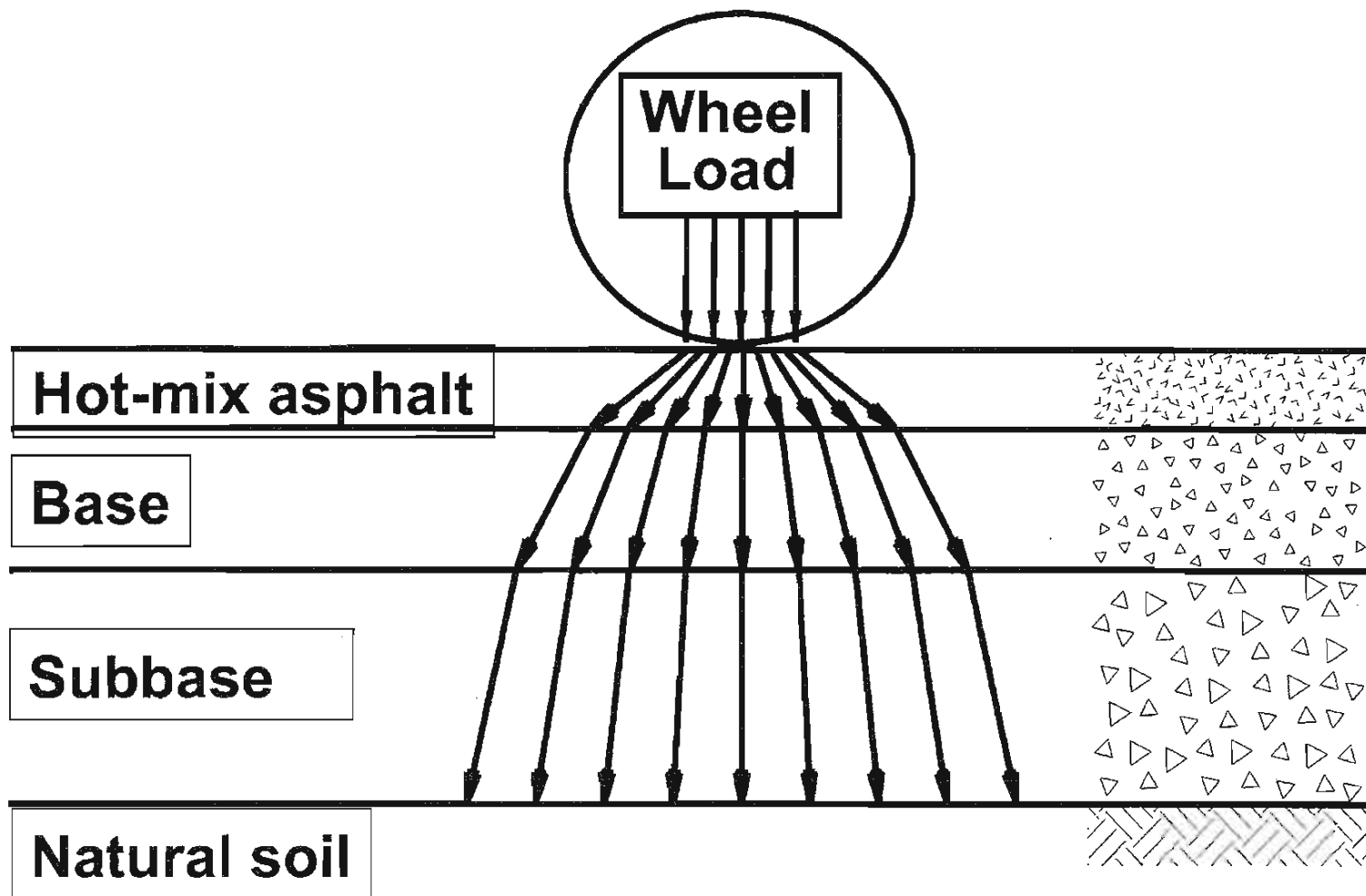
Factors Affecting Pavement Performance

- Subgrade soil support
- Materials
- Layer thickness
- Construction variation from specs
- Maintenance programs
- WATER ! (and other environmental factors)

ENEMIES OF YOUR ROADS

- WATER
- AGE
- OXIDATION
- SHRINKAGE/CRACKING
- FROST HEAVE
- TRUCKS – 80 TIMES THE IMPACT OF CARS
- SETTLEMENT DUE TO POOR COMPACTION
- LACK OF REGULAR MAINTENANCE
- POOR INITIAL INSTALLATION
- LACK OF DRAINAGE
- LACK OF PROPER CROWN
- INADEQUATE DESIGN ELEMENTS

Distribution of Wheel Load



SUBGRADE ISSUES

- KEY TO A GOOD ROAD IS A GOOD FOUNDATION (STONE, DRAINAGE, THICKNESS)
- SUBGRADE ISSUES OFTEN NOT SEEN UNLESS PAVING IS REMOVED AND STONE IS PROOF-ROLLED.
- PHYSICAL EVIDENCE OF SUBGRADE FAILURE
- TOO MUCH SUBGRADE WATER
- INADEQUATE SUBGRADE THICKNESS

- ***Base & surface
important***





08/21/2013



08/21/2013

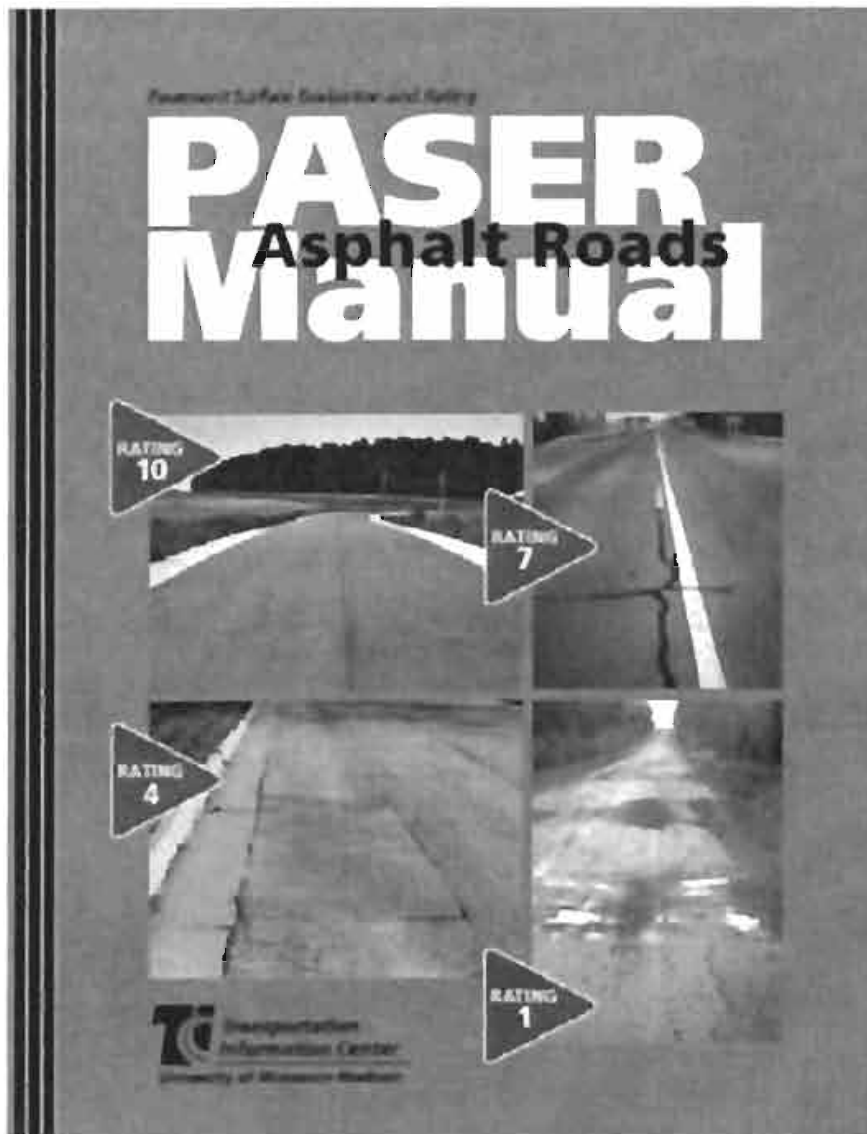


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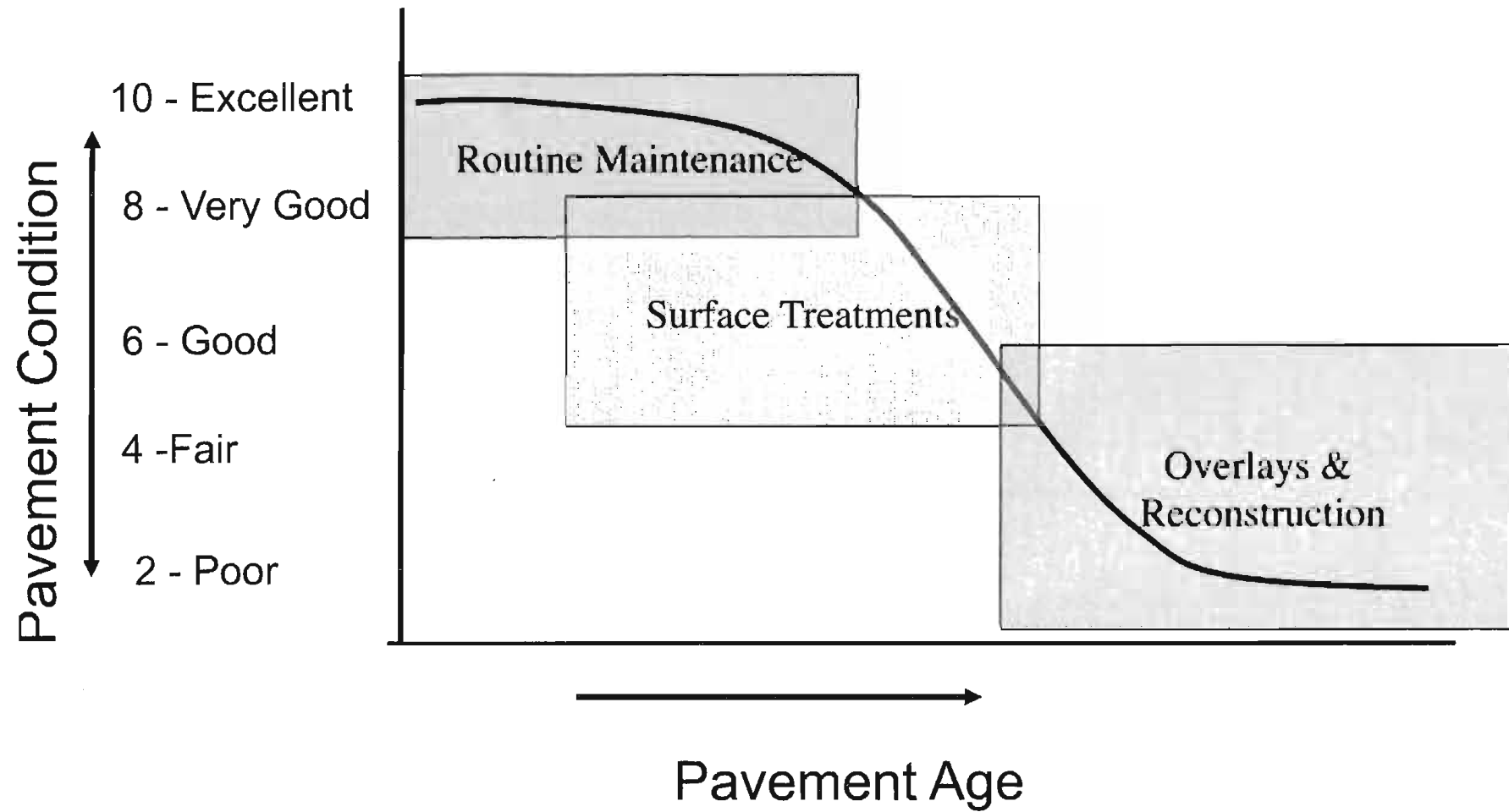




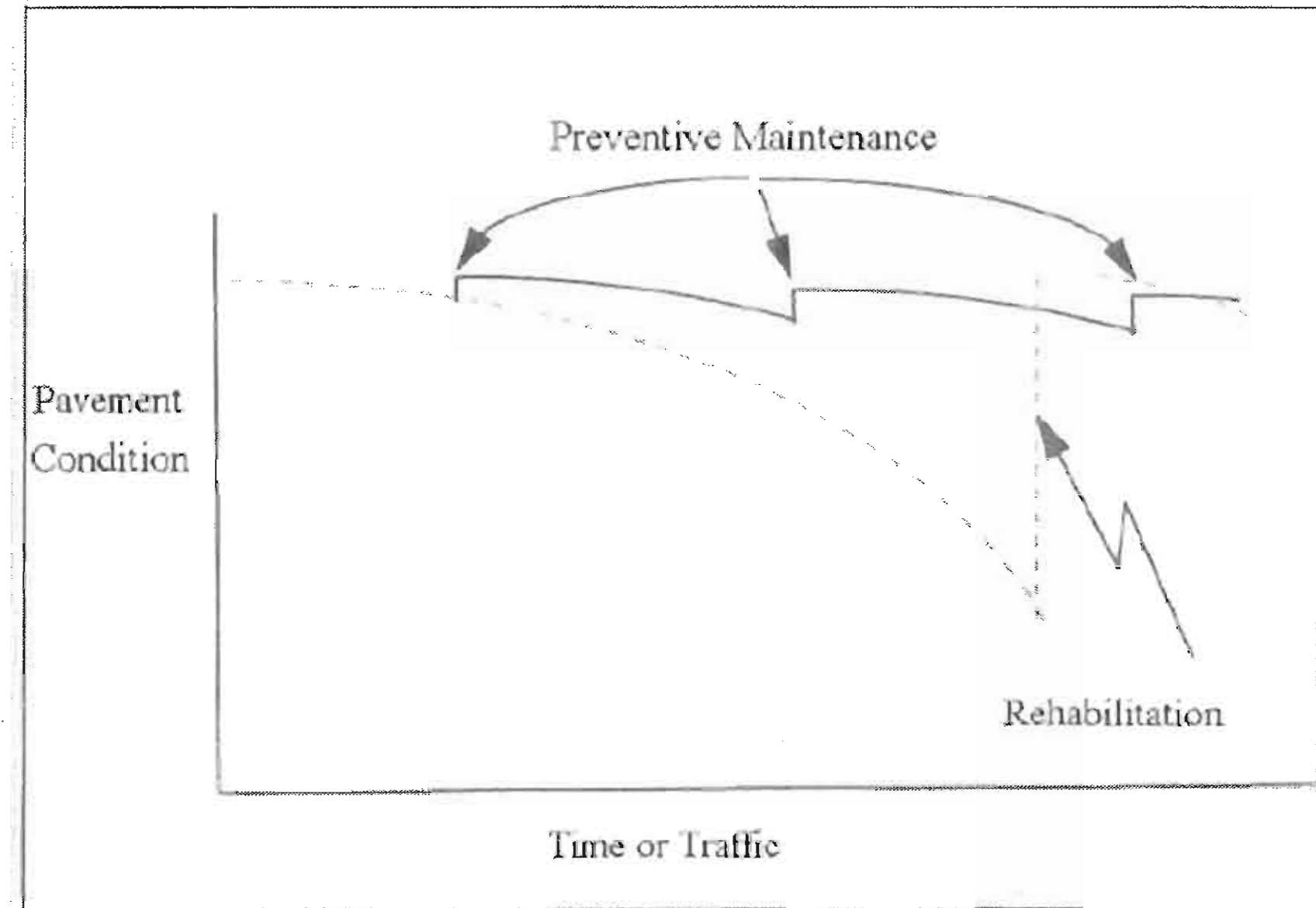
The rating system and distress terminology in this presentation are from the PASER manual series. Manuals are available for Asphalt, Concrete, Sealcoat, Gravel, Unimproved Roads and Brick and Block roads.

<http://tic.engr.wisc.edu/publications.html>

Pavement Rating Related to Maintenance or Repair Strategy



Preventive Maintenance extends useful life



Cracking

- Transverse Cracking
- Reflective Cracking
- Slippage Cracking
- Longitudinal Cracking
- Block Cracking
- Alligator Cracking

Top Down vs. Bottom Up

Researchers consider two types of cracking:

- Bottom up cracking begins at the bottom of the asphalt layer and propagates up. Caused by fatigue of the pavement due to repeated loading
- Top down cracking begins at the surface and propagates down. Caused by temperature changes, asphalt aging and possibly tire forces on the surface



11.10.2009





03/02/2010



12.16.2008

Fatigue Cracking



Why Crack Treatment?

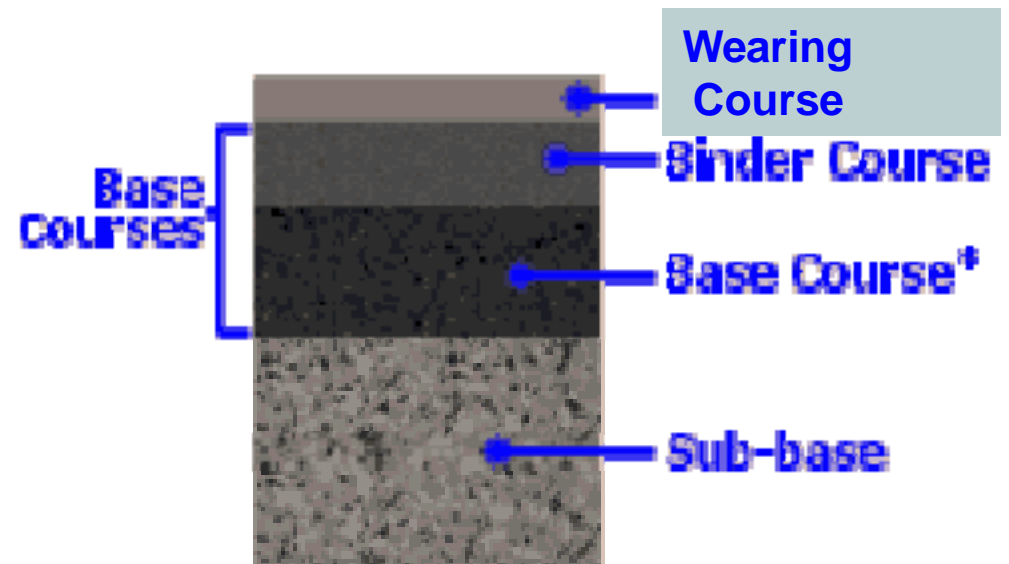
- Prevents water intrusion into subbase
- Prevents incompressible intrusion
- Improves ride quality smoothness
- Slows down pavement deterioration
- COST-EFFECTIVE

Why You Should Treat Cracks

- Protect your largest investment
- Pavement failure imminent
- Crack treatments are cost-effective, up to 9 years of (75% effectiveness) performance
- Extends pavement life

ORIGINAL PAVEMENT DESIGN

- 1.0" WEARING COURSE
- 1.5" BINDER COURSE
- 8" CRUSHED AGGREGATE
BASE COURSE (#4/#1)
- $\text{RATIO} = 2.16$



ORIGINAL CONSTRUCTION

- STORM SEWER, SANITARY SEWER, CURB, AND UTILITIES INSTALLED
- STONE BASE INSTALLED (#4/#1)
- BINDER PAVED (1.5")
- HOMES CONSTRUCTED
- WEARING COURSE INSTALLED
- ENTRANCE ROAD IS OFTEN THE MOST DAMAGED AND FAILS FIRST

ROADWAY REPAIR / REPLACEMENT METHODS

- Overlay Existing Pavement
- 1.5" Mill / Overlay
- Structural Mill / Overlay
- Repair Base Failures, Cold Mill Recycle, Overlay
- Reconstruction – Base Replacement, Geotextile Fabric as Required, Proof Roll Base, New Binder, New Wearing Course, Seal Joints

MAINTENANCE & REPAIR METHODS

- CRACK SEALING
- CHIP SEALS
- PETROTAC OR PETROMAT
- RALUMAC
- MICROSURFACING
- ULTRATHIN OVERLAYS

ISSUES OFTEN OBSERVED

- VARIABLE THICKNESS OF EXISTING PAVEMENT (NEED CORE TESTS)
- MINIMAL CROWN TO DRAIN WATER TO EDGE OF ROAD
- TRANSVERSE, BLOCK, AND EDGE CRACKING
- ALLIGATOR TYPE CRACKING (BASE AND SUB-BASE FAILURE)
- JOINT FAILURE
- BASE FAILURE
- BIRD BATHS, PUDDLES
- SURFACE DEGRADATION & WEATHERING
- SETTLEMENT OF PAVING DUE TO LOADING (WHEEL PATHS)
- CONDITION OF INLETS – CRACKED AND DEGRADED TOPS, SPALLING, LOOSE BRICK, SETTLEMENT AROUND INLET, BENT FRAMES, WRONG FRAMES
- CONDITION OF CURB – SPALLING, CRACKED, MIS-ALIGNMENT, DIVOTS,
- CONDITION OF SIDEWALK – CRACKED, SPALLING,

STEP 1 - EVALUATION

- EVALUATE ROADS, CURB, INLETS
- DETERMINE UTILITY OWNERSHIP
- VERIFY QUANTITIES (AREAS, LENGTHS)
- OBTAIN CORE TESTS OF EXISTING PAVEMENT TO DETERMINE THICKNESS AND TYPE OF BASE
- PREPARE RECOMMENDATIONS ON REPAIRS, REPLACEMENTS AND MAINTENANCE NEEDED
- ESTIMATE COSTS FOR REPAIRS, TIMING
- PRESENT REPORT TO ASSOCIATION MEMBERS
- MEET WITH BOARD RE BUDGET, TIMING, METHODS

STEP 2 - BIDDING

- COMPLETE ASSESSMENT
- PREPARE SPECIFICATIONS AND BID DOCUMENTS
- BIDDING TO REPUTABLE CONTRACTORS
- BID REVIEW AND RECOMMENDATION

STEP 3 - CONSTRUCTION

- CONTRACTOR NEGOTIATION
- REVIEW CONTRACT AGREEMENTS & BONDS
- PRE-CONSTRUCTION MEETING
- CONSTRUCTION INSPECTIONS
- LIAISON, COORDINATION, MANAGEMENT
- CHANGE ORDERS
- PAYMENT RELEASES (10% RETAINAGE)
- TROUBLESHOOTING (FIELD ISSUES)
- PUNCHLIST
- FINAL INSPECTIONS
- CLOSEOUT

NEGLECTED ASPHALT PAVEMENT



03/02/2010



03/02/2010



03/02/2010



03/02/2010



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03/02/2010



