December 4, 2013
WAPA Annual Conference

WAPA
WISCONSIN ASPHALT PAVEMENT ASSOCIATION

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What WAPA Does

The association represents members' interests on a wide range of issues related to asphalt design, construction, maintenance, specifications, costs, marketing, policy (local, state and federal), and the environment.

WAPA also works to educate professional engineers, government employees and the public about the latest advancements in asphalt technology and the advantages and benefits of asphalt pavements.

Excerpts from "Asphalt in Wisconsin" a WAPA Publication

Wisconsin's Asphalt Industry

- Wisconsin Asphalt Pavement Businesses (WAPA Members)
  - Asphalt Pavement Producers
    - 75 Facilities
    - ~3500 Employees
  - Aggregate Resource Provider (Pits & Quarries)
    - 275 Locations
    - Distributed Throughout the state (facility in every county)

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WI RIDES ON US ASPHALT.

Wisconsin Asphalt by the Numbers

In 2012, 11.2 million tons of asphalt were produced in Wisconsin

Of 116,000 total paved roadway miles in Wisconsin:

→ 75% have an asphalt surface

Wisconsin DOT's 2013 estimated asphalt use was 2.85 million tons

Of 13,200 total paved WisDOT roadway miles in Wisconsin:

→ 57% are paved with asphalt

→ 21% are overlaid with asphalt

Wisconsin roadway miles by network type

Network	Total Miles	Asphalt Miles, Including Overlays	Percent Asphalt
WisDOT	13,200	10,300	78%
County	20,800	19,600	94%
City	13,700	11,200	82%
Town	62,000	40,100	65%
Village	6,000	5,600	93%

Excerpt from "Asphalt in Wisconsin" a WAPA Publication

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Working Together

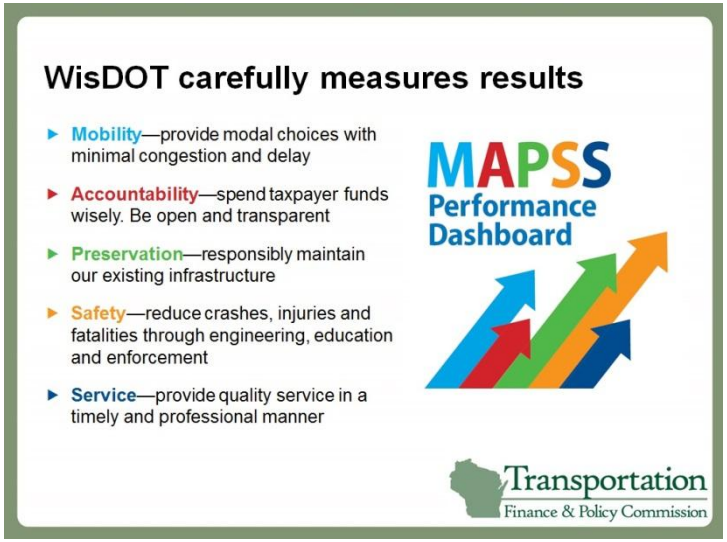
WAPA has strong working relationships with:

- FHWA
- WisDOT
- WCHA
- League of WI Municipalities
- WI Towns Association

We're Listening

WAPA is engaged in reviewing highway user feedback:

- FHWA
  - Highways for Life
- WisDOT
  - MAPSS
  - Customer Satisfaction Survey
- NAPA
  - Agency Customer Survey



What They Said *(FHWA's Highways for Life)*

- Improve safety during and after construction
- Reduce congestion caused by construction
- Improve the quality of the highway infrastructure

What They Said *(NAPA's Agency Customer Survey)*

- Quicker Speed of Construction
- Less Traffic Delay
- Lower Pavement/Vehicle Noise
- Lower Initial Cost
- Smoother Surface
- Lower Rehabilitation Cost

What They Said *(WisDOT Statewide Customer Satisfaction Survey)*

Survey Concern:

- Maintenance Operations
  - » "Keeping shoulders free of drop-offs"
  - » "Keeping highways smooth/free of potholes"
  - » "Ensuring striping is visible at night/wet weather"
- Design Features
  - » "Width of shoulders"
  - » "How well water drains during a storm"
  - » "Minimizing delays in construction work zones"
- Facility Functionality
  - » "Repairing/maintaining existing highways"
  - » "Adding turning/passing lanes"
  - » "Adding lanes to increase capacity"
  - » "Adding biking facilities"
  - » "Adding walking facilities"

Choosing Asphalt:

- Maintenance Operations
  - » Safety Edge
  - » Smoothest Pavement
  - » Best pavement for visual striping contrast
- Design Features
  - » New design standard of 5' widths
  - » SMA and "Gap-graded" mixes provide drainage and reduced "tire spray"
  - » Night paving and No cure times
- Facility Functionality
  - » Integrates well with Preventative Maintenance
  - » Easily tie existing pavement to new
  - » Smooth surfaces and use less pavement materials, also Porous Asphalt pavement opportunities

We're Responding

WAPA is working with our partners to make sure the asphalt pavement industry is doing everything we can to help:

- FHWA
  - "Every Day Counts"
- WisDOT
  - Asphalt Pavement Oversight Group *("Green Team")*
  - WAPA/DOT Tech Team
  - Wisconsin Highway Research Program (WHRP)

WAPA's Top Engineering Initiatives

1. Utilize **Higher Recycle Asphalt Mixes**
2. Incorporate **Thin Asphalt Overlays** and other asphalt maintenance treatments into a Preventative Maintenance program
3. Design pavements by the **Perpetual Pavement** design methodology
4. Implement **Base Course Compaction Specifications**

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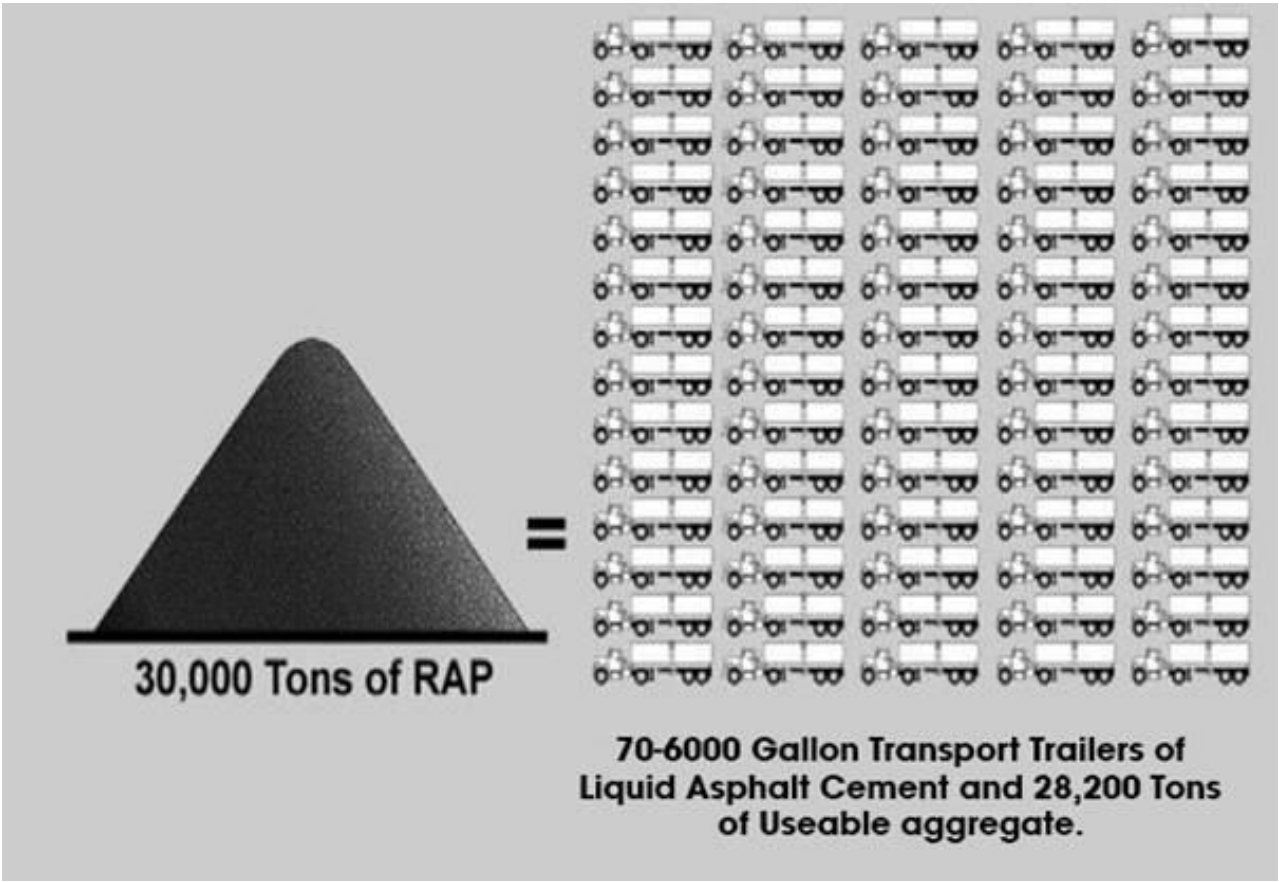
Higher Recycle Asphalt Mixes

- What's being Recycled into the Mix?
  - Recycled Asphalt Pavement (RAP)
    - Material Sources:
      - » Existing Stockpiles
      - » Projects with asphalt surfaces
  - Recycled Asphalt Shingles (RAS)
    - Material Sources:
      - » Asphalt shingle manufacturers (Manufactured)
      - » Asphalt shingle roofing (Tear-offs)
  - Ground Tire Rubber (GTR)
    - Material Source:
      - » Scrap Tires

Higher Recycle Asphalt Mixes



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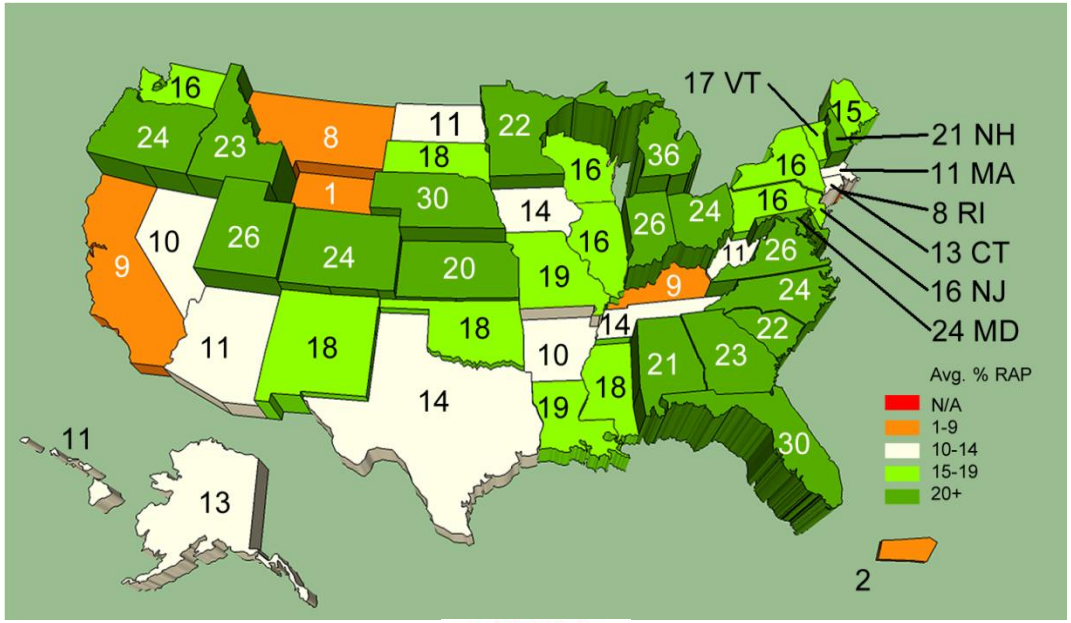
Higher Recycle Asphalt Mixes

- Wisconsin's Opportunity
  - Current Practice
    - WisDOT Projects
      - » Avg ~14%
    - NonDOT Projects
      - » Avg ~20%
    - Statewide
      - » Avg ~16%



NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION

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Higher Recycle Asphalt Mixes

- What it will take:
  - Contractors
    - Capital Investments
      - » Aggregate Processing
      - » Dust Control
      - » Quality Control Testing
        - » Binder
        - » Mix Performance

Higher Recycle Asphalt Mixes

What it will take:

- WisDOT
  - Specification Revisions
    - Mixture Performance Testing
      - » Nationally Recognized Possible Methods

Distress	Test	Reference
Permanent Deformation*	Asphalt Pavement Analyzer (APA)	AASHTO TP 63
	Hamburg Wheel Tracking Device	AASHTO T 324
	Flow Number (AMPT)	AASHTO TP 79
Moisture Sensitivity	Tensile Strength Ratio (TSR)	AASHTO T 283
	Hamburg Wheel Tracking Device (wet)	AASHTO T 324
Fatigue	Beam Fatigue, S-VECD fatigue, Overlay Tester	
Thermal Cracking**	Creep Compliance & Strength Using Indirect Tensile Test (IDT)	AASHTO T 322

Higher Recycle Asphalt Mixes

- What it will take:
  - Mixture Performance Testing
    - WAPA Recommends:
      - » PG Binder Grading
      - » Hamburg Wheel Tracking Device
      - » Field Tensile Strength Ratio (TSR)

WAPA's Top Engineering Initiatives

1. Utilize **High Recycle Asphalt Mixes**
2. Incorporate **Thin Asphalt Overlays** and other asphalt maintenance treatments into a Preventative Maintenance program
3. Design pavements by the **Perpetual Pavement** design methodology
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Thin Asphalt Overlays

- What is a Thin Asphalt Overlay?
  - A fine graded asphalt mixture ≤ 2” thick
  - Fine graded being 9.5mm or 4.75mm mixture
  - For pavements in structurally sound condition

Preventative Maintenance Practice

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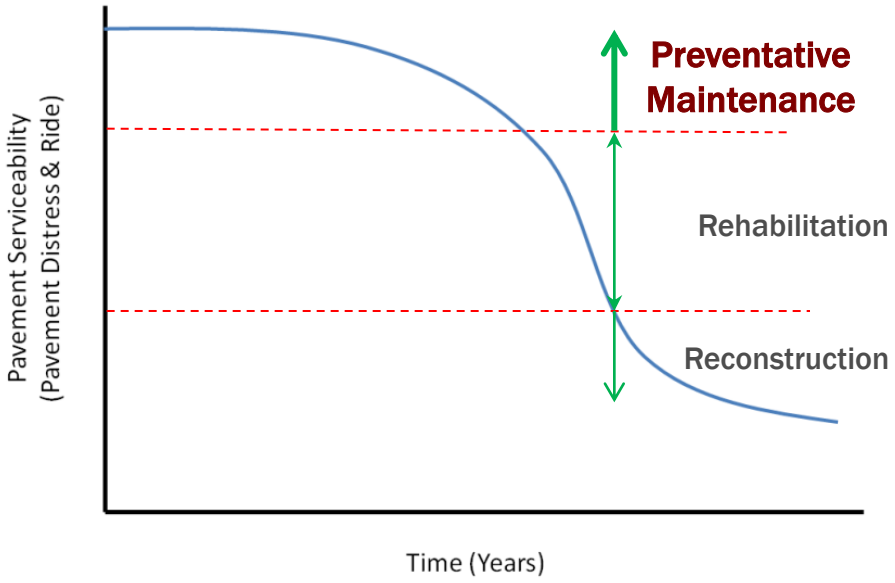
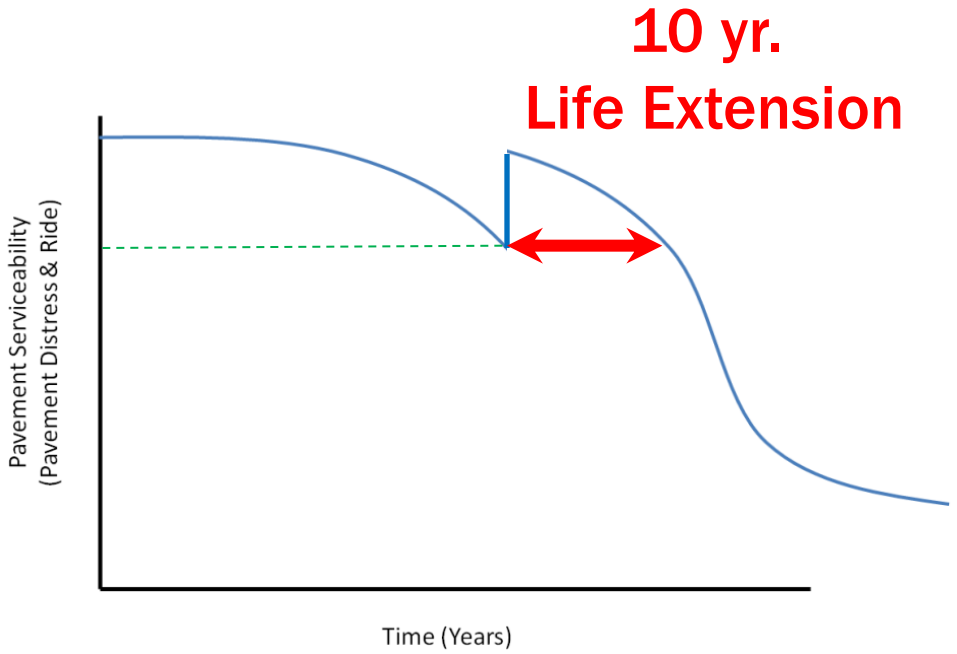
Thin Asphalt Overlays

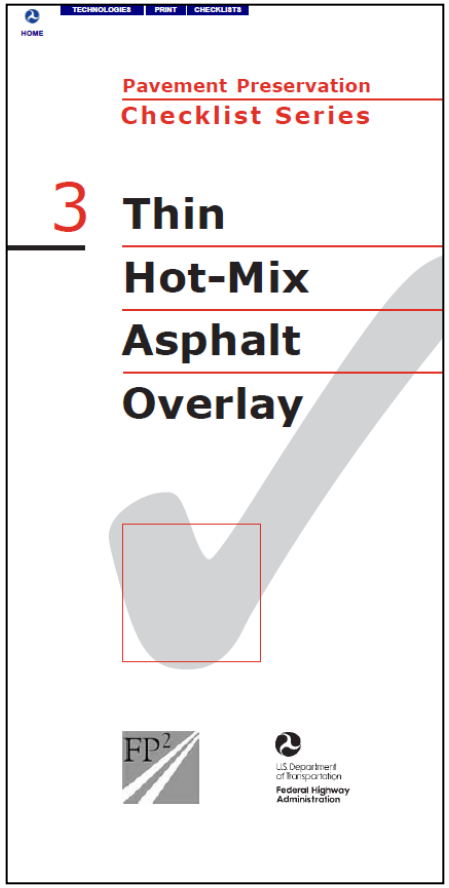
- Preventative Maintenance Philosophy





Thin Asphalt Overlays

- Wisconsin's Opportunity
  - **Incorporate Thin Asphalt Overlays and programmed Crack Filling as part of WisDOT's Preventative Maintenance treatments**
    - Already nationally accepted treatment
      - » FHWA
      - » FP^2 (Foundation for Pavement Preservation)



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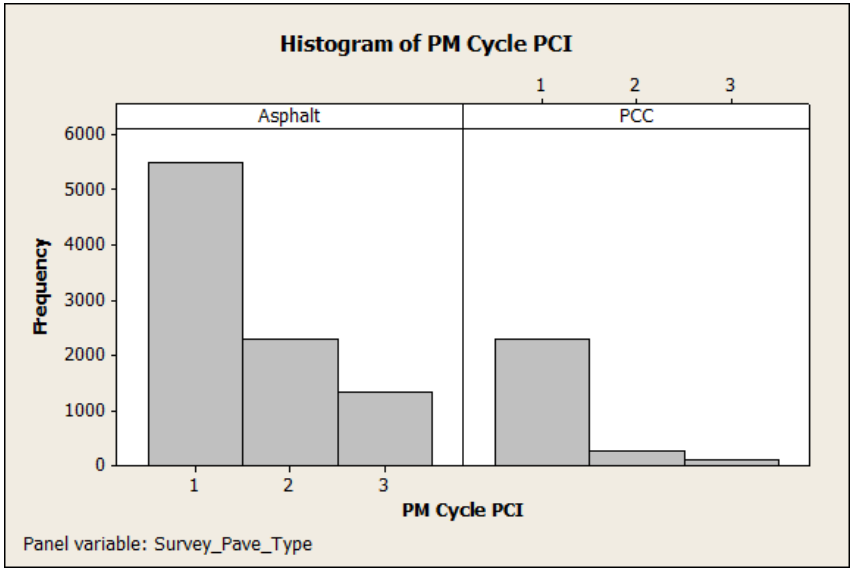
Thin Asphalt Overlays

- Wisconsin's Opportunity
  - Current System Review
    - Potential Candidates
      - » Existing Asphalt Surface
        - » ~5400 C/L miles
      - » Existing Concrete Surface
        - » ~2300 C/L miles
    - More potential applications than Preventative Maintenance Budget allows



Pavement Management Cycle (based on PCI)	
Cycle 1	Preventative
Cycle 2	Rehabilitation
Cycle 3	Reconstruction

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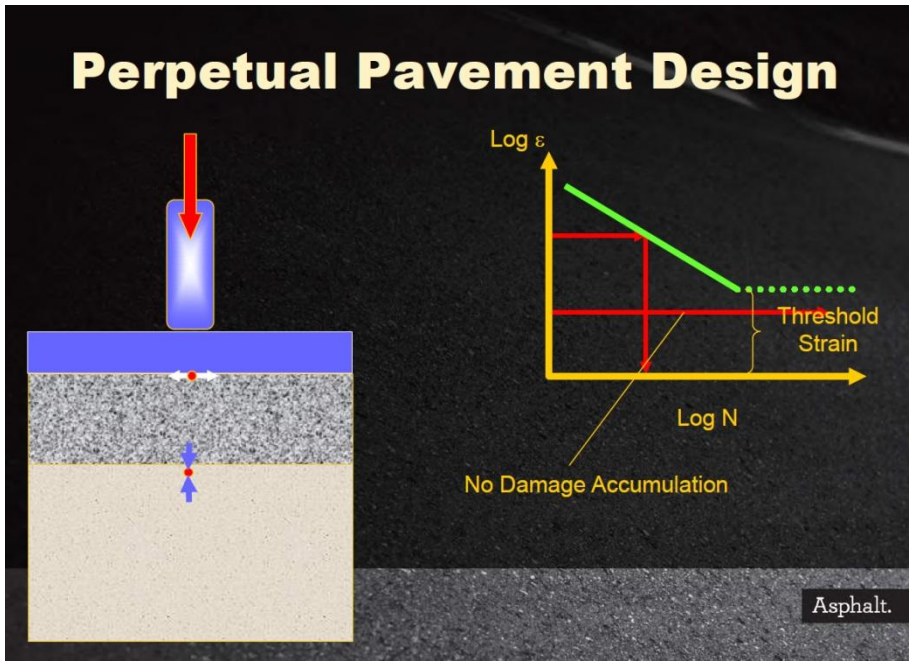
Perpetual Pavement

- Background
  - The concept
    - Limit load induced strain levels
      - » Unlimited load applications and added structural capacity to handle unplanned heavy vehicle loadings
    - Periodic surface overlay



Perpetual Pavement

- Background
  - WisDOT FDM Guidance developed in 2002
    - Deep Strength HMA Pavements
    - Perpetual HMA Pavements

FDM 14-15-1 Process *December 21, 2012*

1.1 Objective

The objective of this procedure is to describe the Pavement Type Selection process.

1.2 Pavement Type Selection Policy

It is the policy of the department to include both a standard HMA pavement and a concrete pavement option in the pavement type selection process.

On Majors and Corridors 2020 Backbone projects, it is the policy of the department to also include either a deep-strength or perpetual hot-mix asphalt pavement design alternative in the pavement type selection process. These alternatives may be considered on other projects at the designer's option.

FDM 14-10-5 Hot-Mix Asphalt (HMA) Pavement Design *December 22, 2011*

5.1 Basis of Design

5.1.1 Traditional HMA Pavements

Thickness design is based on the structural number (SN) concept of the AASHTO Interim Guide [1]. The majority of the thickness of the pavement structure comes from the paving platform (refer to FDM 14-5-1).

5.1.2 Deep-Strength or Perpetual HMA Pavements

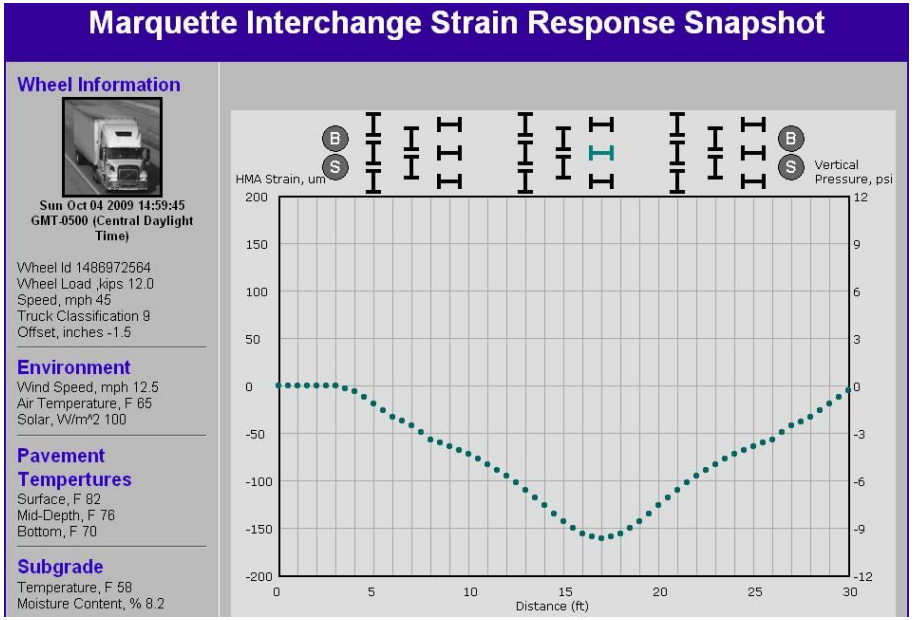
To determine if either a deep-strength or perpetual HMA pavement design is required during the pavement type selection process, refer to FDM 14-15-1. The design is based on 20-year cumulative design ESALs. When these ESALs are anticipated to be less than 10 million, a deep-strength design is used. If these ESALs are projected to be 10 million or greater, a perpetual design is used.

Deep-strength HMA pavements are similar in design and composition to WisDOT's traditional HMA pavements; thickness design is based on the structural number. For these pavements, the majority of the structural number comes from the HMA pavement layers. The maximum SN given to the paving platform (either base aggregate dense or base aggregate open graded) is equivalent to that for a 6-inch aggregate base.

Perpetual HMA pavements are designed based on a maximum strain value at the bottom of the HMA pavement. Thickness design is determined using a mechanistic design procedure. These designs will be done by, or in conjunction with, WisDOT's central office (refer to Originator, FDM 14-1-1).

Perpetual Pavement

- Background
  - WisDOT Projects
    - USH 41 SB (Abrams)
    - STH 50
    - Kenosha Weigh Station
    - Rhinelander By-Pass
    - Marquette Interchange
  - Marquette Interchange
    - Research Project
      - » Fully instrumented



The concept works!!!

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Perpetual Pavement

- Wisconsin's Opportunity

Design Asphalt Pavements for long lives

  - Perpetual Pavement
    - Preventative Maintenance
      - » Thin Overlays

What's in an inch?
Asphalt Thickness VS. Fatigue Life

Thickness	Micro strain	Reps to failure
2	-652	30,234
3	-495	71,537
4	-383	160,693
5	-302	340,507
6	-242	682,133

Asphalt.

"Building a Perpetual Pavement one inch at a time"

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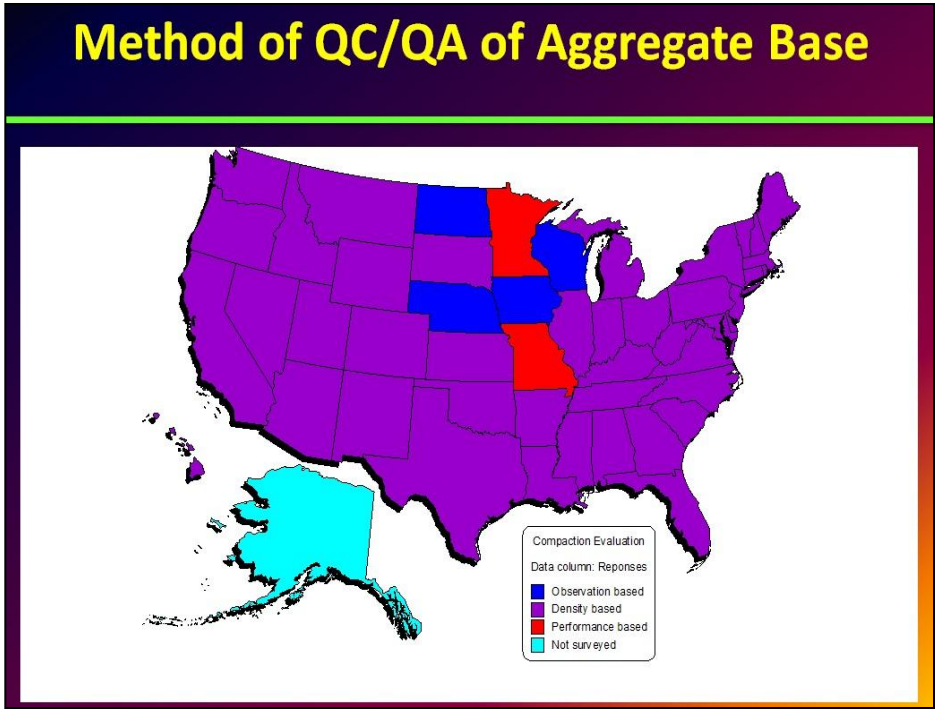
Base Course Compaction Spec

- Background
  - Long standing concern for WAPA (> 20 yrs.)
  - Asphalt pavements are Flexible Pavement Systems
    - Pavement structural design utilizes the supportive strength of underlying granular layers

Base Course Compaction Spec

- Background
  - Part of Base Course QMP specifications for most all other DOTs
  - Part of WisDOT's Aeronautics specifications

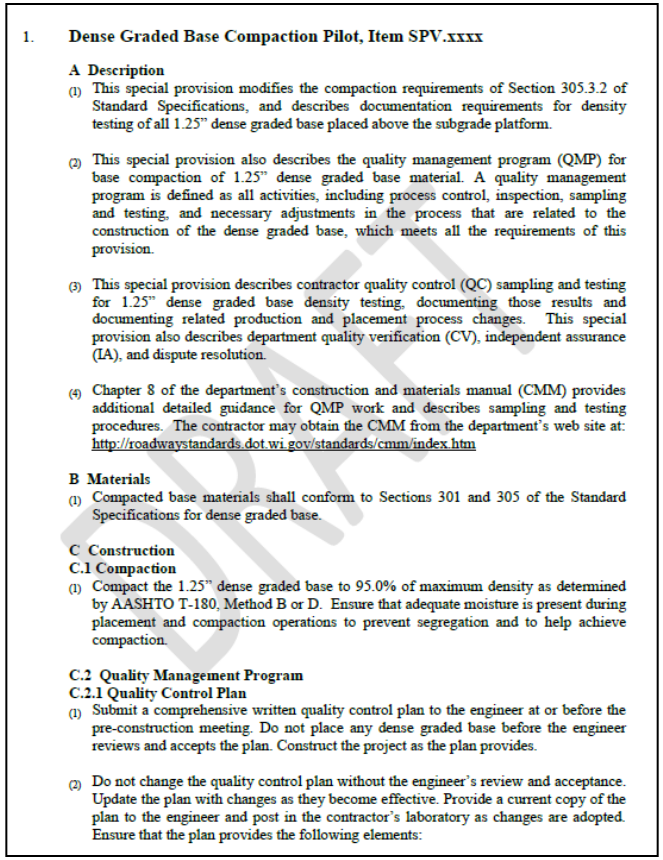


WHRP Study: 0092-11-02

Base Compaction Specification Feasibility Analysis

Base Course Compaction Spec

- Wisconsin's Opportunity
  - Asphalt Pavement Oversight Group
    - Base Compaction initiative
      - » Draft Specification developed
        - » AASHTO T-180 method
        - » 95% of maximum density
  - **Adopt and Implement the Specification**



1. **Dense Graded Base Compaction Pilot, Item SPV.xxxx**

A Description

(1) This special provision modifies the compaction requirements of Section 305.3.2 of Standard Specifications, and describes documentation requirements for density testing of all 1.25" dense graded base placed above the subgrade platform.

(2) This special provision also describes the quality management program (QMP) for base compaction of 1.25" dense graded base material. A quality management program is defined as all activities, including process control, inspection, sampling and testing, and necessary adjustments in the process that are related to the construction of the dense graded base, which meets all the requirements of this provision.

(3) This special provision describes contractor quality control (QC) sampling and testing for 1.25" dense graded base density testing, documenting those results and documenting related production and placement process changes. This special provision also describes department quality verification (CV), independent assurance (IA), and dispute resolution.

(4) Chapter 8 of the department's construction and materials manual (CMM) provides additional detailed guidance for QMP work and describes sampling and testing procedures. The contractor may obtain the CMM from the department's web site at: http://roadwaystandards.dot.wi.gov/standards/cmm/index.htm

B Materials

(1) Compacted base materials shall conform to Sections 301 and 305 of the Standard Specifications for dense graded base.

C Construction

C.1 Compaction

(1) Compact the 1.25" dense graded base to 95.0% of maximum density as determined by AASHTO T-180, Method B or D. Ensure that adequate moisture is present during placement and compaction operations to prevent segregation and to help achieve compaction.

C.2 Quality Management Program

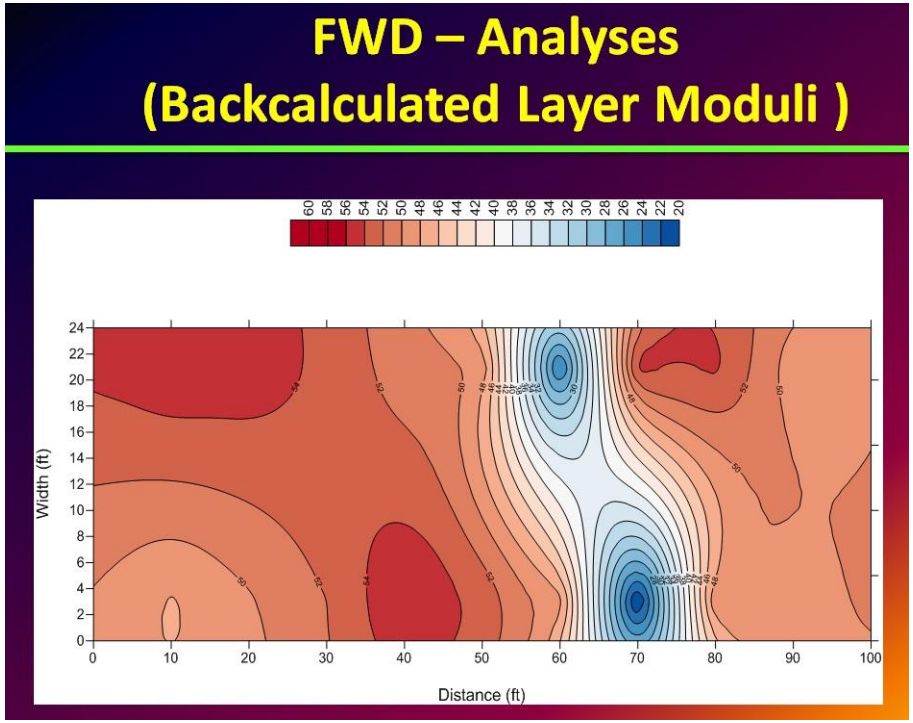
C.2.1 Quality Control Plan

(1) Submit a comprehensive written quality control plan to the engineer at or before the pre-construction meeting. Do not place any dense graded base before the engineer reviews and accepts the plan. Construct the project as the plan provides.

(2) Do not change the quality control plan without the engineer's review and acceptance. Update the plan with changes as they become effective. Provide a current copy of the plan to the engineer and post in the contractor's laboratory as changes are adopted. Ensure that the plan provides the following elements:

Base Course Compaction Spec

- The Savings
  - Elimination of non-uniform base compaction
  - Enhanced asphalt pavement performance
    - **$ Priceless $**



Additional Benefits of Asphalt

- **Sustainable**
  - Recycling
  - Lower Carbon Footprint than other paving materials
  - Perpetual Pavements
- **Superior Ride (smoothness)**
- **Speed of Construction**
- **Flexible Construction Staging**
- **Less User Delay**
- **Low Noise (tire / pavement generation)**

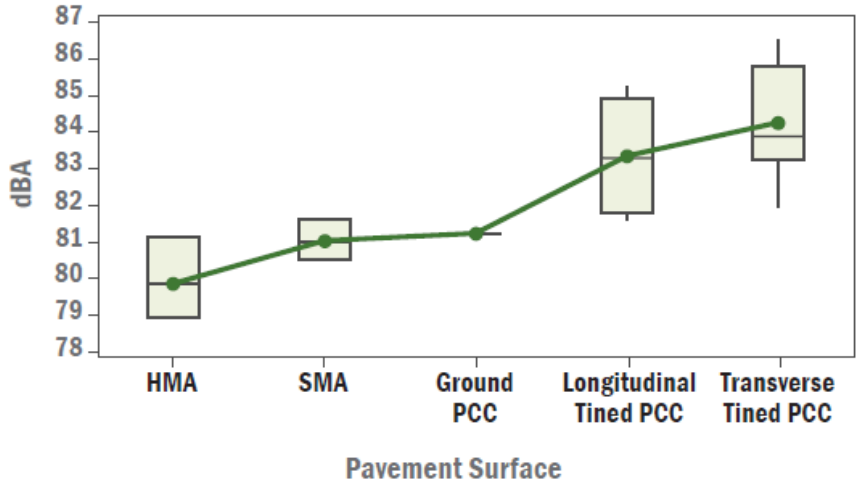


Figure 3 Exterior noise test results for Wisconsin pavement surfaces. (Source: "Noise and Texture on PCC Pavements: Results of a Multi-State Study," Marquette University, page 45)

The Value of Asphalt

"Doing more with less"

- Save dollars in initial construction costs
- Save dollars in LCCA costs
- Improve and maintain more lane miles
- Reduce construction work zone delays and queue lengths
- Maintain the driving public's satisfaction of pavement performance
- Achieve high Sustainable Pavement goals

We've Done It Before

Wisconsin Lead in National Innovation:

- Asphalt QMP Specifications
- Asphalt Pavement Warranty
- Pavement Smoothness
- Rubblization

We Can Do It NOW

Engineering Technologies primed for Success

- Perpetual Pavement Design
- Concrete Pavement Rubblization
- Warm Mix Asphalt Technology

The Asphalt Advantage

Thank You!

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AMERICA RIDES ON US Asphalt.

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