ASPHALT SPECIFICATIONS FOR LOCAL PAVING PROJECTS

Purdue Road School
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PRESENTATION OVERVIEW

- The “Need”
- APAI Local Guide Spec
  - INDOT 2016 Specification Changes
- Construction Best Practices
- PaveXpress Software
- Wrap-up
Design and Specification Issues

- Improper mixture types
- Varying RAP/RAS contents
- Not enforcing construction requirements
- Inaccurate asphalt layer thicknesses

The “Need”

Quality Product at Lowest Cost
What is it?

- Asphalt guide specification for LPA and commercial projects
- Revised in February 2018
- Reference to 2018 INDOT Standard Specifications
- Incorporates NAPA guidelines
- Modified by agency or designer
- Establishes standard of quality
How to use?

- Certifications required
- Mix design for approval and Type D cert for acceptance
- Guidelines for Design
  - Mixture types
  - Volumetric mix design
  - Recycled content
- Guidelines for Construction
  - Surface preparation
  - Temperature requirements
  - Compaction

**2018 RECOMMENDED GUIDE SPECIFICATION FOR ASPHALT PAVEMENTS FOR LOCAL GOVERNMENTS AND NON-GOVERNMENTAL APPLICATIONS**

This recommended specification incorporates the latest asphalt pavement technologies. It attempts to present the best practices, procedures, and processes but is not intended to replace sound engineering judgment and experience.

The Indiana Department of Transportation (INDOT) Standard Specifications, Section 403 – Hot Mix Asphalt (HMA), Pavement dated 2010, shall apply with the modifications as noted herein. Section numbers refer to INDOT Standard Specifications.

**HMA-01** Description

This work shall consist of one or more courses of Hot Mix Asphalt (HMA) base, intermediate, surface mixtures or other miscellaneous HMA application.

**HMA-02** Quality Control

HMA shall be supplied from a Certified HMA Plant in accordance with Indiana Test Method (ITM) 582 – Certified Volumetric Hot Mix Asphalt Producer Program. HMA shall be transported and placed according to a Quality Control Plan (QCP) prepared by the Contractor in accordance with ITM 499 – Contractor Quality Control Plan for HMA Pavement. The QCP shall be submitted to the Contracting Agency five calendar days prior to commencing HMA paving operations.

**HMA-03** Materials

PC binder for HMA shall be supplied by an INDOT approved supplier in accordance with ITM 502 – Asphalt Supplier Certification (ASC) Program and shall meet the requirements of Section 902.01.

Aggregate materials for HMA mixtures shall be supplied by an INDOT Certified Aggregate Producer (CAPP). The aggregate shall meet the requirements of Section 904.

The HMA fine aggregate materials shall meet the requirements of Section 904.02(b), except the fine aggregate angularity table shall be modified as follows:

<table>
<thead>
<tr>
<th>FINE AGGREGATE ANGULARITY</th>
<th>Depth from Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>0 - 4 inches</td>
</tr>
<tr>
<td>A</td>
<td>40</td>
</tr>
<tr>
<td>B</td>
<td>40</td>
</tr>
<tr>
<td>C</td>
<td>45</td>
</tr>
</tbody>
</table>

*Note: For 4.75 mm materials, the fine aggregate angularity shall be 40 for Type A and 35 for Type B and C.*
Mixture Types

- Type A, B, or C depending on traffic count
- INDOT eliminated Type A (Cat. 1) and Cat. 5 mixes
- Correlates ESALs to AADT and AADTT

<table>
<thead>
<tr>
<th>Mixture Type</th>
<th>Type A*</th>
<th>Type B*</th>
<th>Type C*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design ESAL</td>
<td>&lt;300,000</td>
<td>300,000 to &lt;3,000,000</td>
<td>≥3,000,000</td>
</tr>
<tr>
<td>AADT (Average Annual Daily Traffic)***</td>
<td>&lt;4,000</td>
<td>4,000 - 15,000</td>
<td>15,000 - 30,000</td>
</tr>
<tr>
<td>AADTT (Average Annual Daily Truck Traffic)***</td>
<td>&lt;50</td>
<td>50 - 1700</td>
<td>&gt;1700</td>
</tr>
<tr>
<td>Commercial &amp; Residential Application***</td>
<td>Passenger car parking with &lt;500 stalls and &lt;20 heavy trucks** per day, residential driveways</td>
<td>Parking Lots with 20-300 heavy trucks** per day</td>
<td>Heavy commercial parking lots with 150-300 heavy trucks** per day</td>
</tr>
</tbody>
</table>
Volumetric Mix Design

- Design requirements align with all current INDOT specifications
- Specs for Type A mix added since removed from INDOT spec book
- Recommended PG binder grade for each mixture type and layer
Recycled Content

- Recommendation to specify maximum binder replacement at 25% or 40% (excludes Type C surface)
  - INDOT October 2016 spec changes
  - NAPA guidelines
  - Neighboring states’ specs
  - “Proper engineering judgement on project-by-project basis”

- PG binder grade jump when above 25% binder replacement
CONSTRUCTION BEST PRACTICES
**Surface Preparation**

**Subgrade and Subbase**

- Must support pavement and load transferred from traffic
- Be graded to properly drain and provide basis for final longitudinal and cross slope of pavement
- Uniformly compacted to required density
- May be stabilized with cement to increase strength
- Proof roll to check stability
**Surface Preparation**

**Milling**
- Mill to sound surface
- Improper mill depth will cause delamination
- Patch and crack repair where necessary
- Clean surface thoroughly after milling and prior to applying tack coat, no dust or debris
- Fine milling cutting drum for 4.75 mm surface
**Surface Preparation**

**Tack Coat**
- Promote bonding to the subsequent pavement layer
- Prevent slippage between asphalt layers
- Moisture barrier
- Uniformly applied without striping at 95% coverage
- “Break” before paving
TEMPERATURE REQUIREMENTS

Plant
- Plant discharge maximum temperatures based on PG binder grade
- Warm mix asphalt allowed

Field
- Weather limitations for ambient and surface temperatures based on depth of asphalt course
- Asphalt may be placed at lower temperatures if density controlled or if approval given by Owner or Engineer
**Compaction**

How important is density?

- Impacts service life directly
- Prevents further consolidation
- Provides shear strength and resistance to rutting
- Improves resistance to fatigue and thermal cracking
- Ensures impermeability
- Prevents excessive oxidation of binder
Compaction

Keys to Maximizing Density

- Establish rolling pattern and do not deviate from it
- Design at optimum lift thicknesses
- Watch temperatures when compacting – initial breakdown when HOT
- Proper roller operation techniques
AASHTO has been developing Pavement ME (MEPDG) for high volume roads, but a gap has developed for local roads and lower volume roads.
Why use software for pavement design?

- AASHTO 1993, 1998, and Pavement ME determine the pavement thickness for which the mean value of traffic can be carried given specific inputs.
- Over-conservatism $\rightarrow$ thicker pavements $\rightarrow$ higher cost
- Reliability factor built into software decreases the risk of premature deterioration below acceptable serviceability
- Use materials testing and traffic counts when possible
- Avoid “one size fits all” designs
What is PaveXpress?
An online tool to create simplified pavement designs using key engineering inputs, based on the AASHTO 1993 and 1998 pavement design process.

- Accessible via the web and mobile devices
- Free — no cost to use
- Based on AASHTO pavement design equations
- User-friendly
- Share, save, and print project designs
- Interactive help and resource links
### Main Street

<table>
<thead>
<tr>
<th>1</th>
<th>Project Information</th>
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<tbody>
<tr>
<td></td>
<td>Location, Roadway Classification and Pavilion Type</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Design Parameters</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Specific Design Variables</td>
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</table>

<table>
<thead>
<tr>
<th>3</th>
<th>Traffic Data</th>
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<tbody>
<tr>
<td></td>
<td>Traffic and Loading Data</td>
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<table>
<thead>
<tr>
<th>4</th>
<th>Pavement Structure</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pavement Layer(s) Information</td>
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<table>
<thead>
<tr>
<th>5</th>
<th>Pavement Sub-Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base, Sub-Base and Subgrade</td>
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</tbody>
</table>

### Calculated Design

<table>
<thead>
<tr>
<th>Design Parameters</th>
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<tbody>
<tr>
<td>Design Period</td>
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<table>
<thead>
<tr>
<th>Reliability</th>
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<tbody>
<tr>
<td>Reliability Level (R)</td>
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<tr>
<td>Combined Standard Error ($S_o$)</td>
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<table>
<thead>
<tr>
<th>Serviceability</th>
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<tbody>
<tr>
<td>Initial Serviceability Index ($p_i$)</td>
</tr>
<tr>
<td>Terminal Serviceability Index ($p_t$)</td>
</tr>
<tr>
<td>Change in Serviceability ($\Delta p$)</td>
</tr>
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</table>
PaveXpress
A Simplified Pavement Design Tool

www.PaveXpressDesign.com

APAI workshop for designers coming summer/fall 2018!
WRAP-UP