Asphalt Specifications for Local Paving Projects

Purdue Road School
March 7, 2018

Kirsten Pauley, PE
Technical Director, APAI
kpauley@asphaltindiana.org

Presentation Overview

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

The "Need"

Design and Specification Issues

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

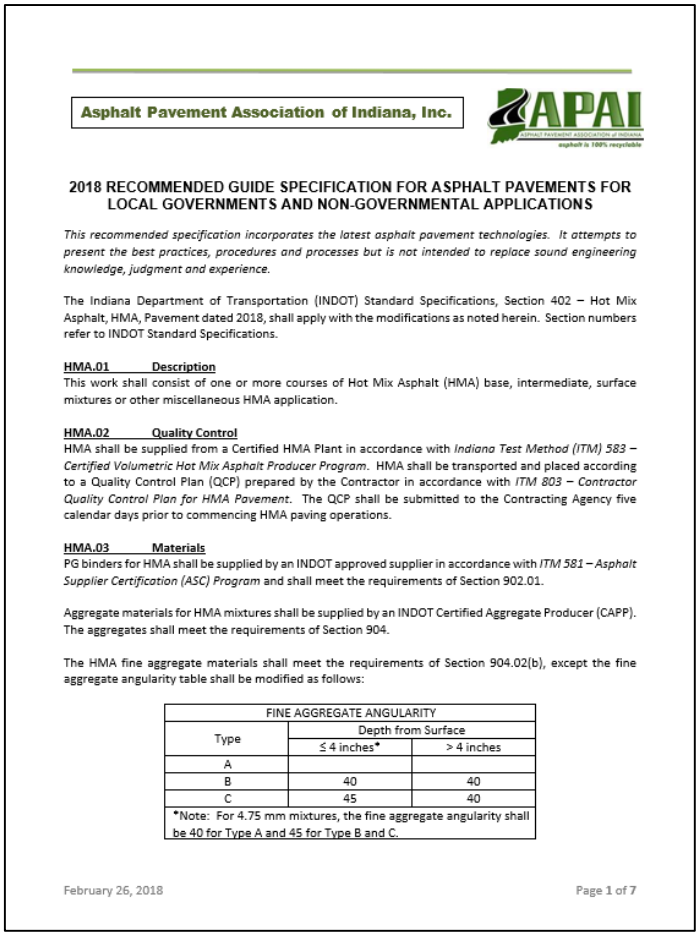
Quality Product at Lowest Cost

APAI Local Guide Spec

APAI Local Guide Spec

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



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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 knowledge, judgment and experience.

The Indiana Department of Transportation (INDOT) Standard Specifications, Section 402 – Hot Mix Asphalt, HMA, Pavement dated 2018, 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) 583 – 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 803 – 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
PG binders for HMA shall be supplied by an INDOT approved supplier in accordance with *ITM 581 – 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 aggregates 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:

FINE AGGREGATE ANGULARITY		
Type	Depth from Surface	
	≤ 4 inches*	> 4 inches
A		
B	40	40
C	45	40
*Note: For 4.75 mm mixtures, the fine aggregate angularity shall be 40 for Type A and 45 for Type B and C.		

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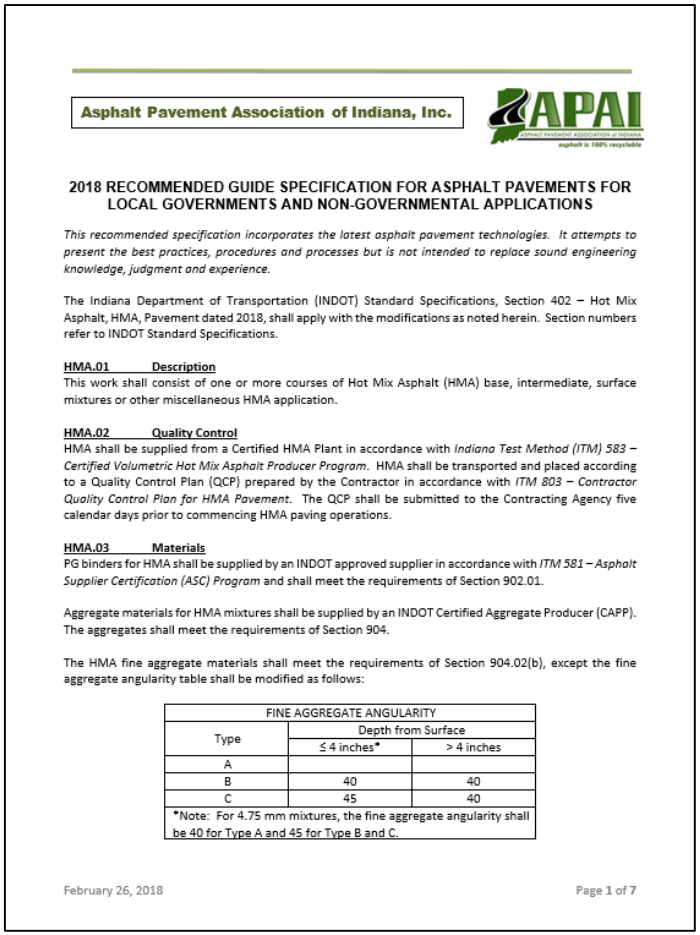
APAI Local Guide Spec

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



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Design

Mixture Types

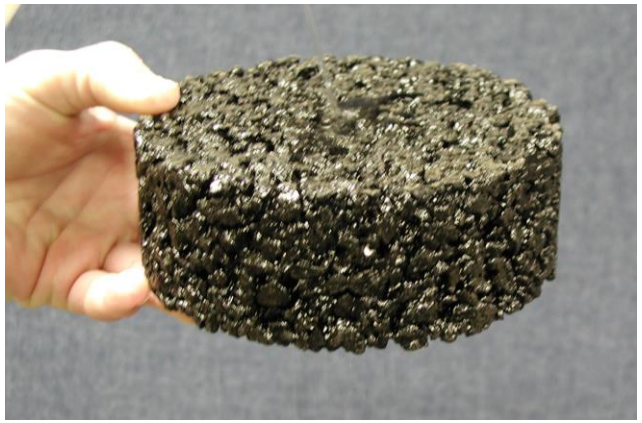
- Type A, B, or C depending on traffic count
- INDOT eliminated Type A (Cat. 1) and Cat. 5 mixes
- Correlates ESALs to AADT and AADTT

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

Design

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



DESIGN

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

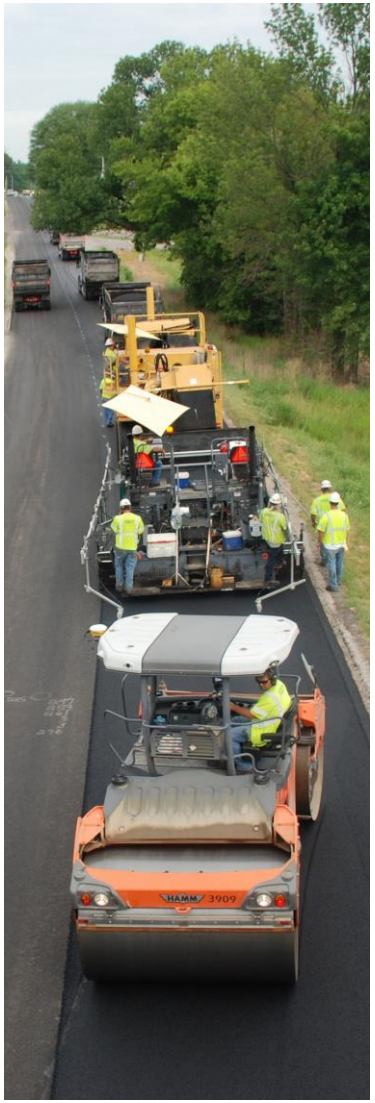
Field

- 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

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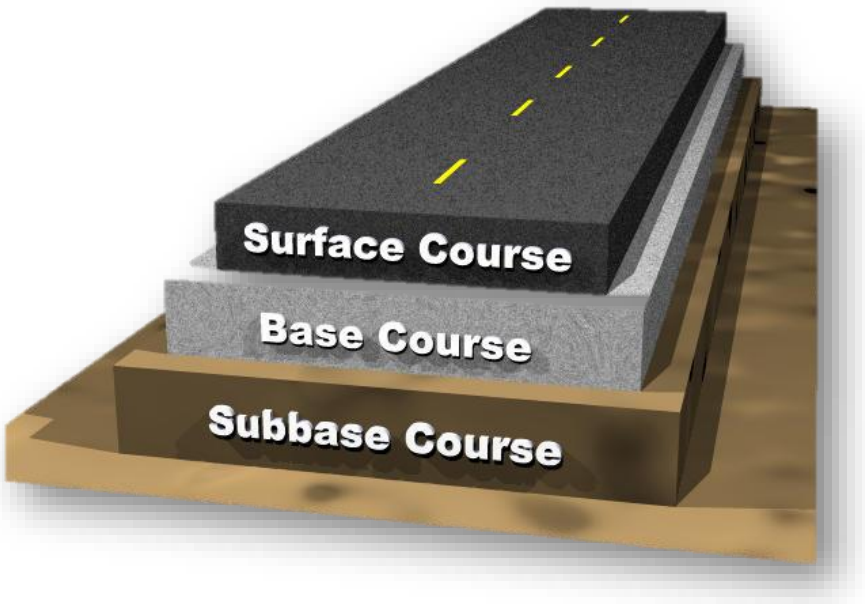

AASHTO has been developing Pavement ME (MEPDG) for high volume roads, but a gap has developed for local roads and lower volume roads.

PAVEXPRESS

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 ⇨ thicker pavements ⇨ 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

PAVEXPRESS

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

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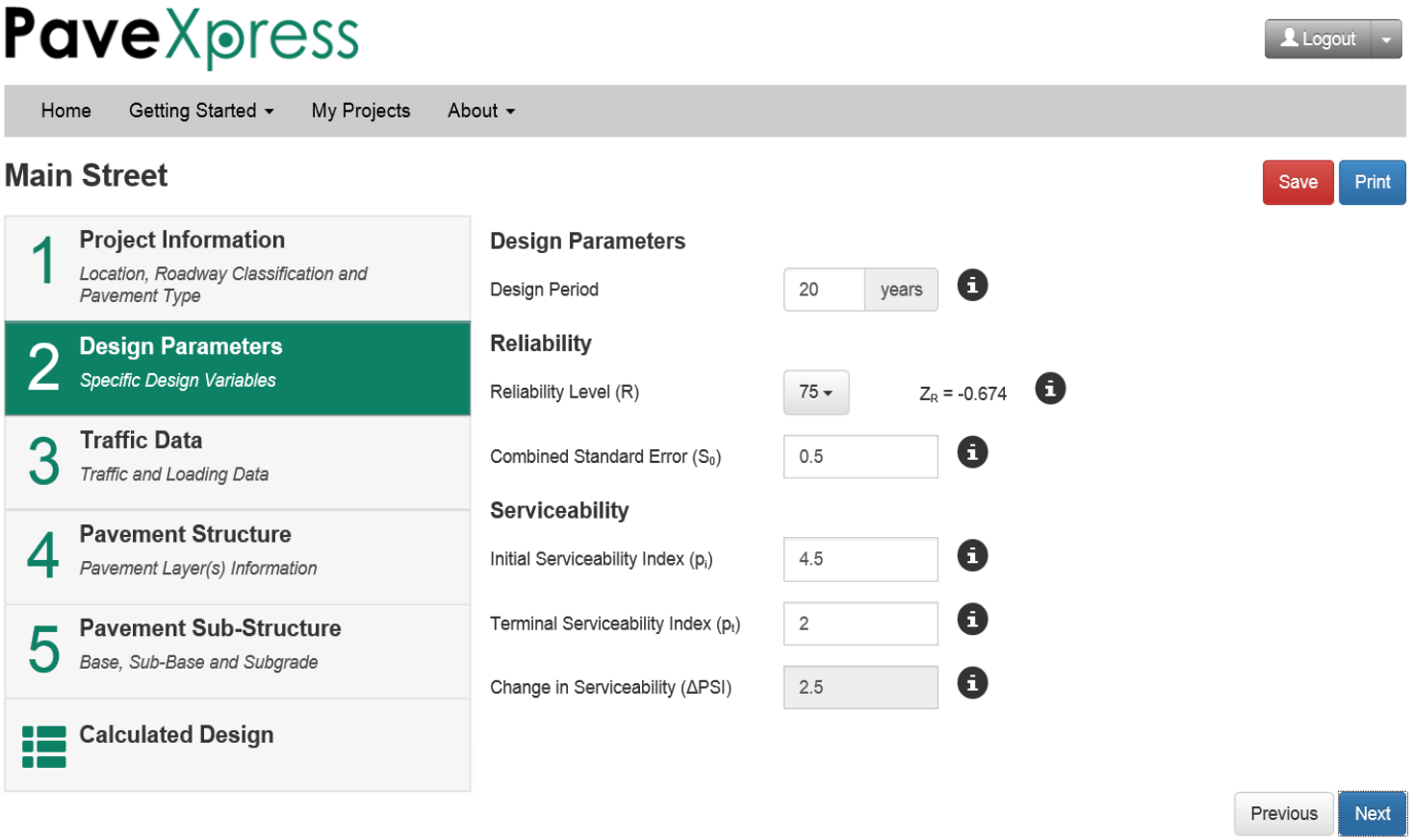
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1 Project Information
Location, Roadway Classification and Pavement Type
2 Design Parameters
Specific Design Variables
3 Traffic Data
Traffic and Loading Data
4 Pavement Structure
Pavement Layer(s) Information
5 Pavement Sub-Structure
Base, Sub-Base and Subgrade
Calculated Design
Design Parameters
Design Period
20
years
Reliability
Reliability Level (R)
75
Z_R = -0.674
Combined Standard Error (S_0)
0.5
Serviceability
Initial Serviceability Index (p_i)
4.5
Terminal Serviceability Index (p_t)
2
Change in Serviceability (ΔPSI)
2.5
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Next
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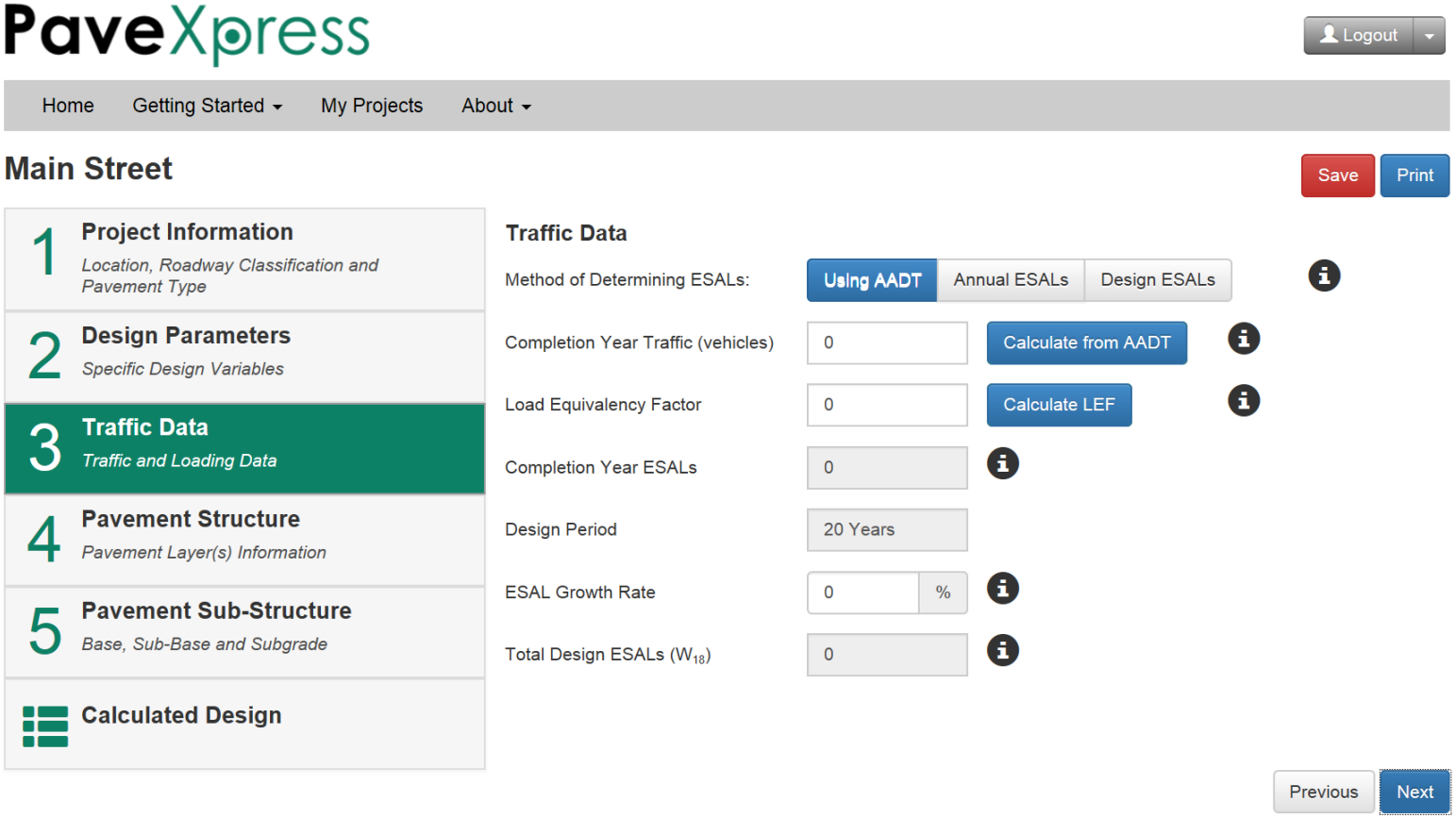
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4 Pavement Structure
Pavement Layer(s) Information
5 Pavement Sub-Structure
Base, Sub-Base and Subgrade
Calculated Design
Traffic Data
Method of Determining ESALs:
Using AADT
Annual ESALs
Design ESALs
Completion Year Traffic (vehicles)
0
Calculate from AADT
Load Equivalency Factor
0
Calculate LEF
Completion Year ESALs
0
Design Period
20 Years
ESAL Growth Rate
0
%
Total Design ESALs (W18)
0
Previous
Next

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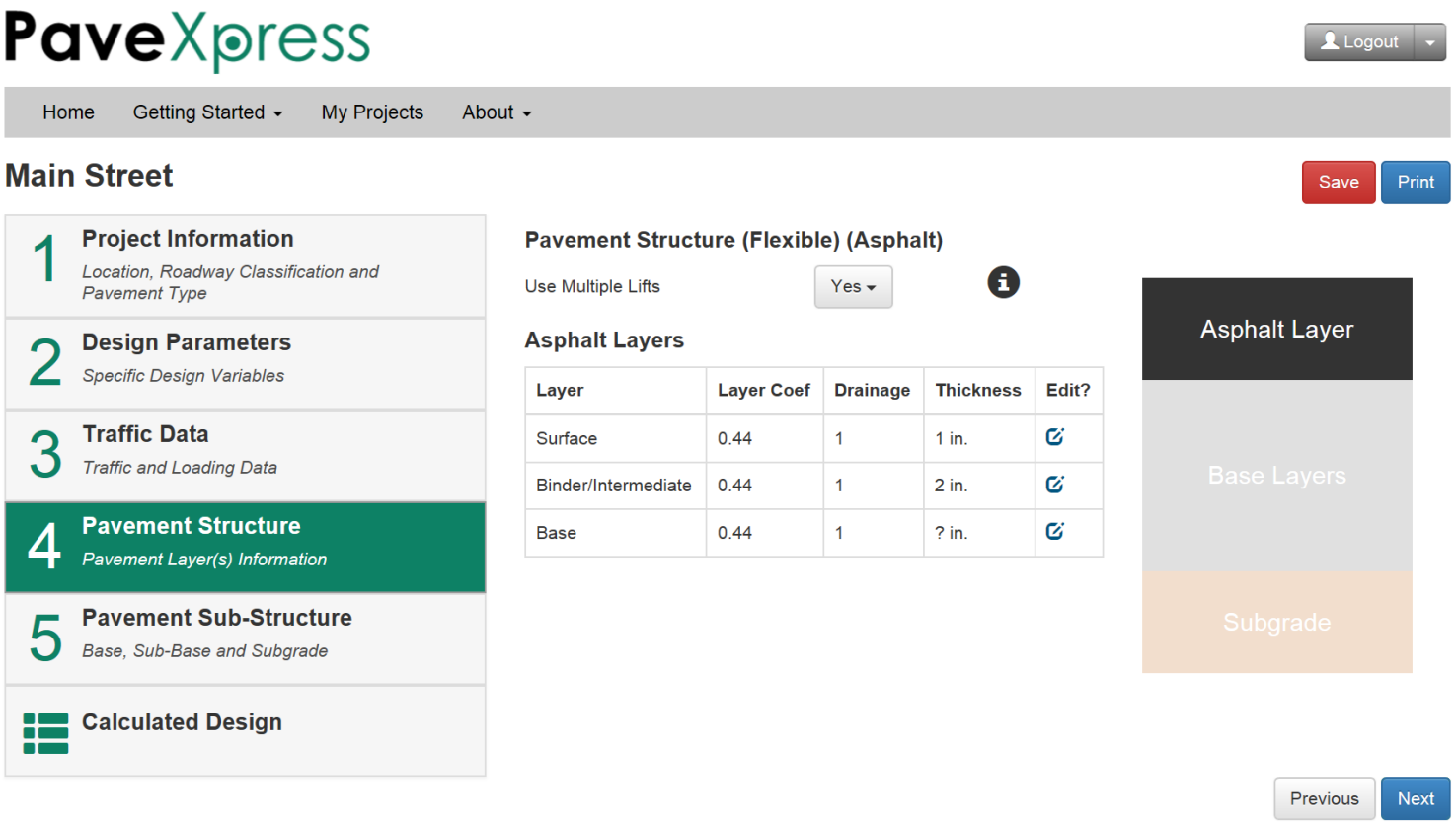
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5 Pavement Sub-Structure
Base, Sub-Base and Subgrade
Calculated Design
Pavement Structure (Flexible) (Asphalt)
Use Multiple Lifts
Yes
Asphalt Layers
Layer | Layer Coef | Drainage | Thickness | Edit?
Surface | 0.44 | 1 | 1 in.
Binder/Intermediate | 0.44 | 1 | 2 in.
Base | 0.44 | 1 | ? in.
Asphalt Layer
Base Layers
Subgrade
Previous
Next
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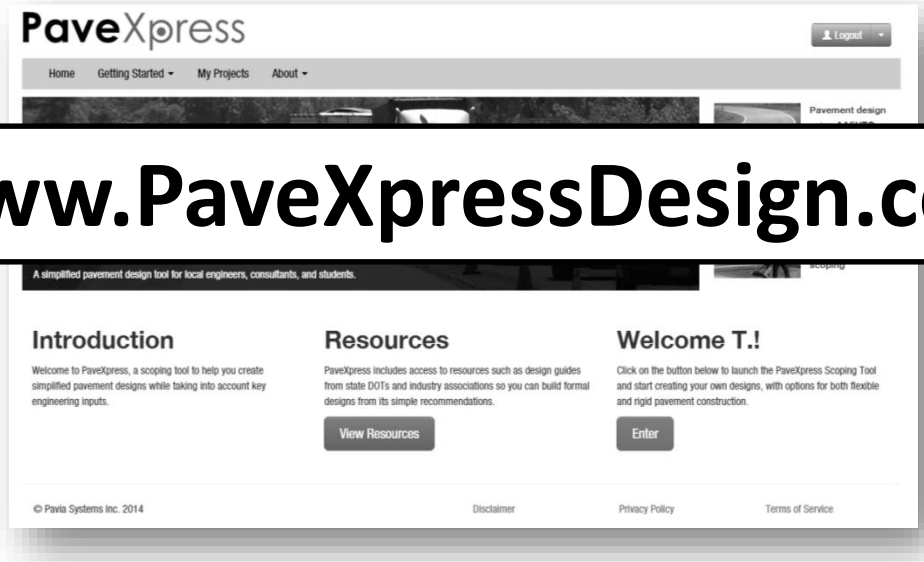
PAVEXPRESS

PaveXpress

A Simplified Pavement Design Tool



www.PaveXpressDesign.com

APAI workshop for designers coming summer/fall 2018!

Wrap-up

Follow APAI on Social Media

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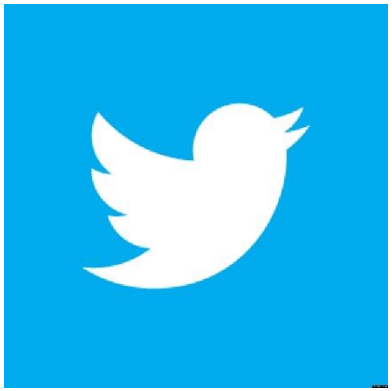

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