PaveXpress

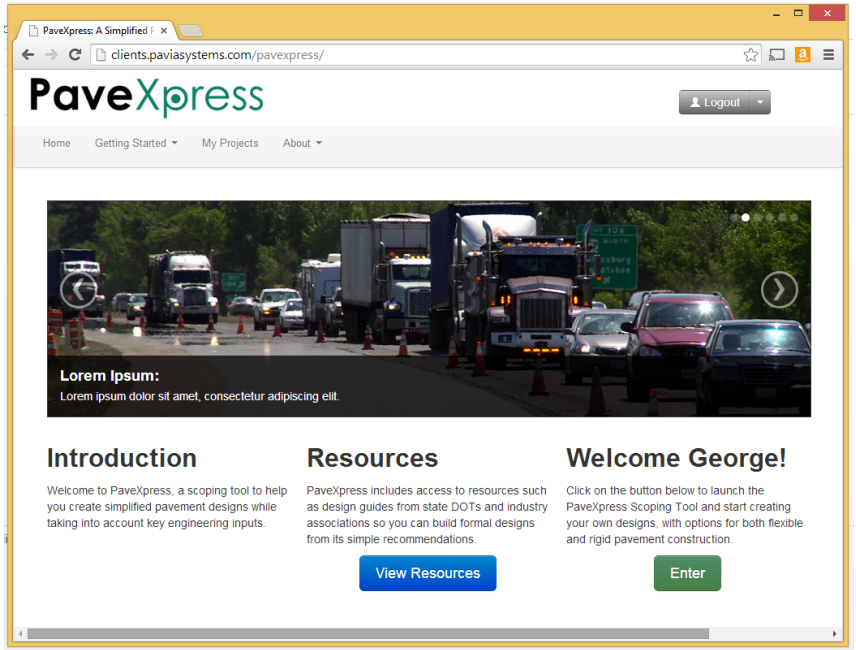
A Simplified Pavement Design Tool

WAPA Annual Conference
December 2014

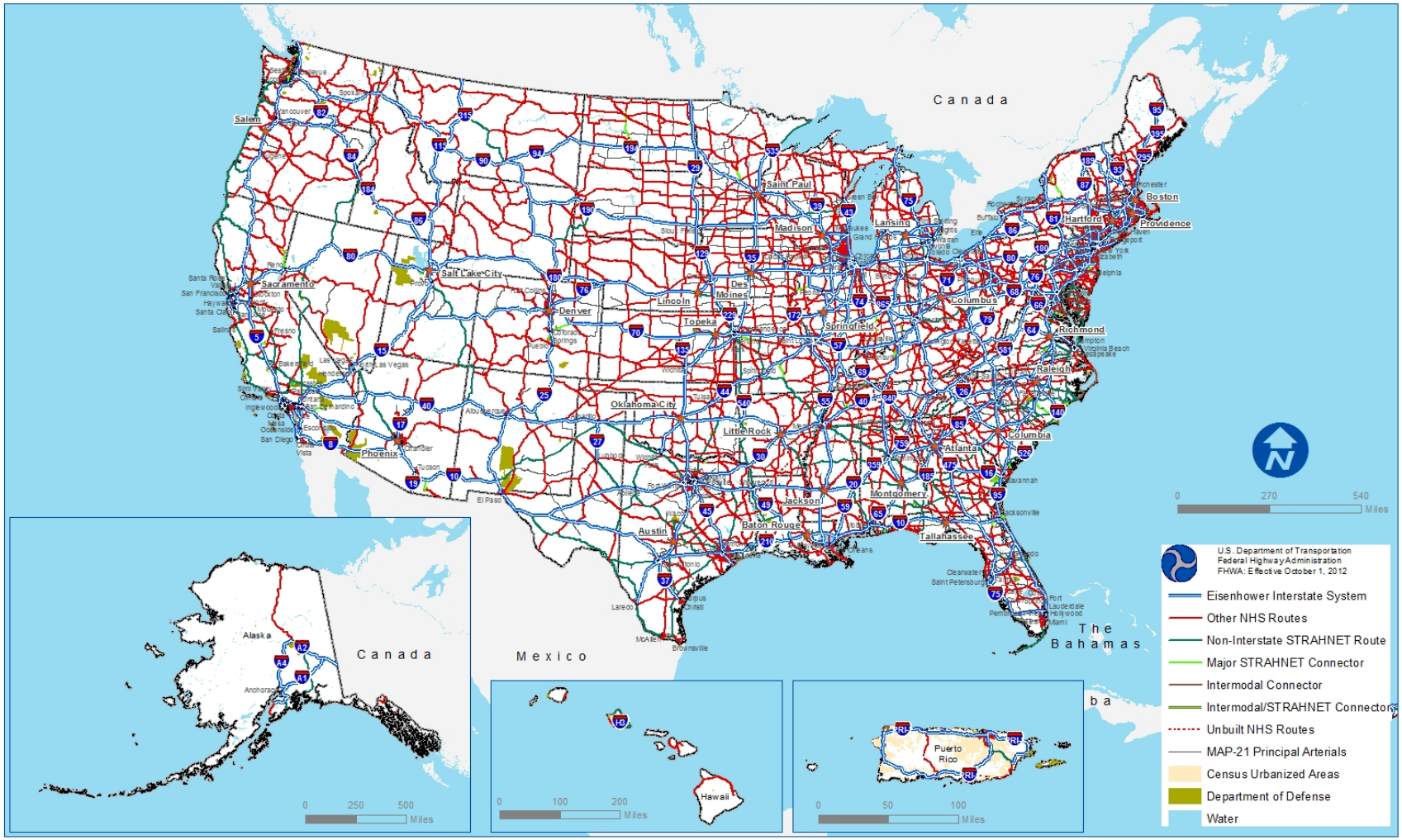
paviasystem

Today's Agenda

- Why PaveXpress?
- An Introduction
- Overview of system
- Design scenarios using ***PaveXpress***
- What is happening next

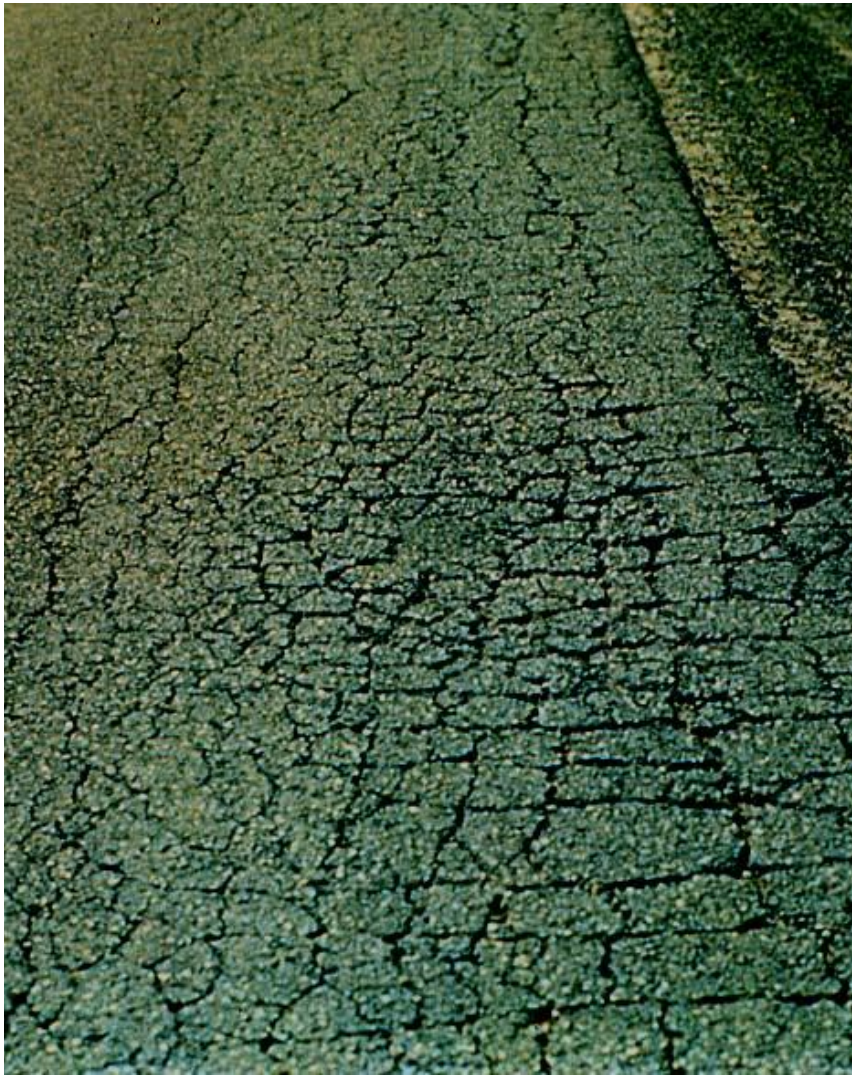


National Highway System

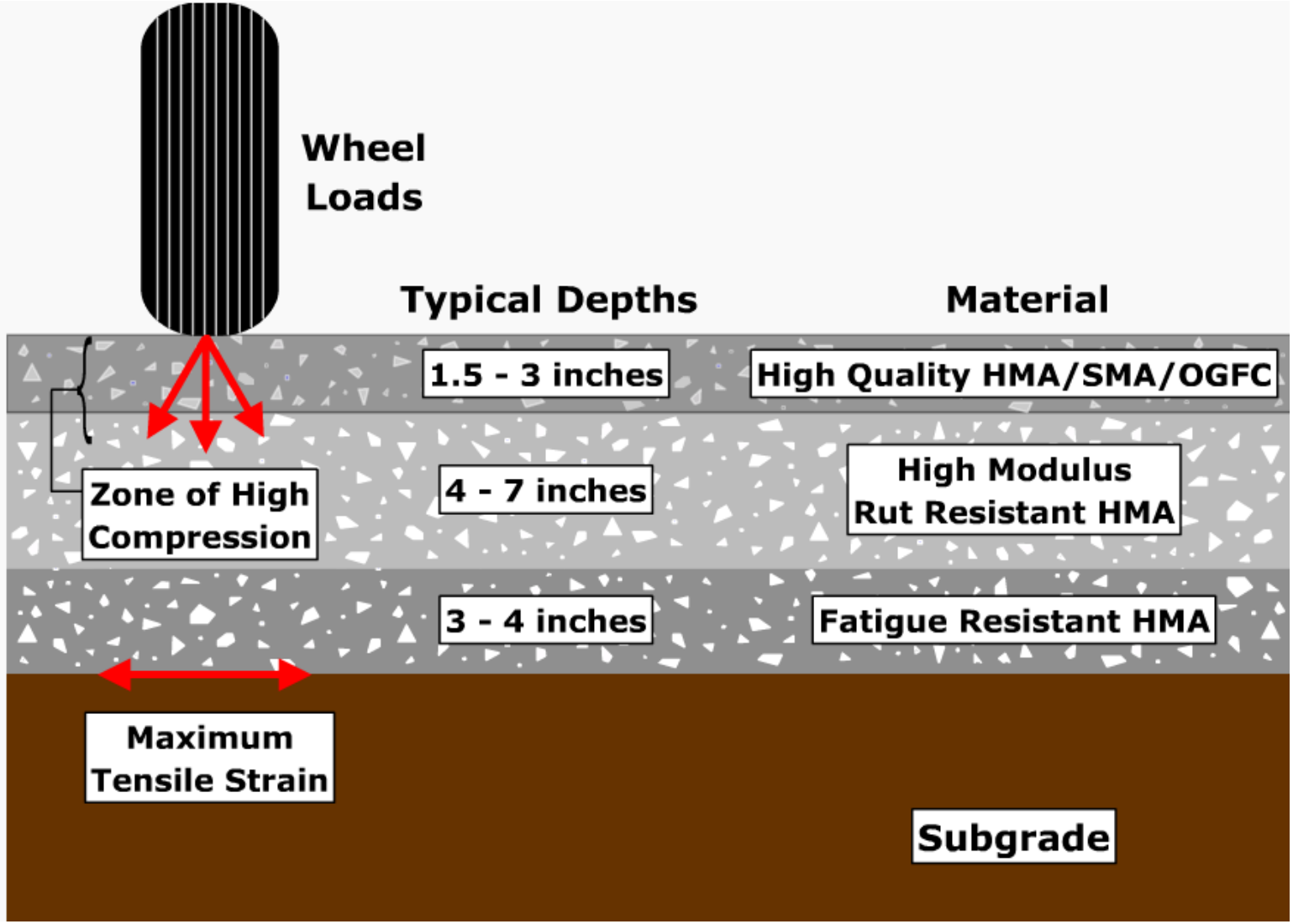


We've got a lot of roads

http://www.fhwa.dot.gov/planning/images/thnhsjpg.jpg

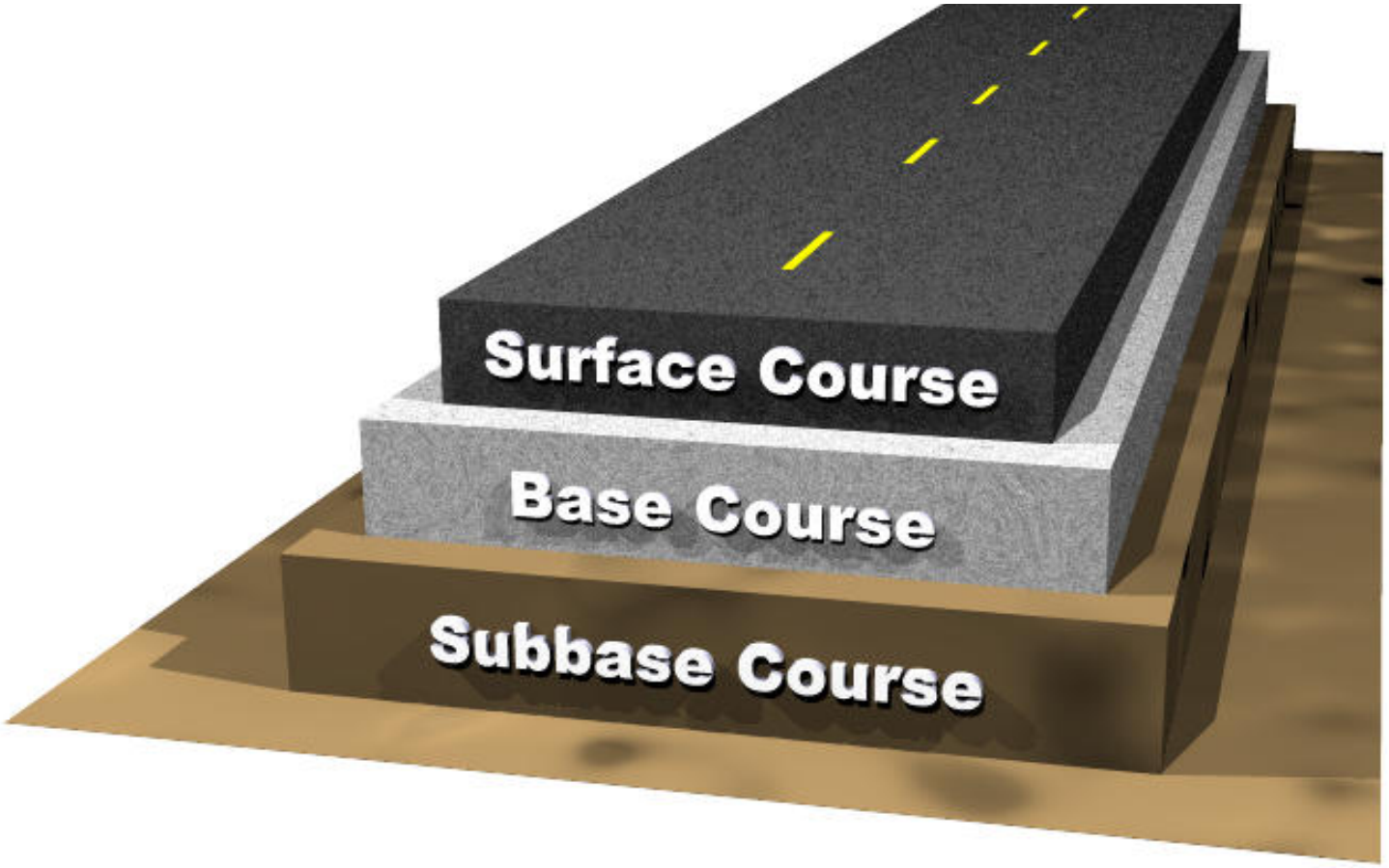


Examples of over and under-designed pavement abound



Perpetual pavement design

Pavement Interactive



AASHTO has been developing MEPDG for high volume roads, but a gap has developed for local roads and lower volumes

Pavement Interactive

PaveXpress Objectives

- Provide tool to develop technically sound pavement designs for roadway pavements
- Provide a user-friendly, visually appealing, pavement design tool accessible to users on a variety of devices
- Provide a free application for conducting pavement designs following 1993/1998 AASHTO
- Provide resources to enhance understanding and comfort with asphalt pavement design

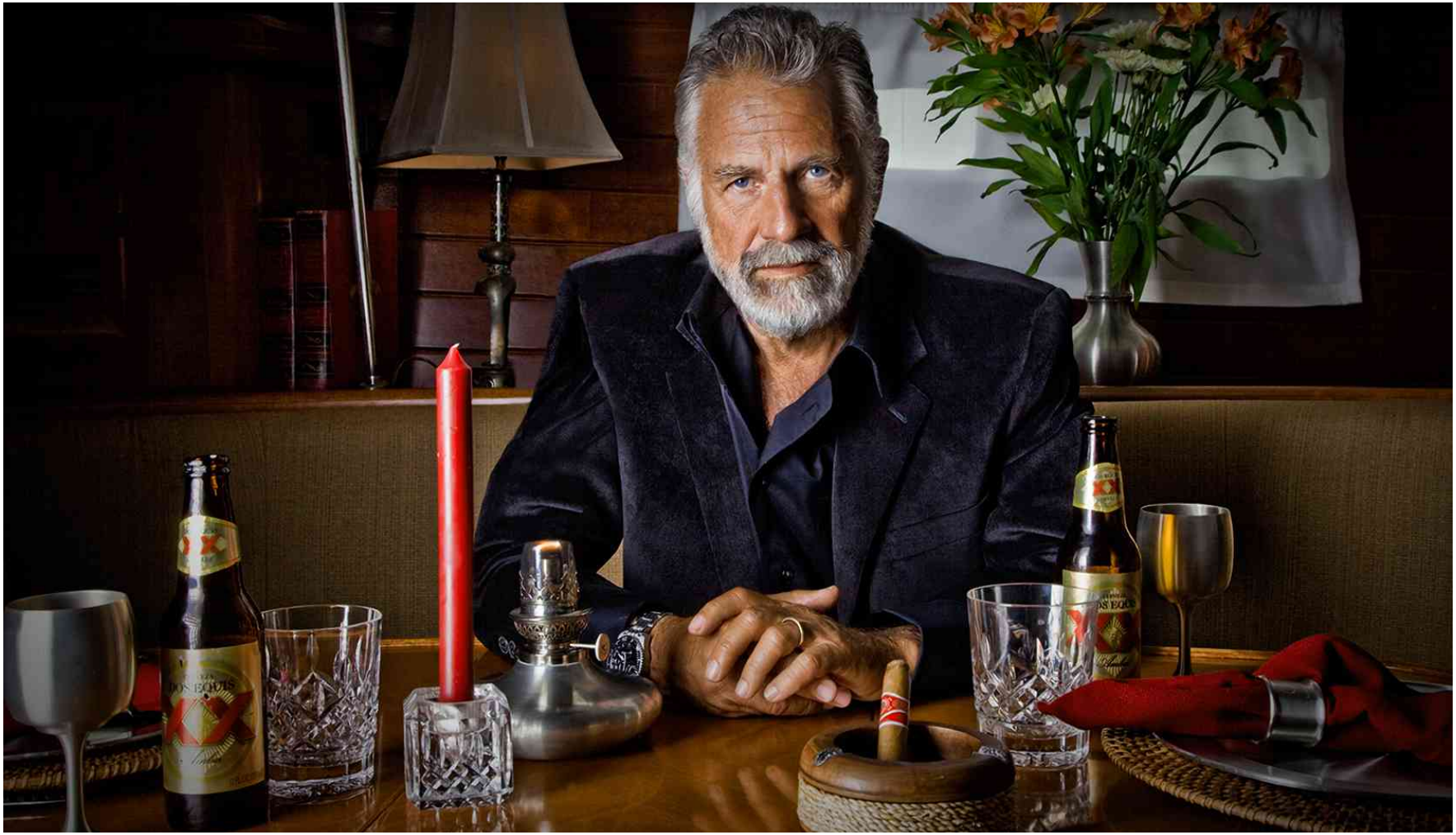
Target Audience

- Local Agencies
- A/E/C Firms
- Engineering Students

Non-Pavement Design Specific Engineers!

Guiding Principles

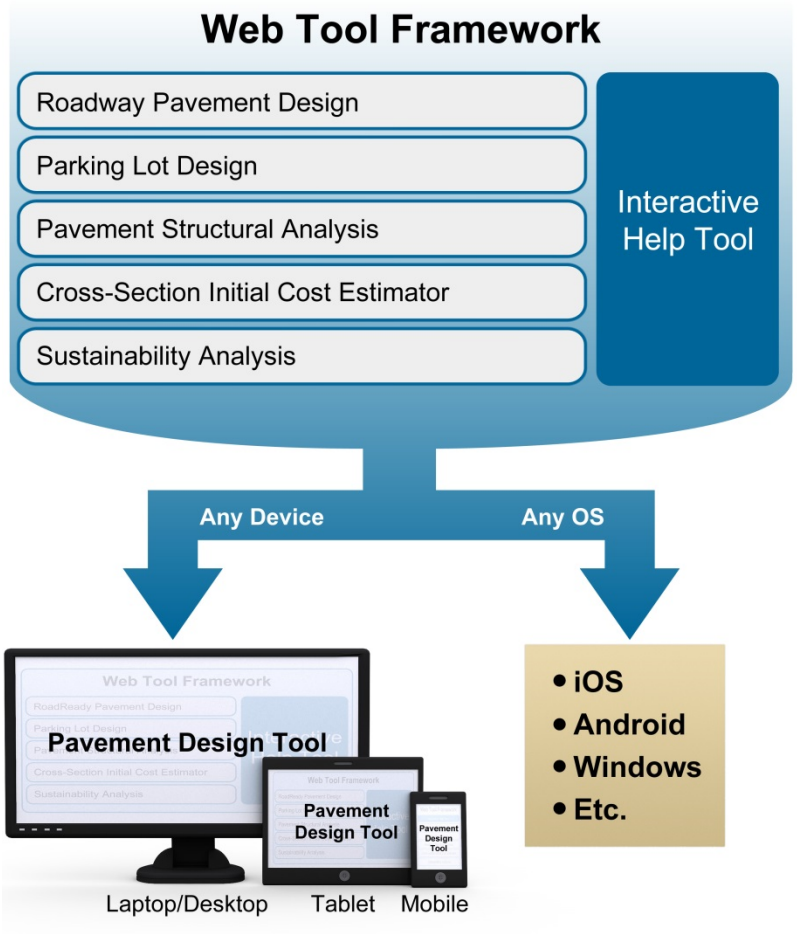
- Provide accurate un-biased results…**be a trusted resource**
- Only ask the user for what is required to perform a technically sound design
- Where appropriate suggest industry accepted defaults to minimize user input
- Provide context sensitive help and guidance
- Assume users aren’t pavement design experts



I don’t always do pavement designs,
but when I do, I prefer PaveXpress.

Image from themostinterestingblogintheworld.com

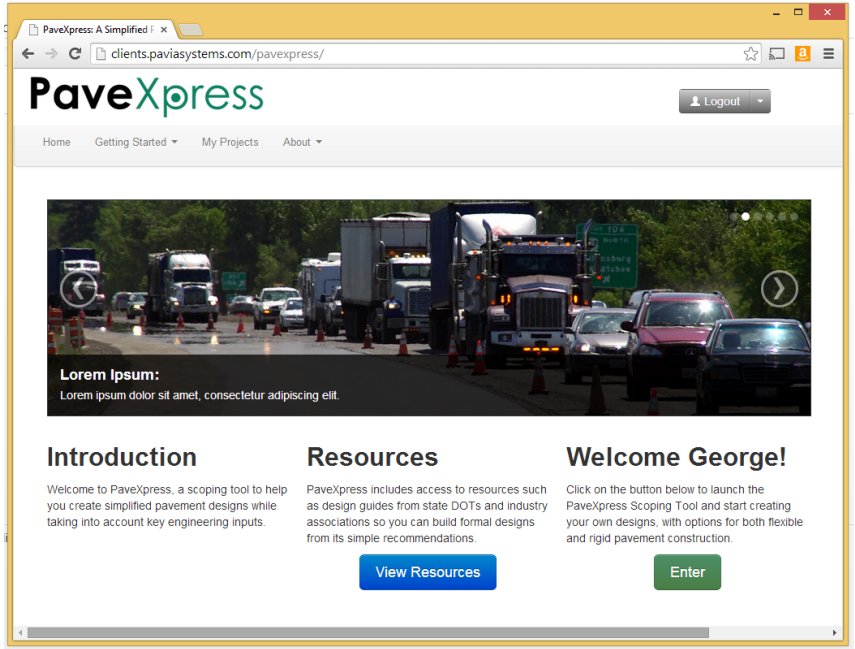
Approach: Web Delivery



- Browser based delivery
- Available via the web
- Supports all kinds of devices/OS
  - Desktops
  - Laptops
  - Tablets (7” – 10” - includes iPad Mini on up.
  - Handheld device capabilities
- Easily scalable and updatable

Approach: Technical

- Provide technically sound designs using:
  - Flexible: AASHTO ’93
  - Rigid: AASHTO ‘93 w/ ‘98 Supplement
  - Parking lot guidance (Flexible only)
- Use industry accepted standards and guidance
- Linkages to State and Local guidance
- Linkages to Pavement Interactive



A sneak preview at some of the highlights.

LET'S TAKE A CLOSER LOOK!

PaveXpress

Login

Home | Getting Started | My Projects | About

Introduction

Welcome to PaveXpress, a scoping tool to help you create simplified pavement designs while taking into account key engineering inputs.

Resources

PaveXpress includes access to resources such as design guides from state DOTs and industry associations so you can build formal designs from its simple recommendations.

View Resources

Get Started

Click on the button below to launch the PaveXpress Scoping Tool and start creating your own designs, with options for both flexible and rigid pavement construction.

Launch

Home page: Welcome to PaveXpress

PaveXpress

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- Using PaveXpress
- Background
- FAQs

Introduction

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Navigation up top, resources to familiarize you

PaveXpress

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Background

Flexible | Rigid

1993 AASHTO Flexible Pavement Structural Design

Empirical equations are used to relate observed or measurable phenomena (pavement characteristics) with outcomes (pavement performance). This article presents the 1993 AASHTO *Guide* basic design equation for flexible pavements. This empirical equation is widely used and has the following form:

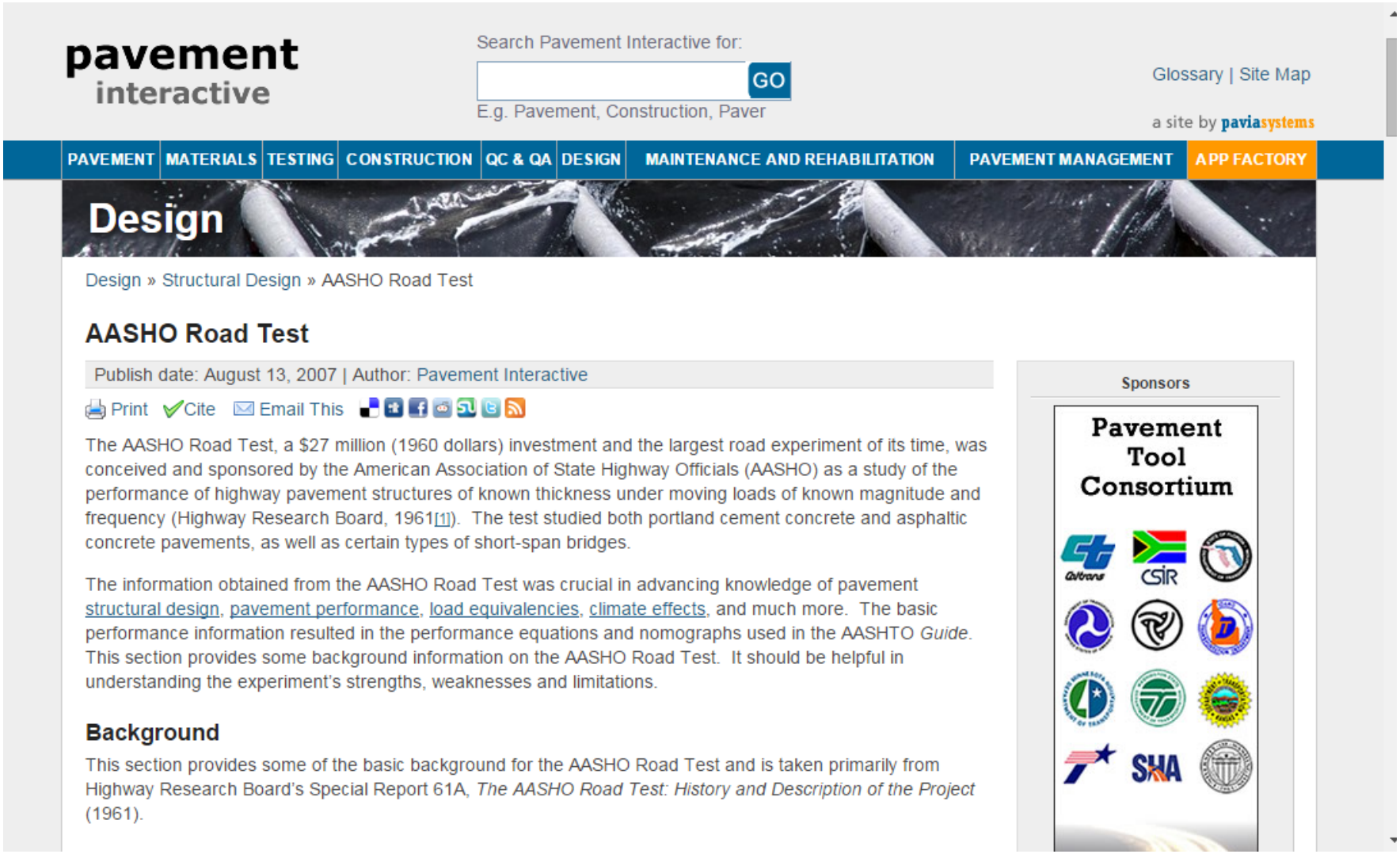
$$\log_{10}(W_{18}) = Z_R \times S_0 + 9.36 \times \log_{10}(SN + 1) - 0.20 + \frac{\log_{10}\left(\frac{\Delta PSI}{4.2 - 1.5}\right)}{0.40 + \frac{1094}{(SN + 1)^{5.19}}} + 2.32 \times \log_{10}(M_R) - 8.07$$

These variables will be further explained in the Inputs section

Where:

W_{18}
predicted number of 80 kN (18,000 lb.) ESALs

Background Information is available



Linked and integrated to Pavement Interactive

FAQ

What data do I need to have ready in order to use the tool?

You should know the intended design life of the pavement, have traffic counts in order to determine loads, and have an idea of what layer types to include in the pavement structure. Many of the tool inputs can be based on estimates or use default values provided by the tool itself.

How is the output of the tool provided?

The tool will generate a recommended structural design and layer thicknesses for the pavement structure being scoped. In addition, the tool can provide you with additional resources to review for design guidance.

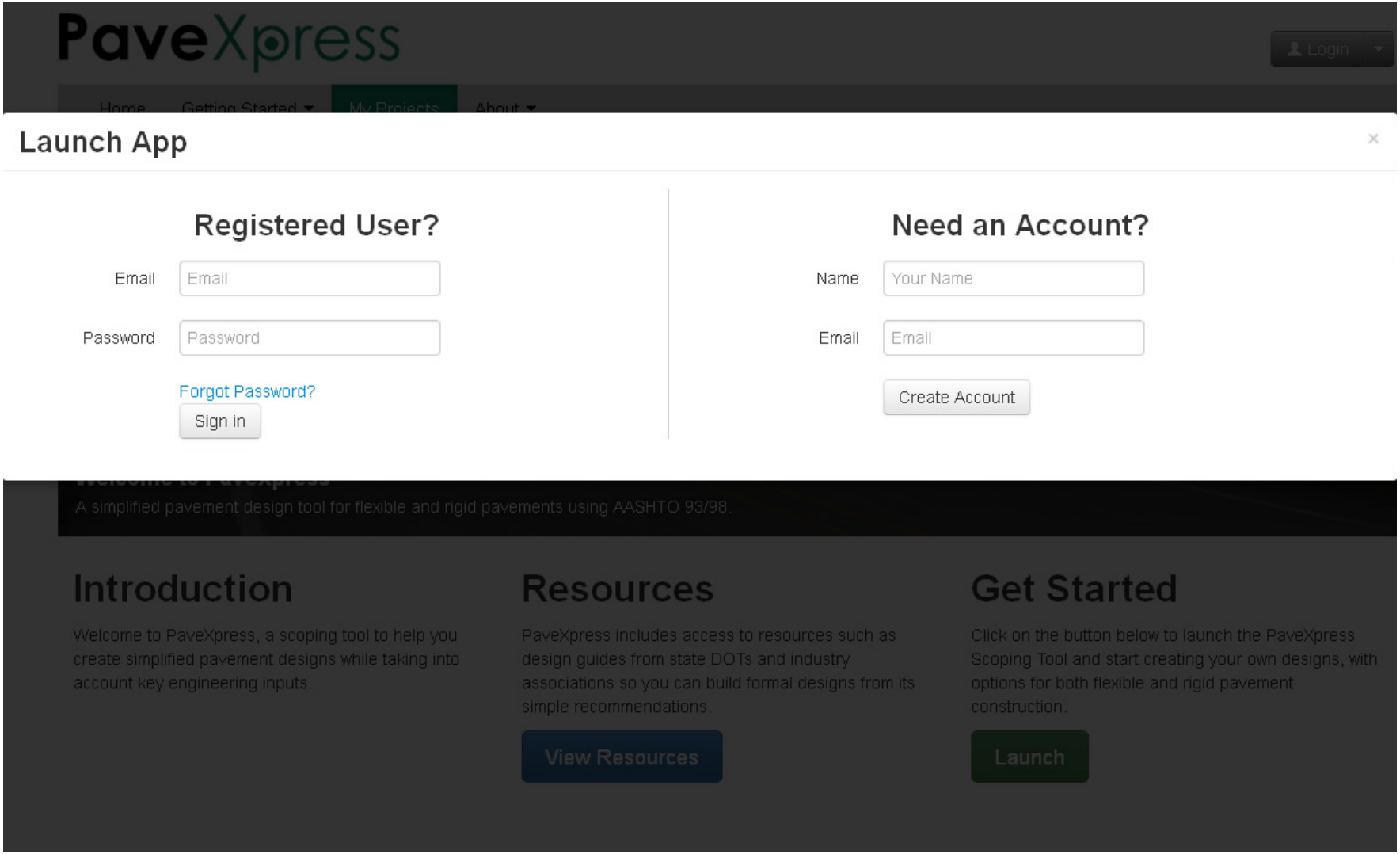
Can this substitute for a formal design program such as DARWin-ME?

PaveXpress is designed as a scoping tool so that users can quickly scope potential pavement designs based on minimal input requirements. The tool applies standard design equations to generate its recommendations, but is not a replacement for an agency's formal design process.

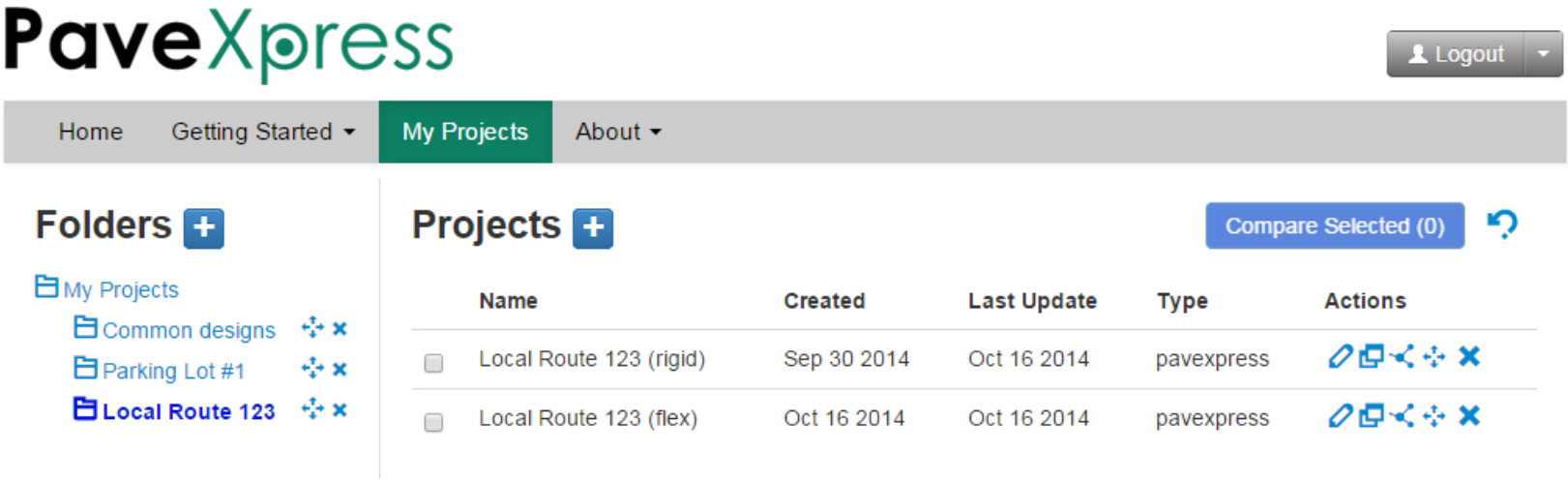
Does the tool use a mechanistic-empirical design process?

The design equations used by the scoping tool are empirical in nature. Additional features to incorporate mechanistic inputs are currently being considered.

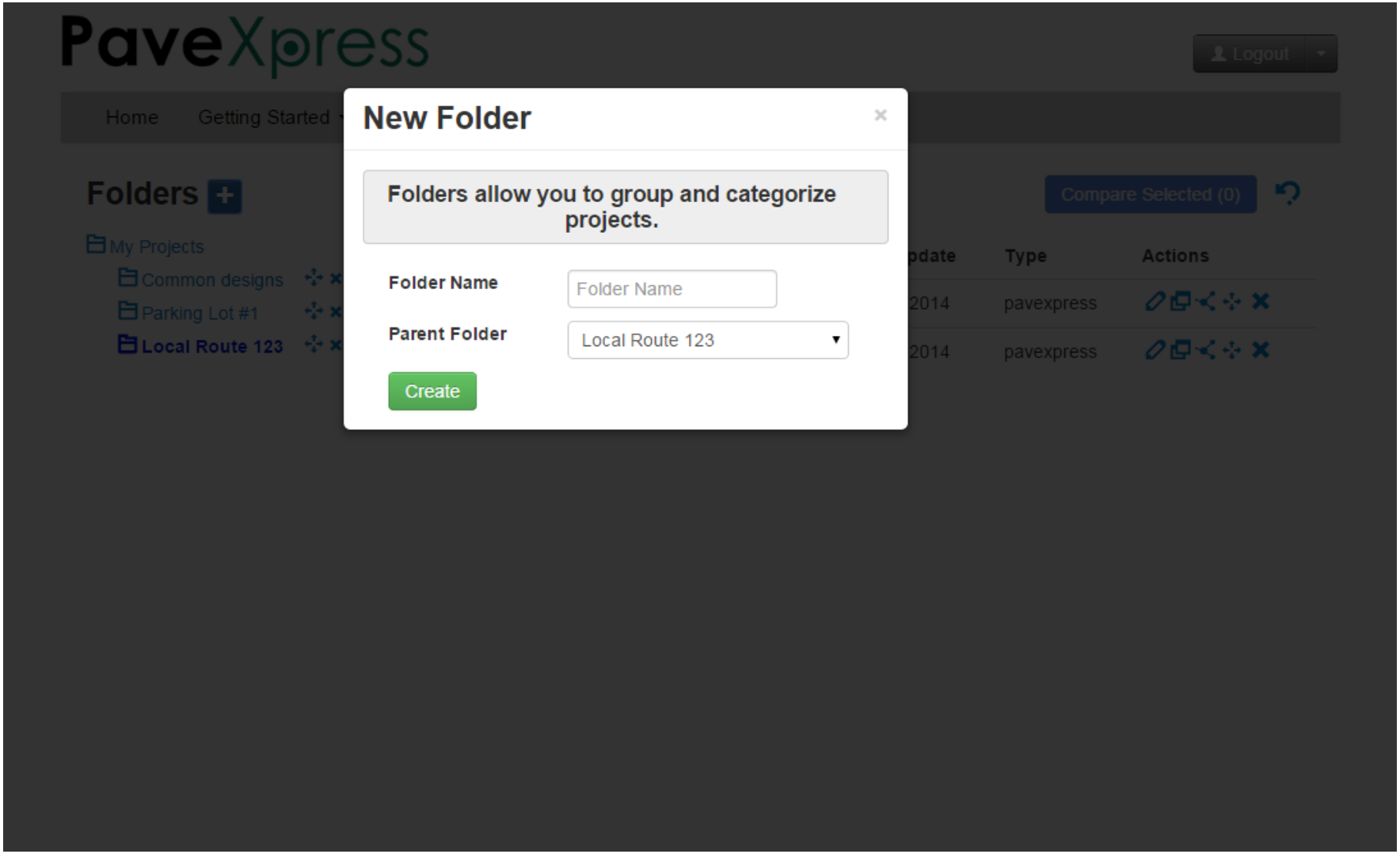
Frequently asked questions



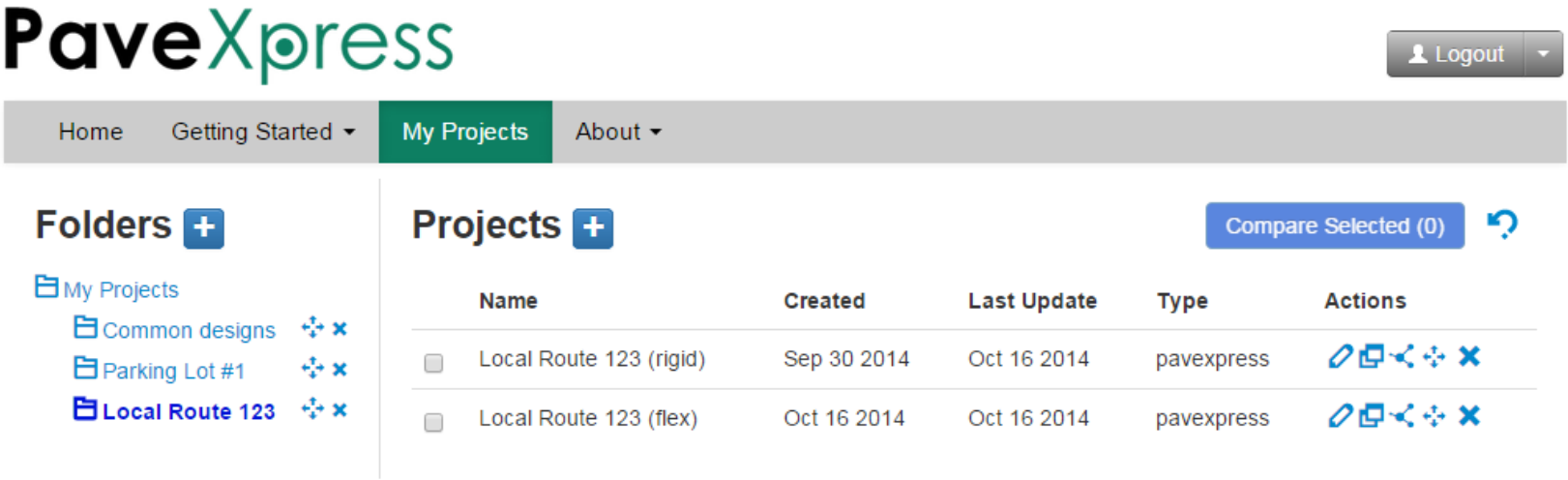
You must register with email and password.



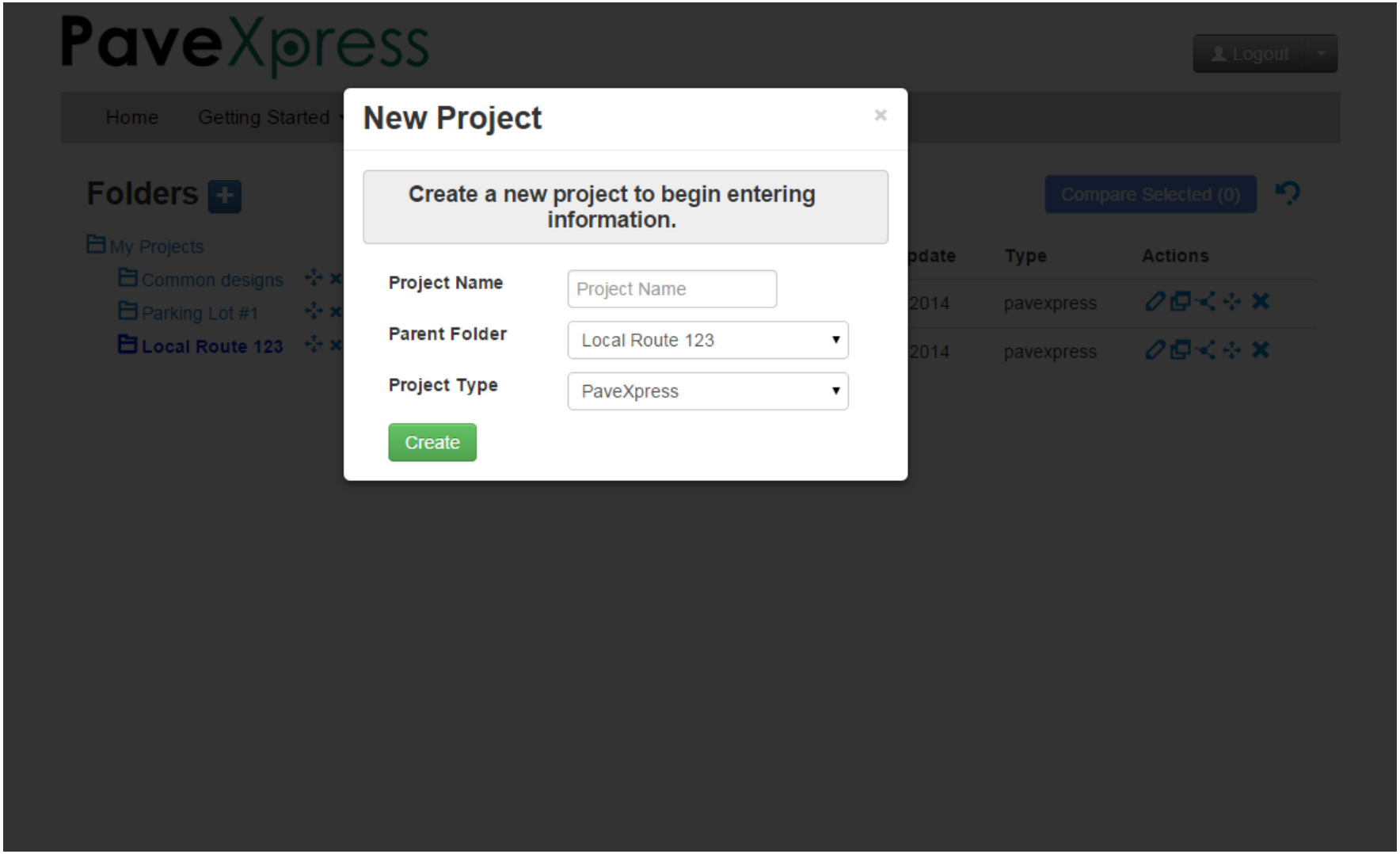
Once logged in, go to My Projects to view your designs



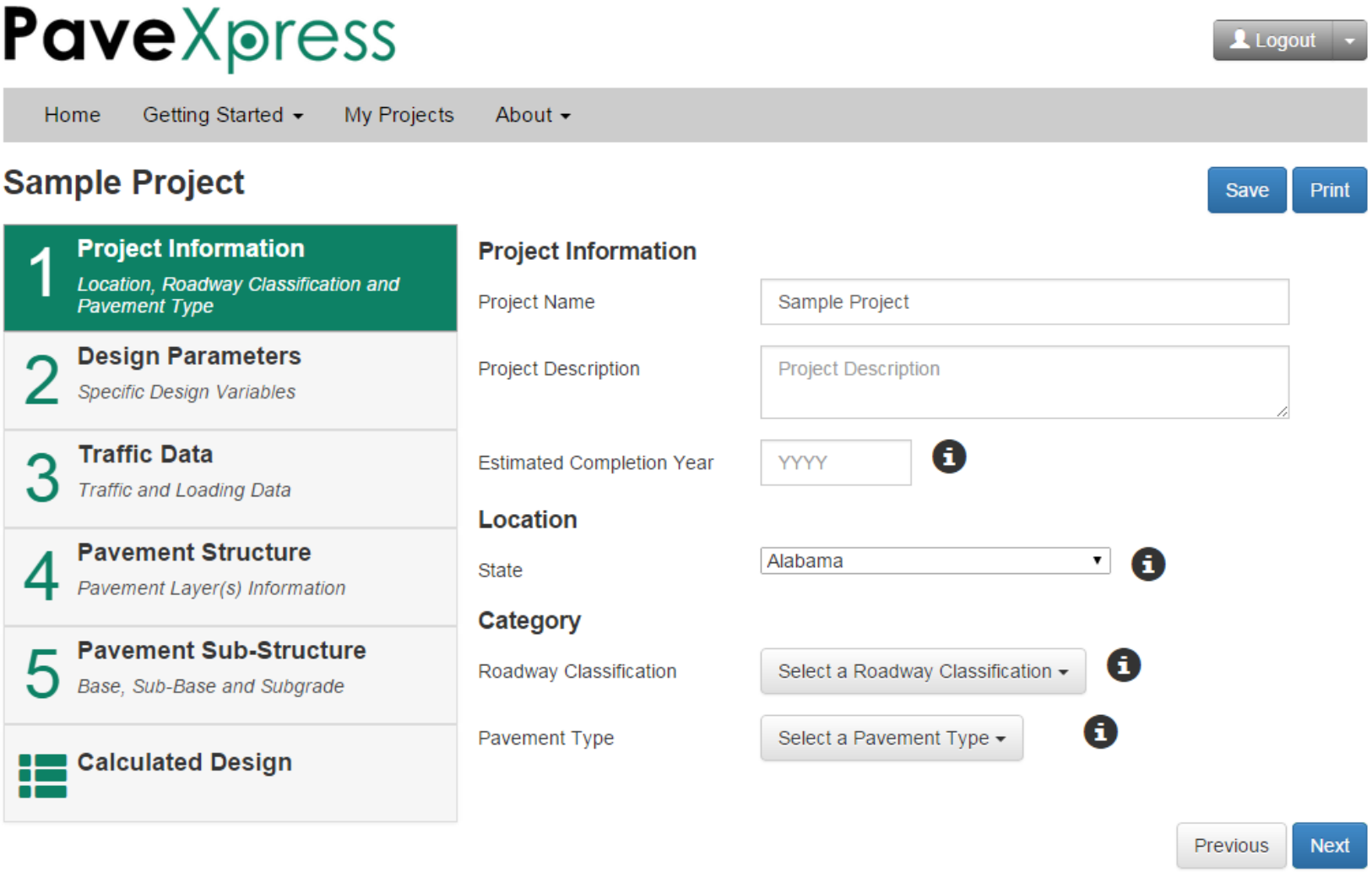
Create and manage your folders of designs



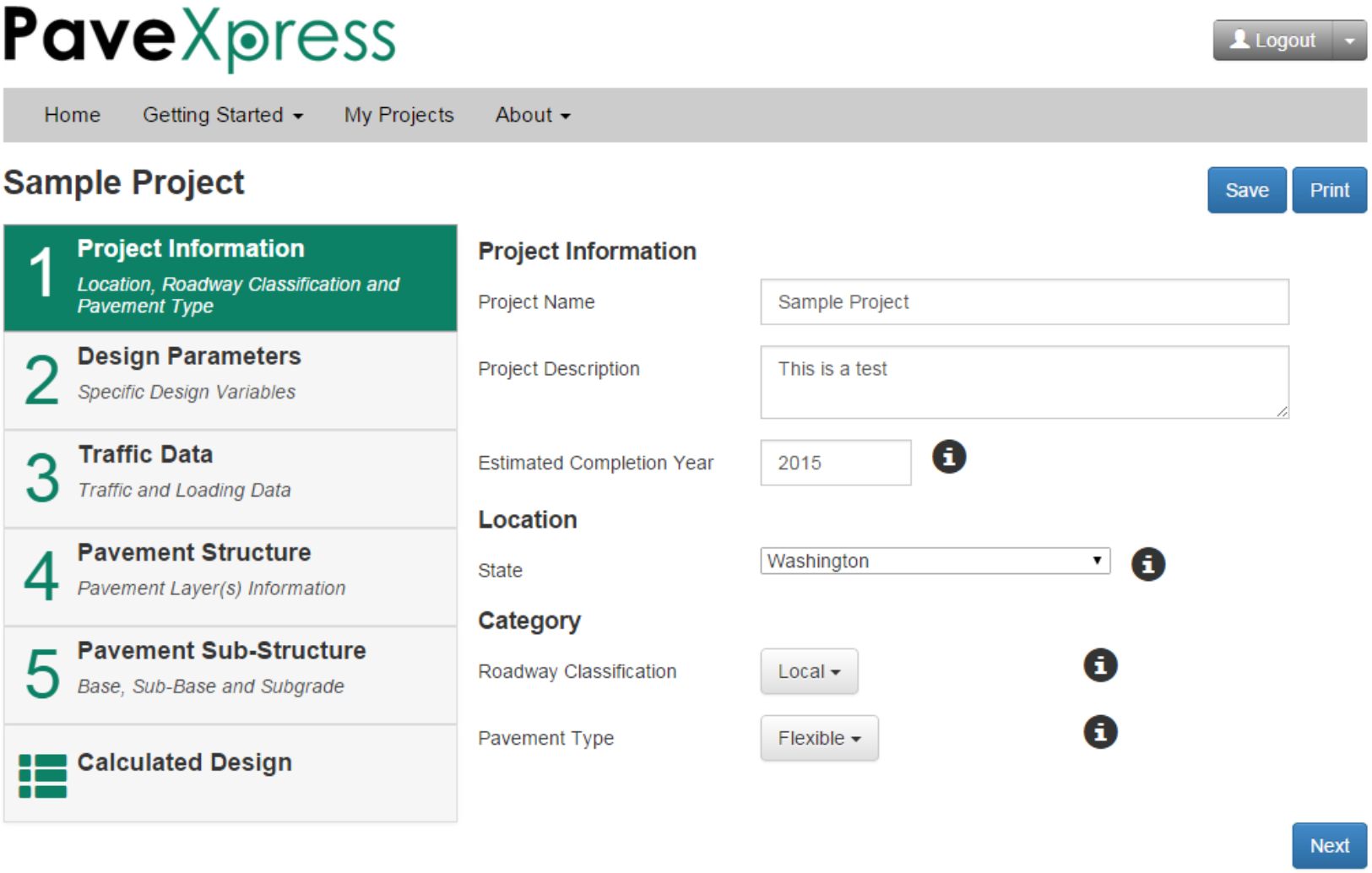
Create a new project and design at the click of a button



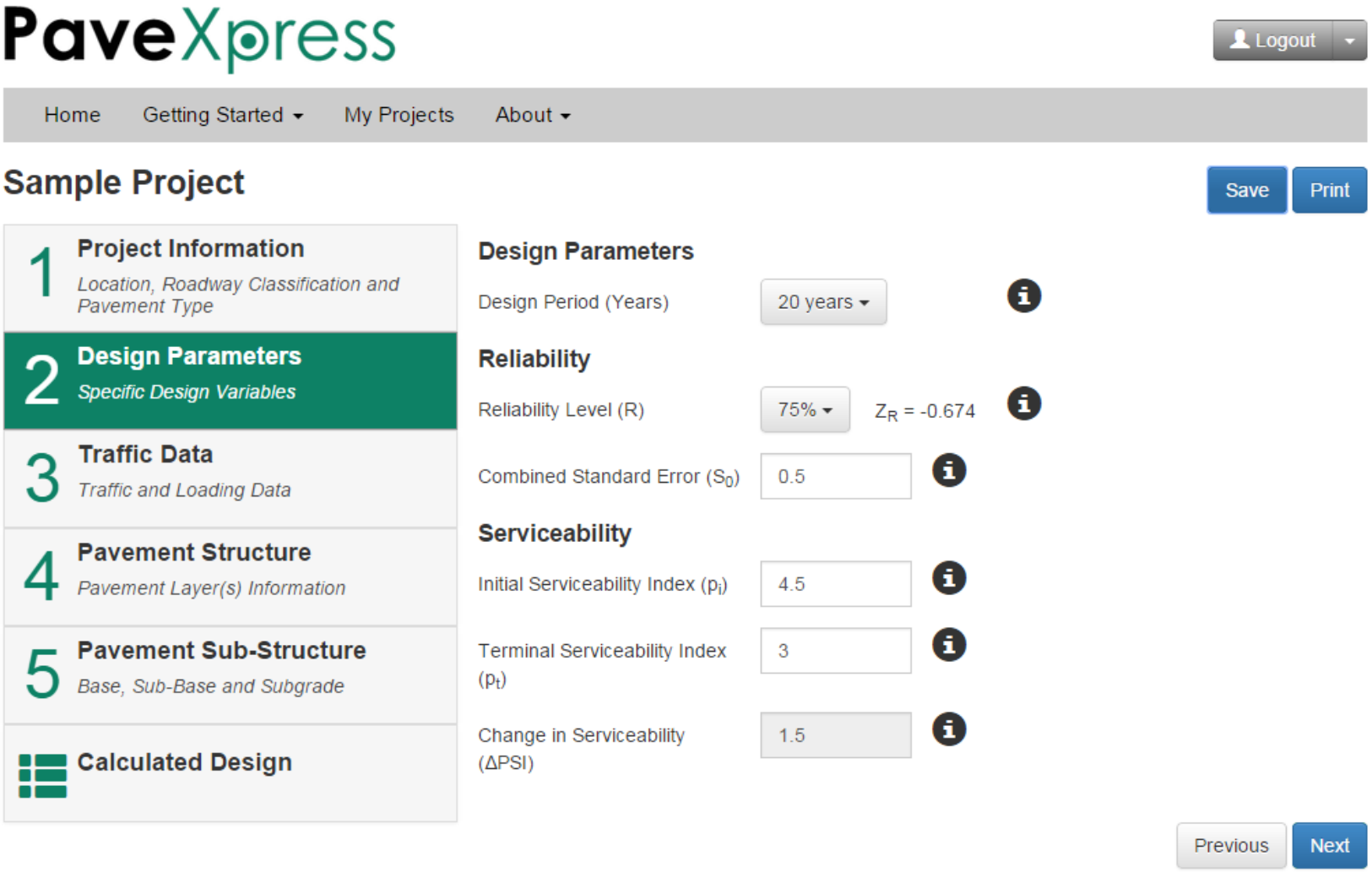
Give it a name and location



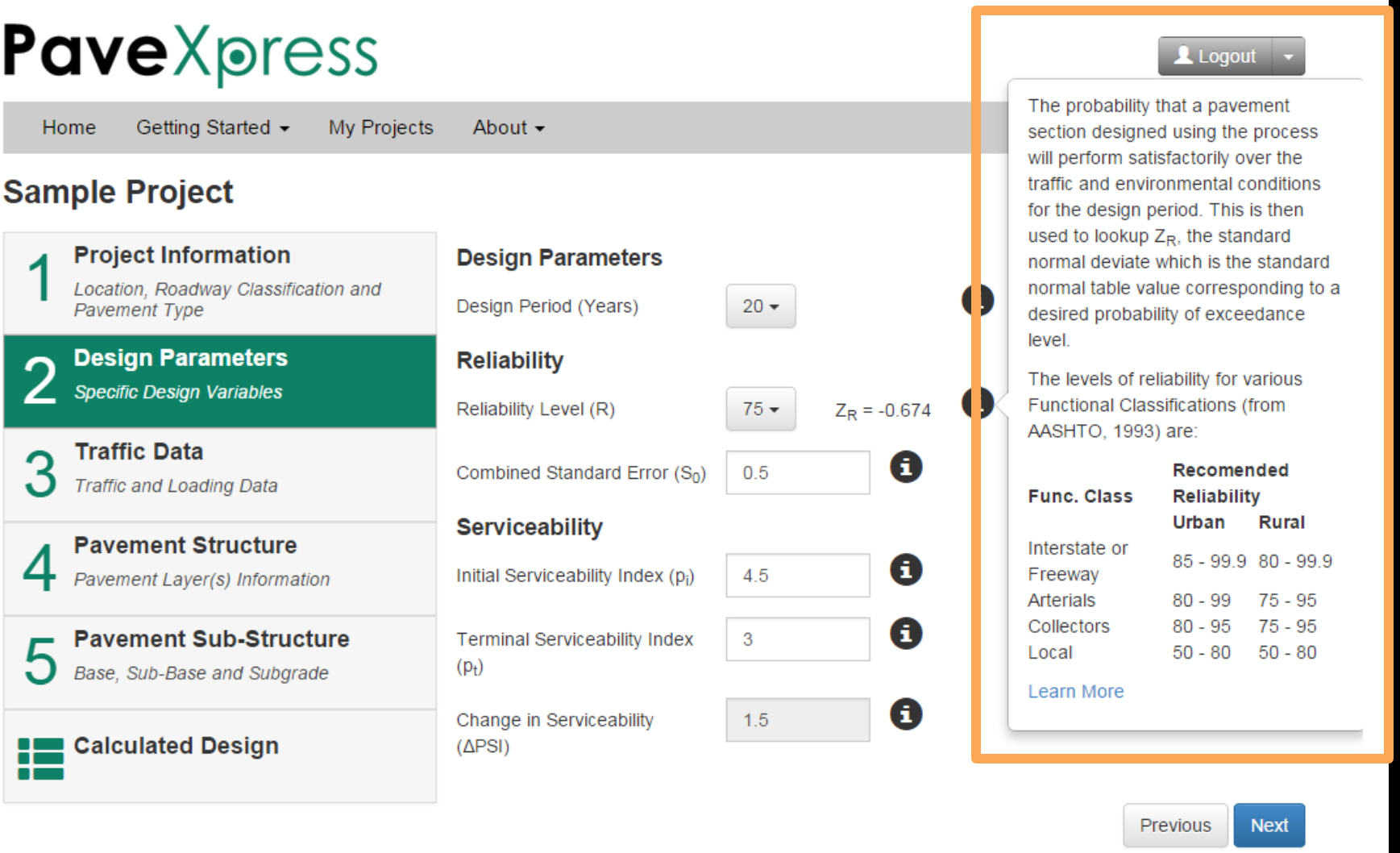
A clean, step wise process for creating the design



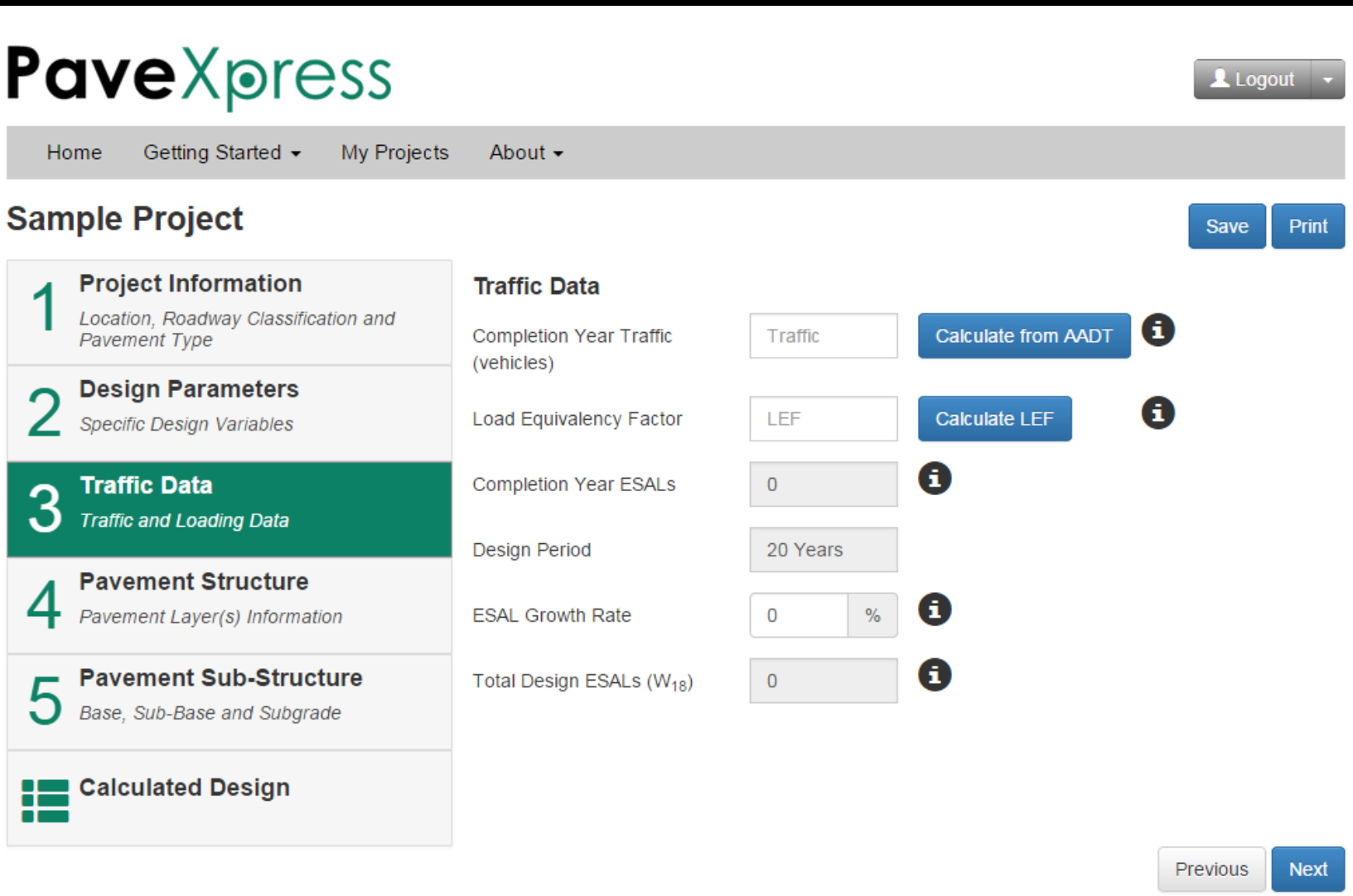
1. Start with general project information, locations



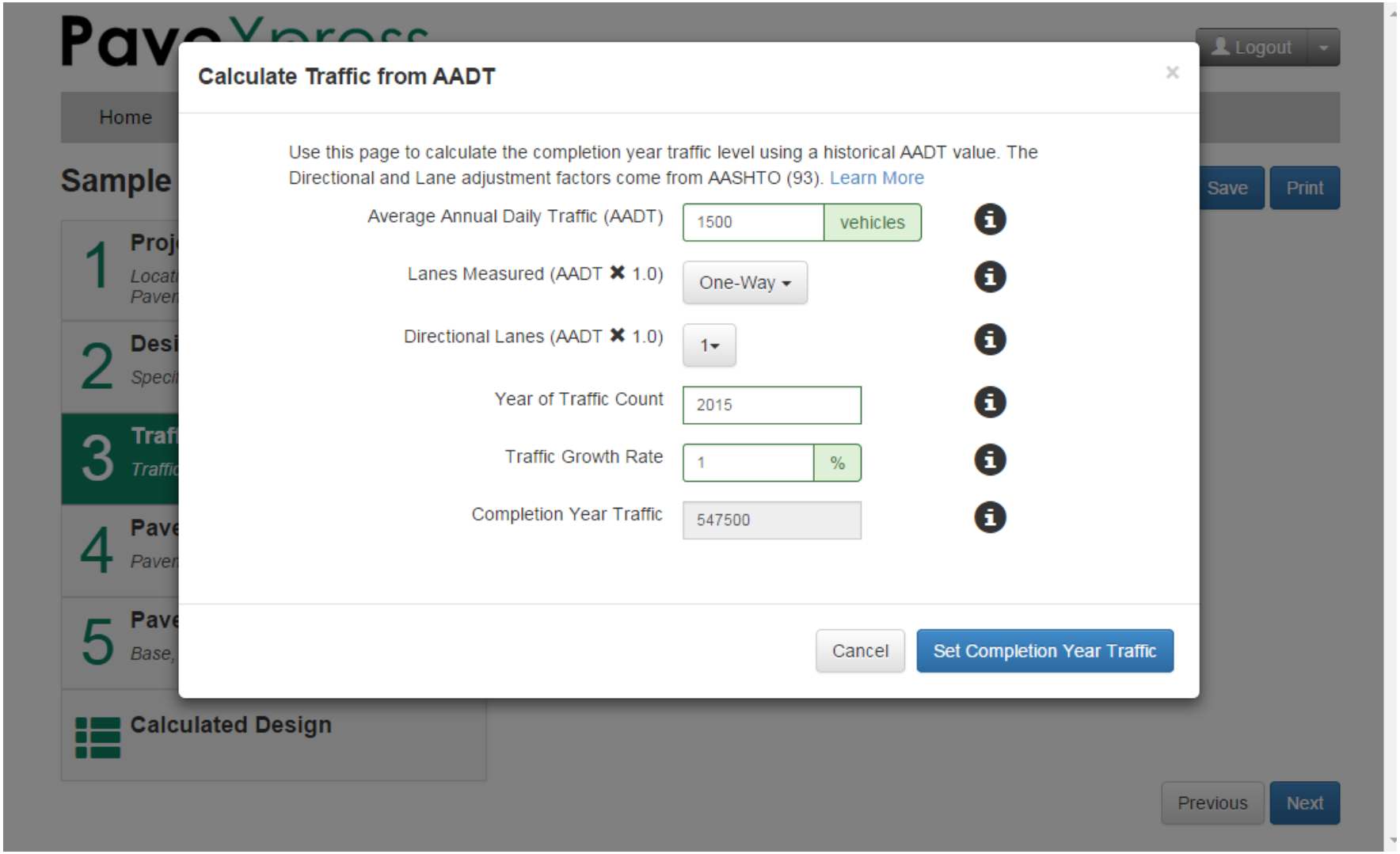
2. Expand into design parameters



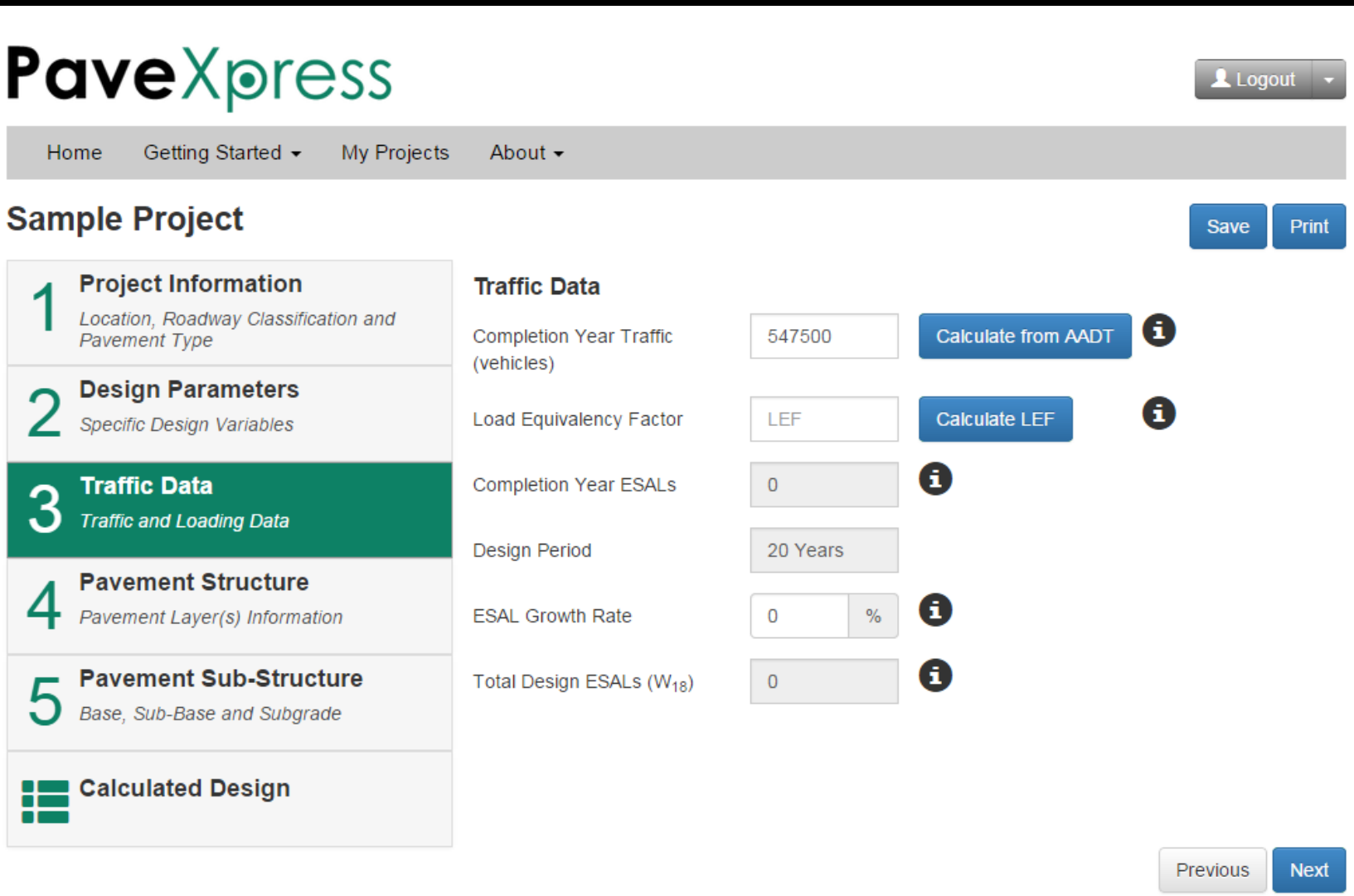
Context sensitive help linked to resources throughout



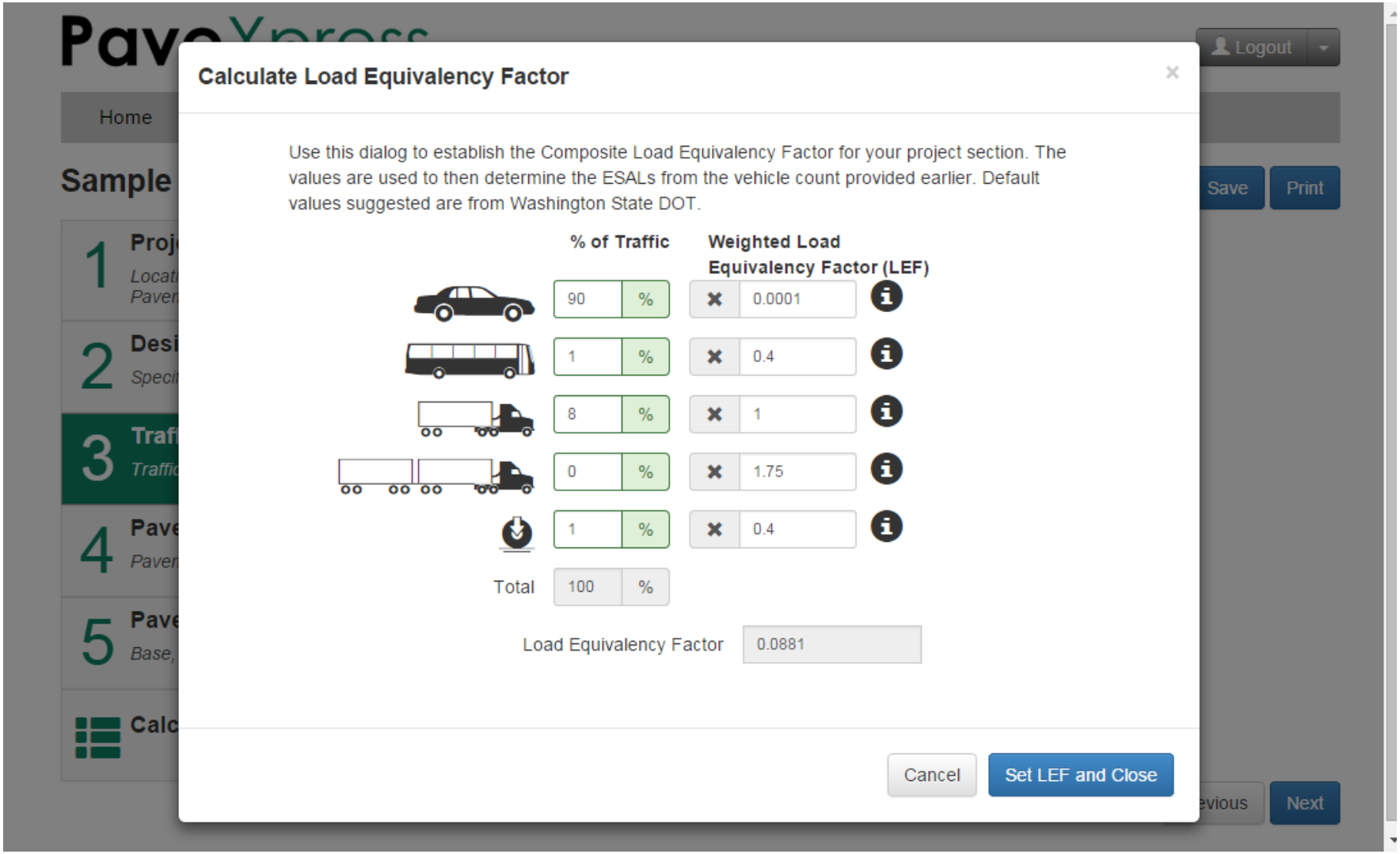
Enter traffic and loading information



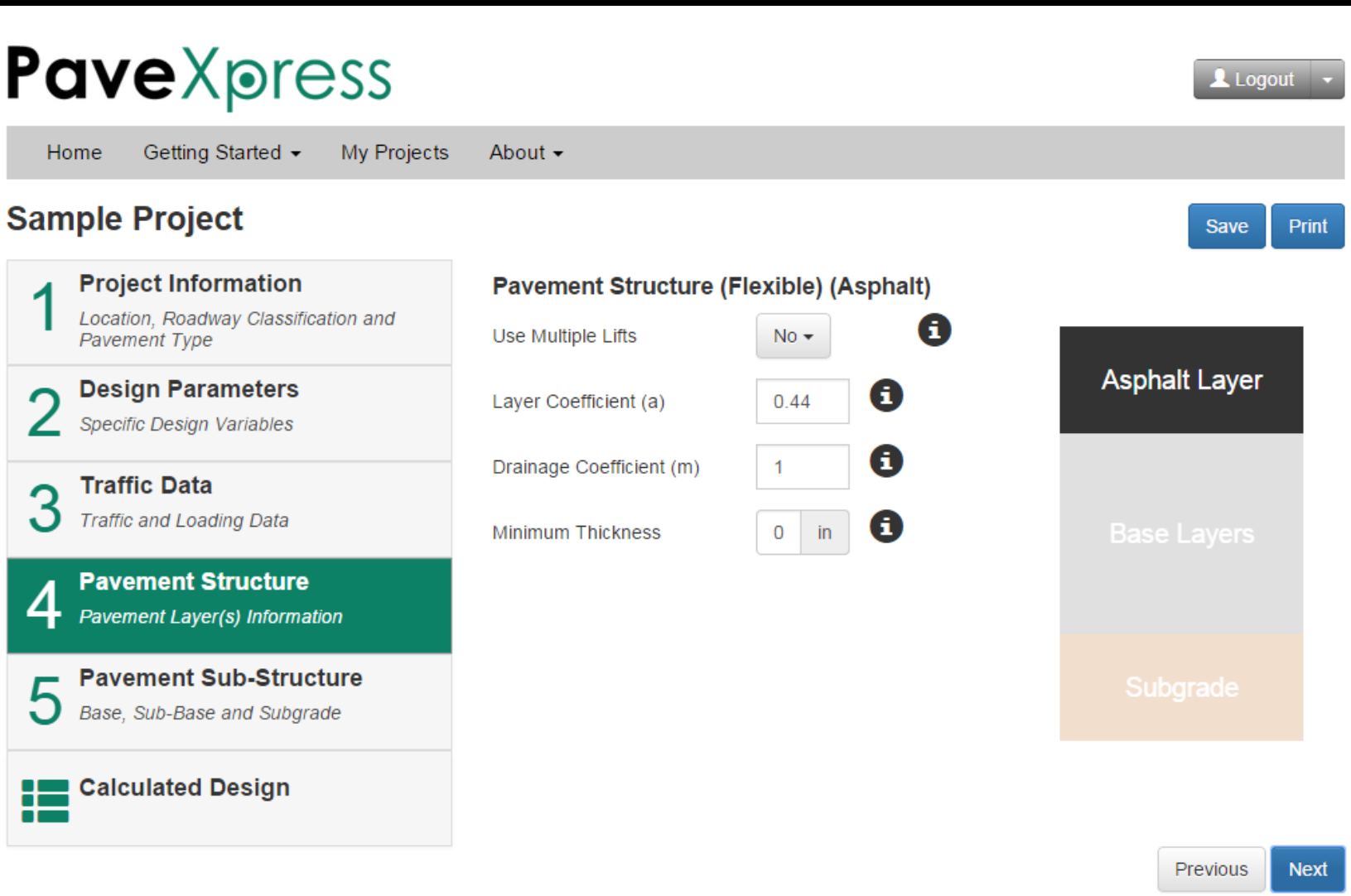
Calculate traffic from AADT using AASHTO methods



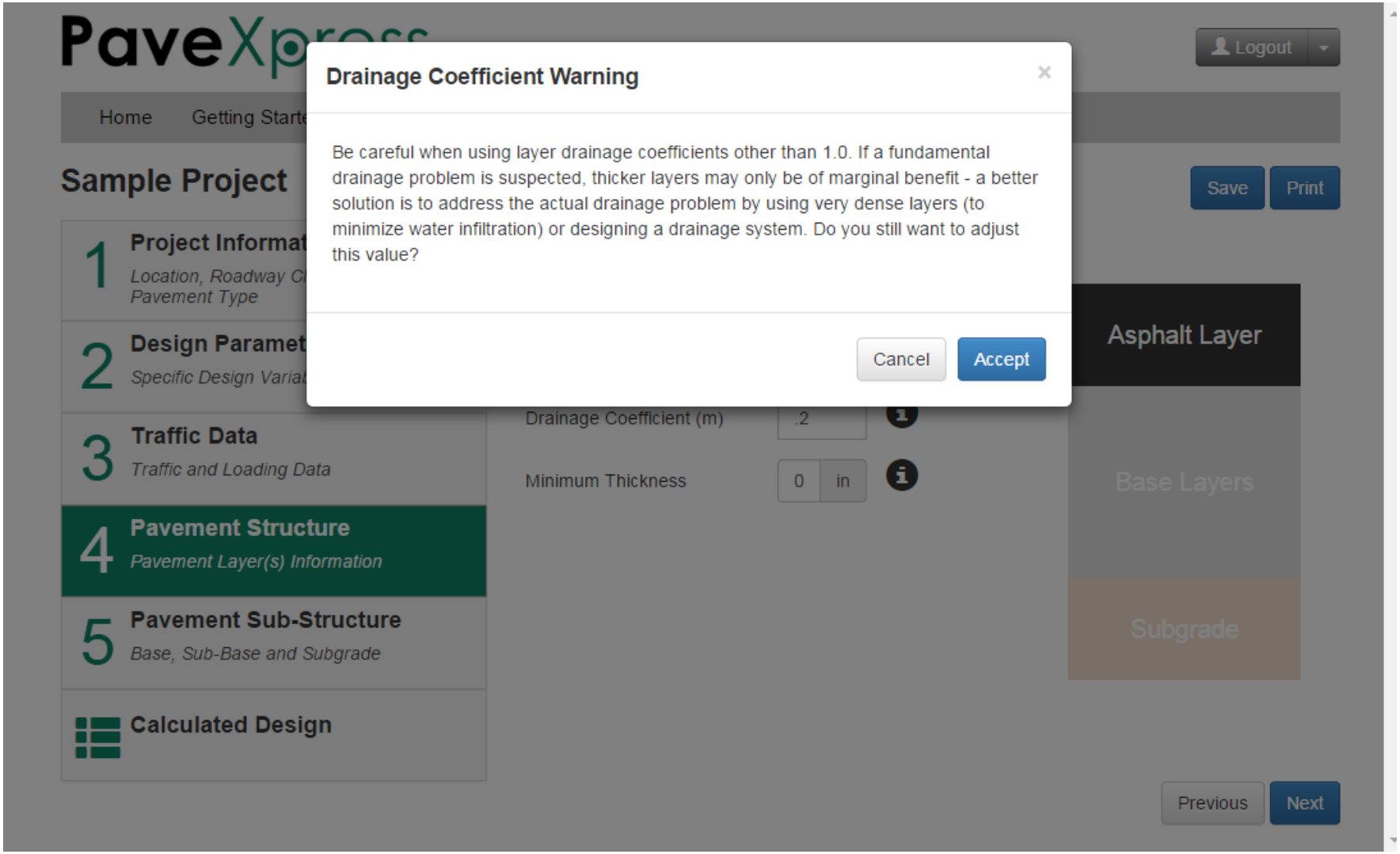
Completion year traffic is set, now on to LEF



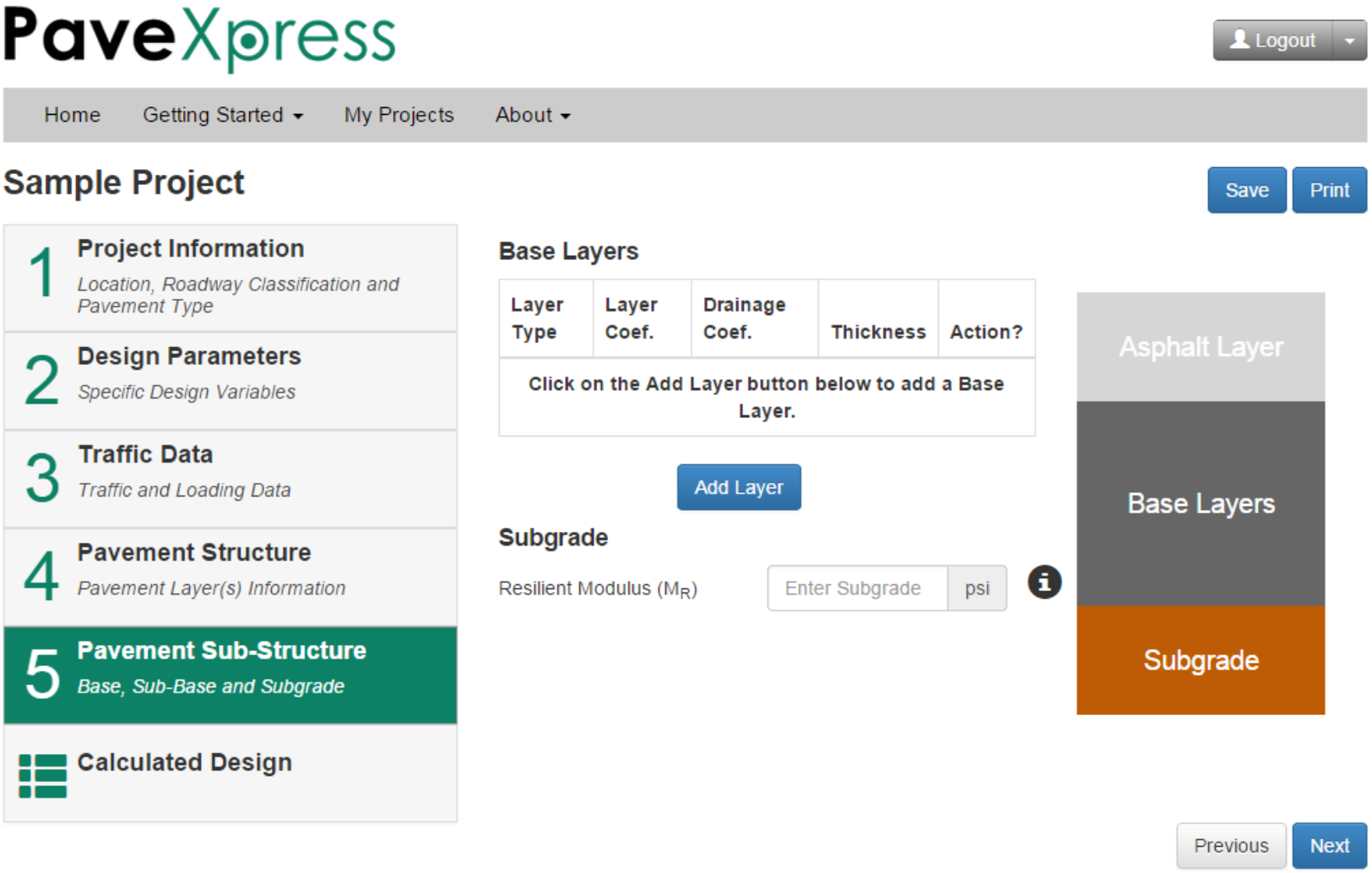
Create composite load equivalency factor



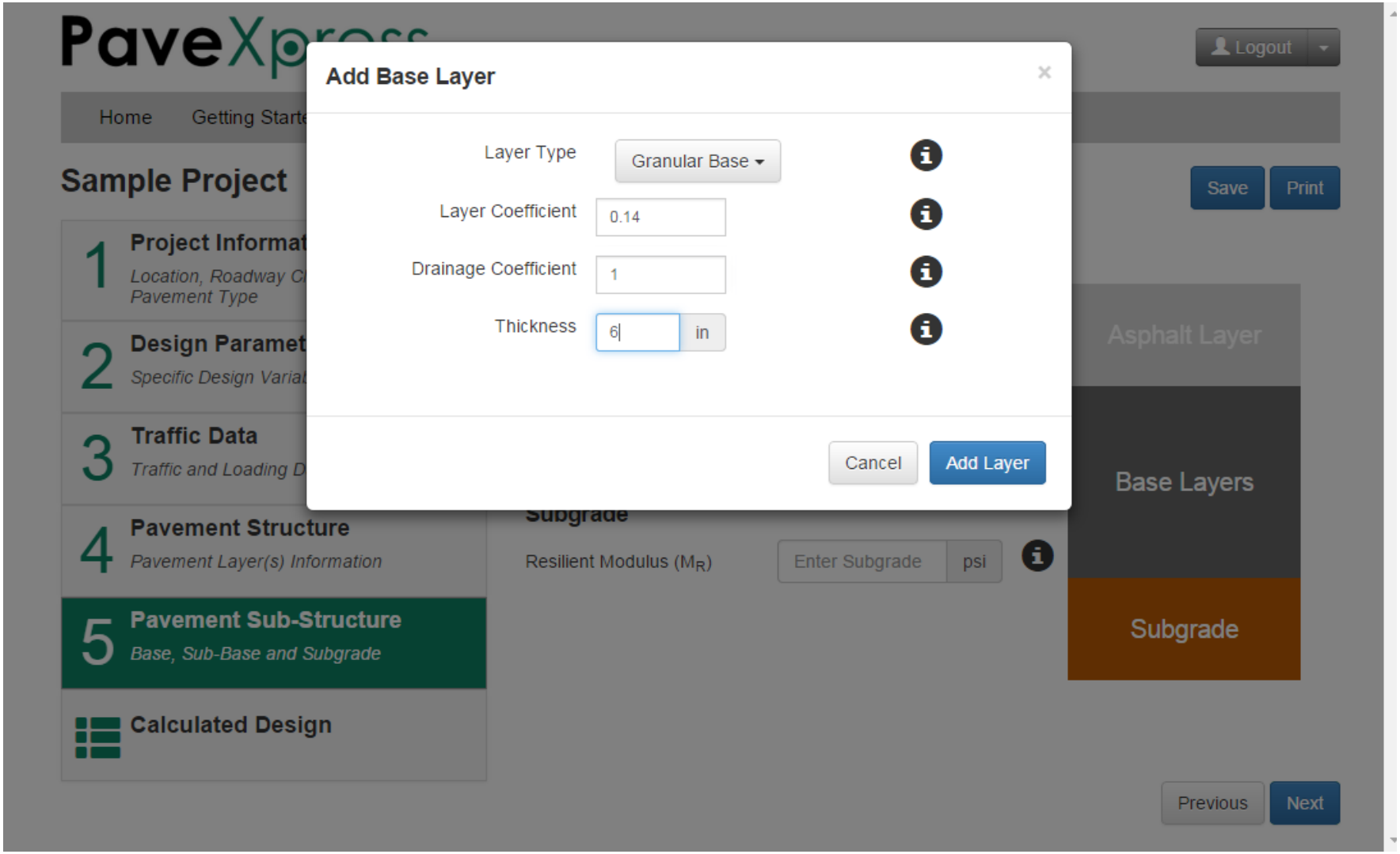
Specify your surface layer information



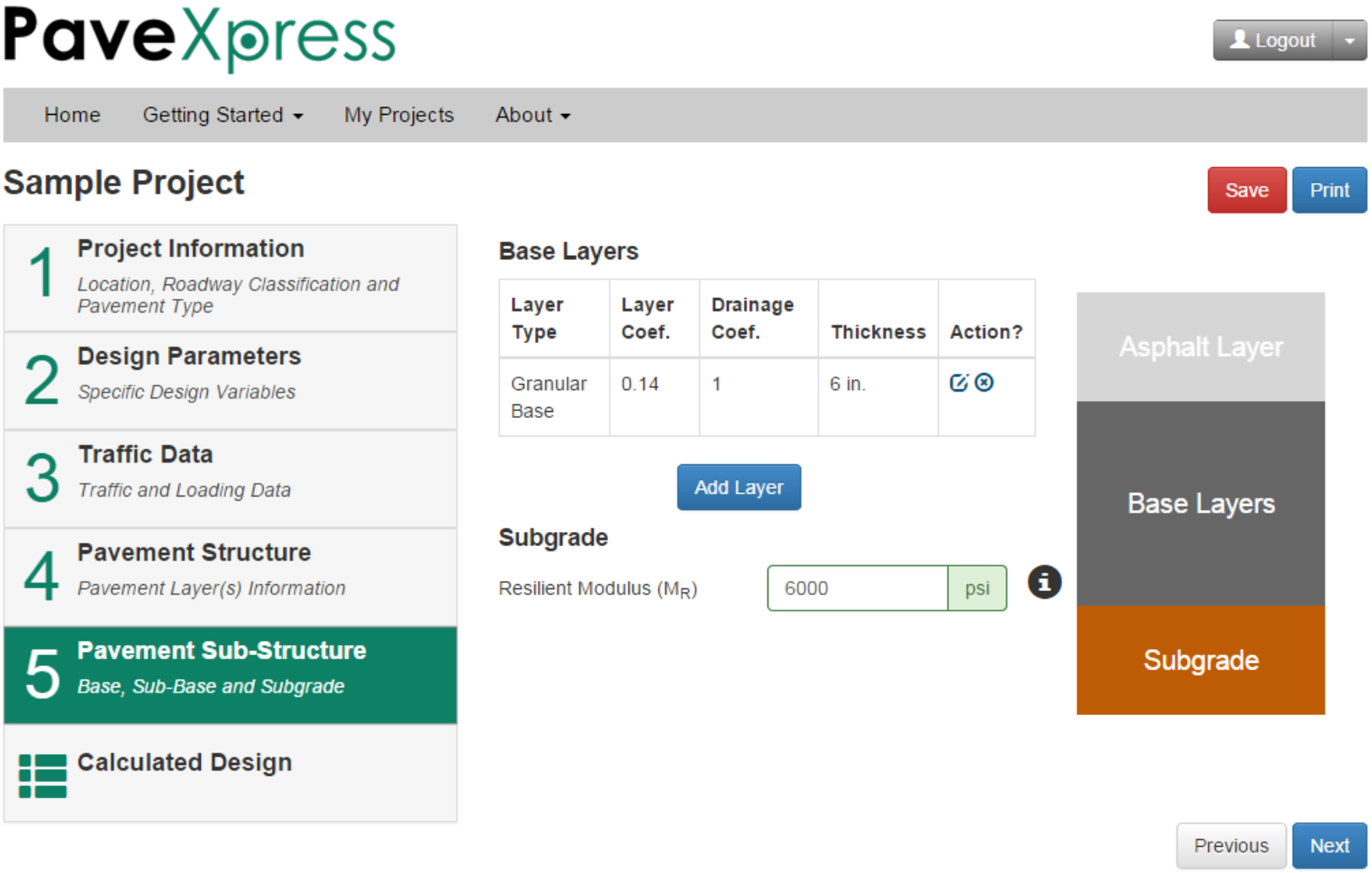
Warnings where appropriate to alert of changes



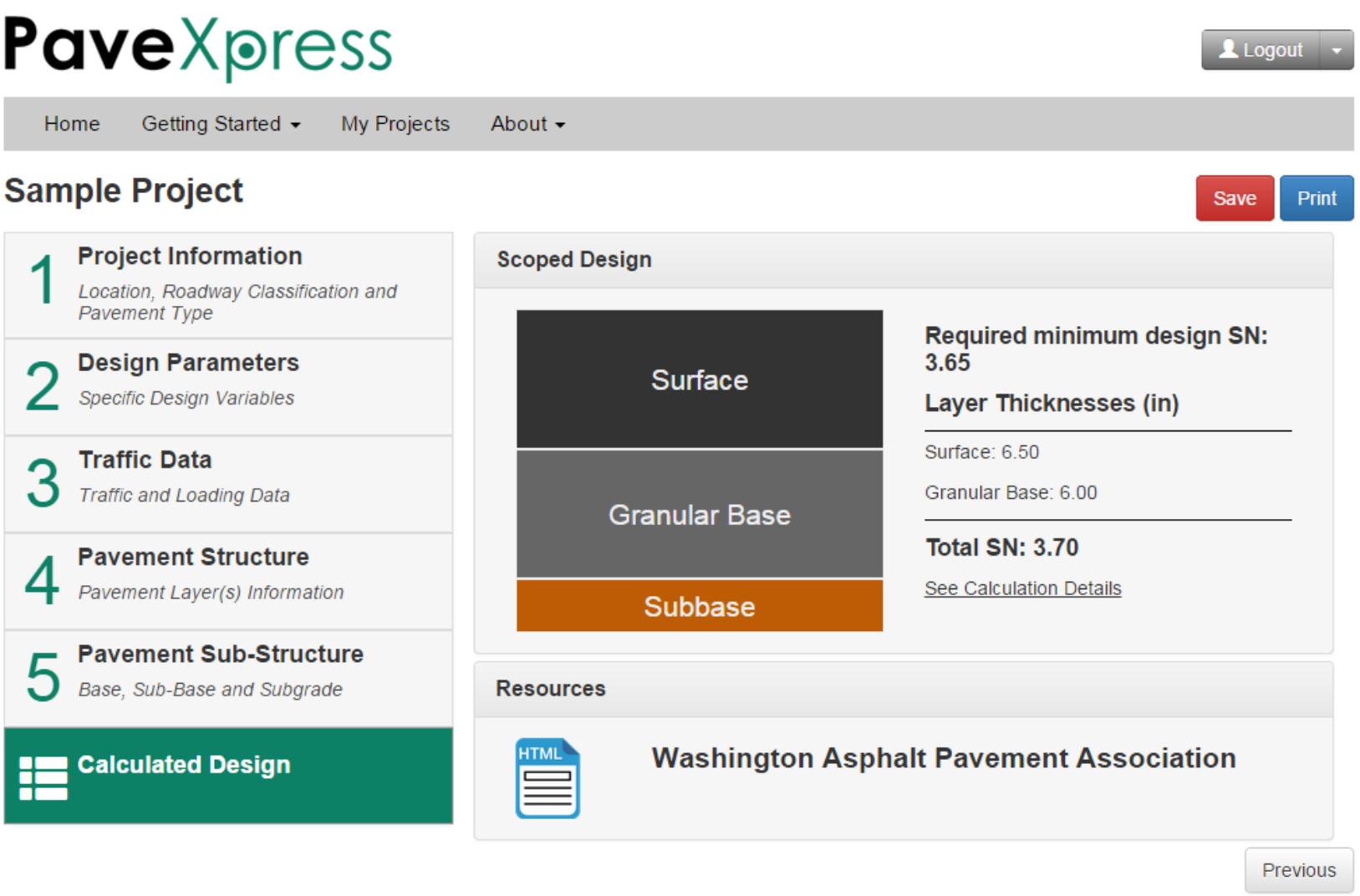
Enter your base layer and subgrade information



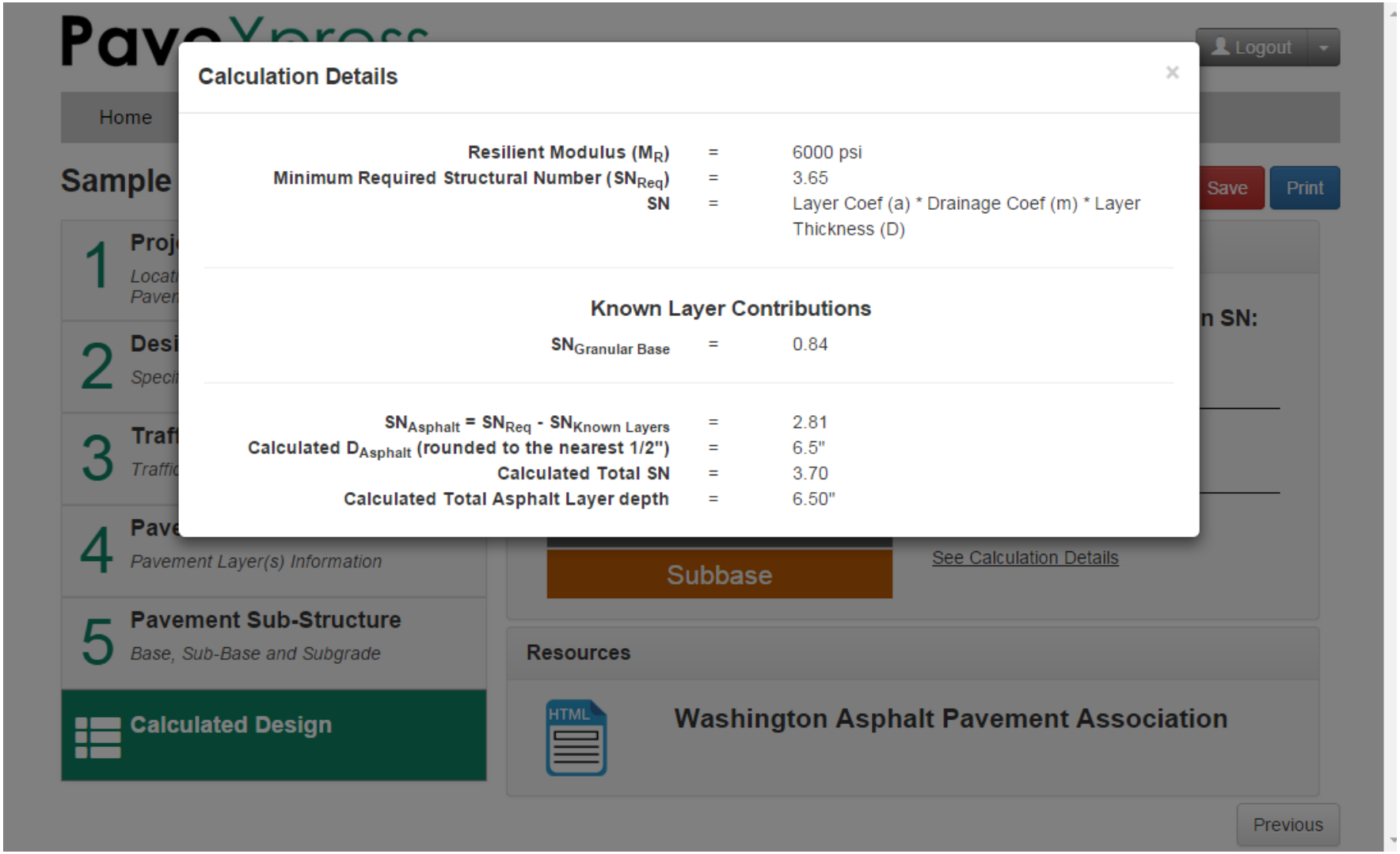
Add multiple base layers if needed



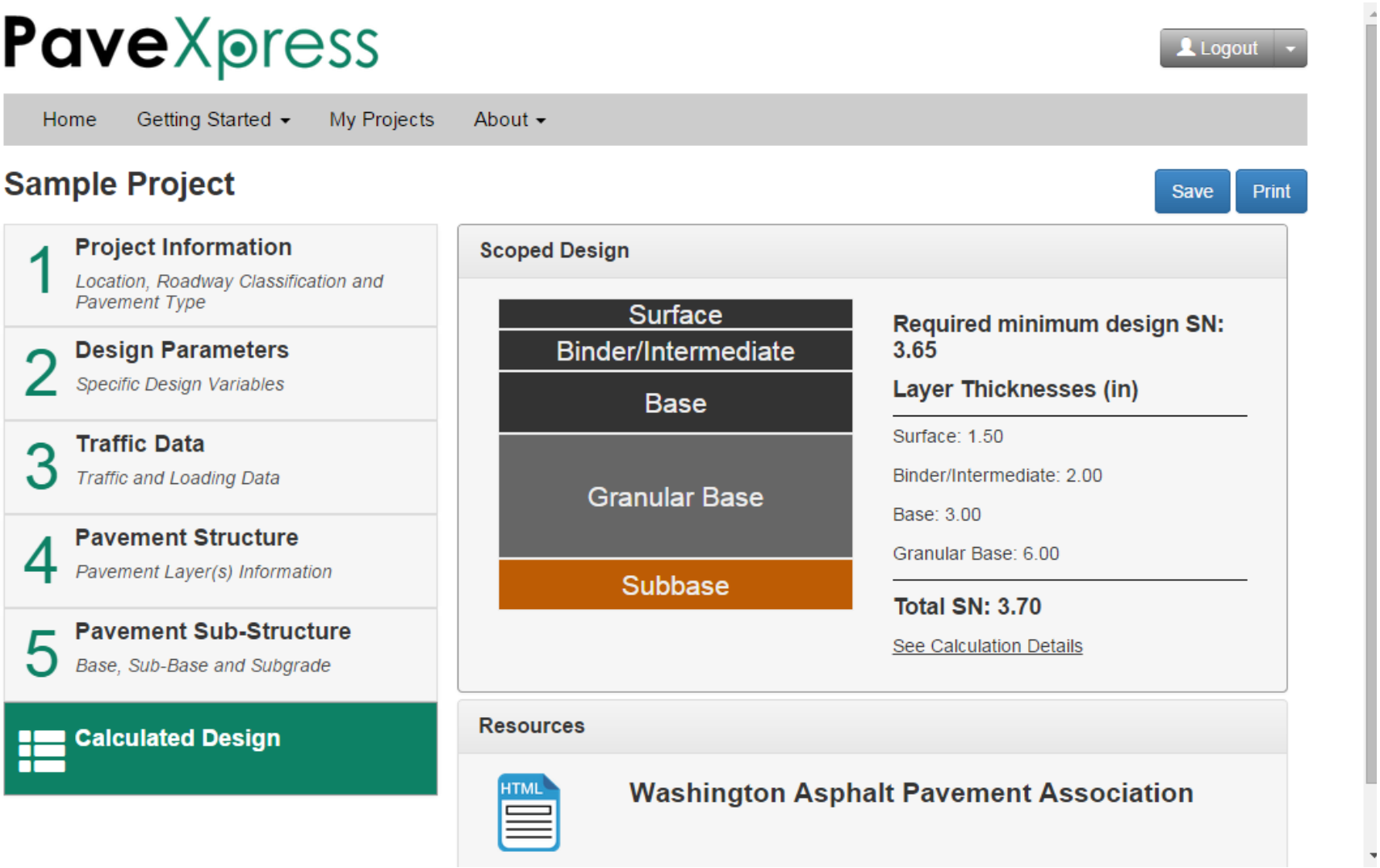
And enter your subgrade…can use conversion tables



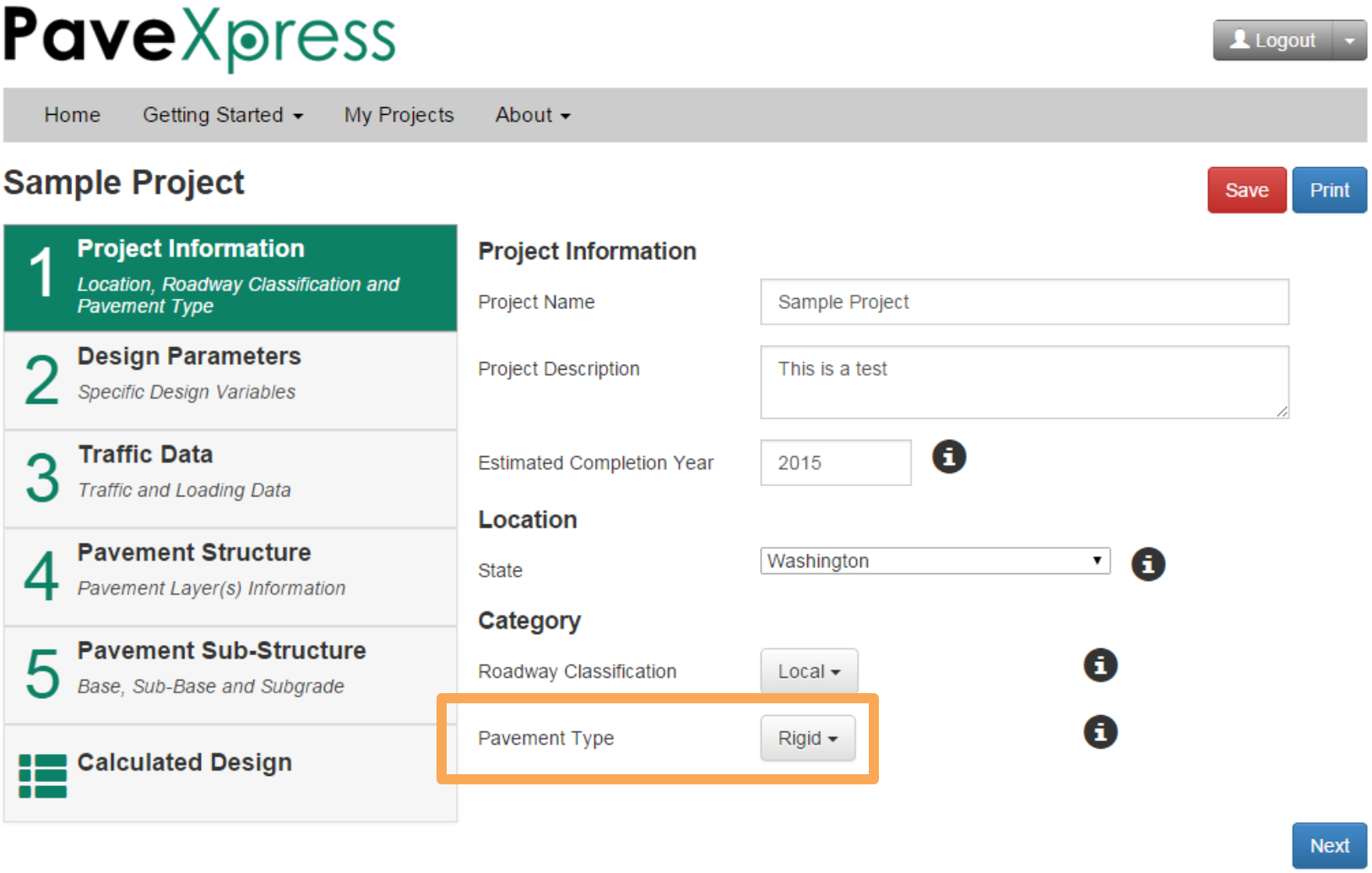
And voila…a design and resources are available



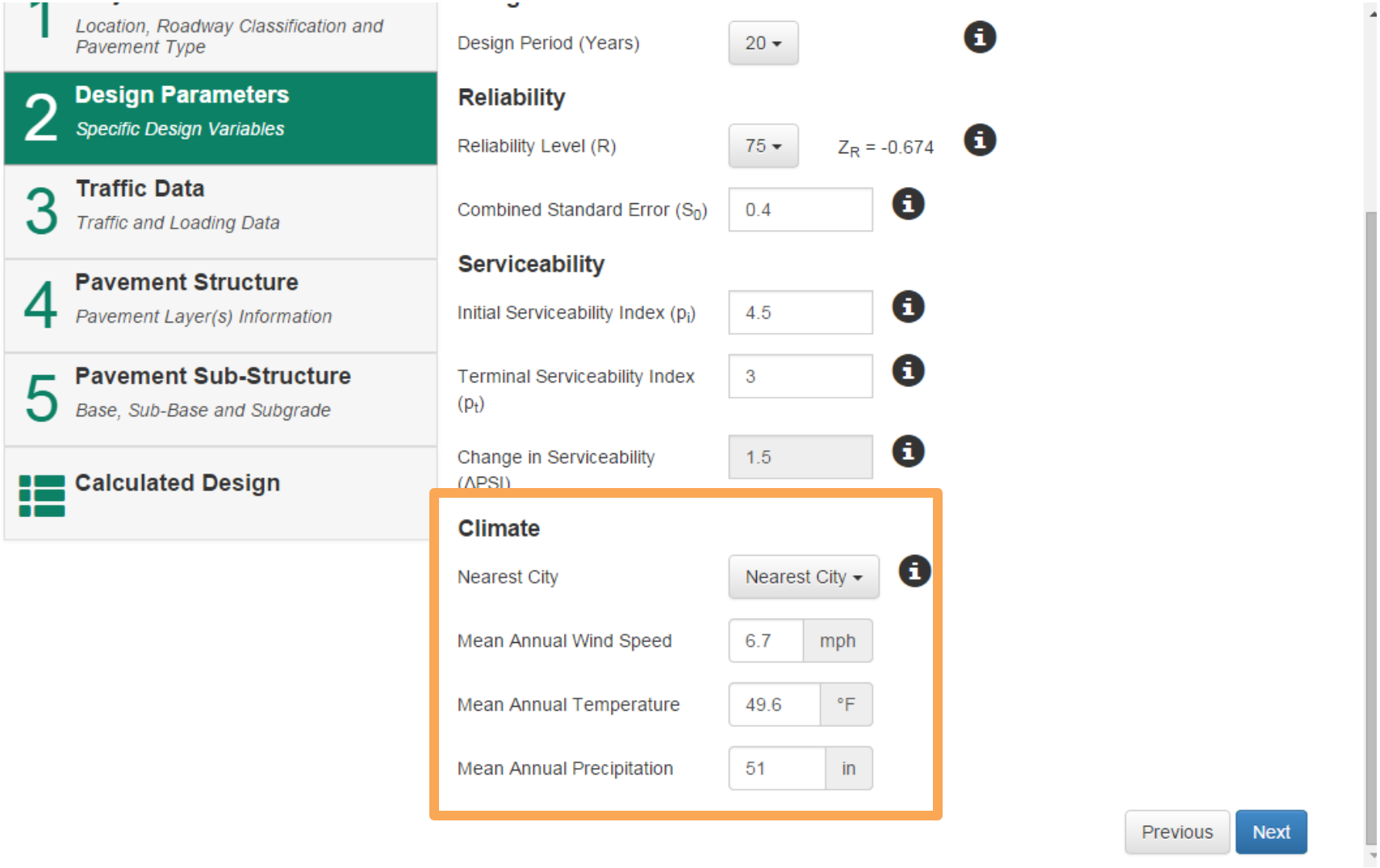
And the calculations are shown



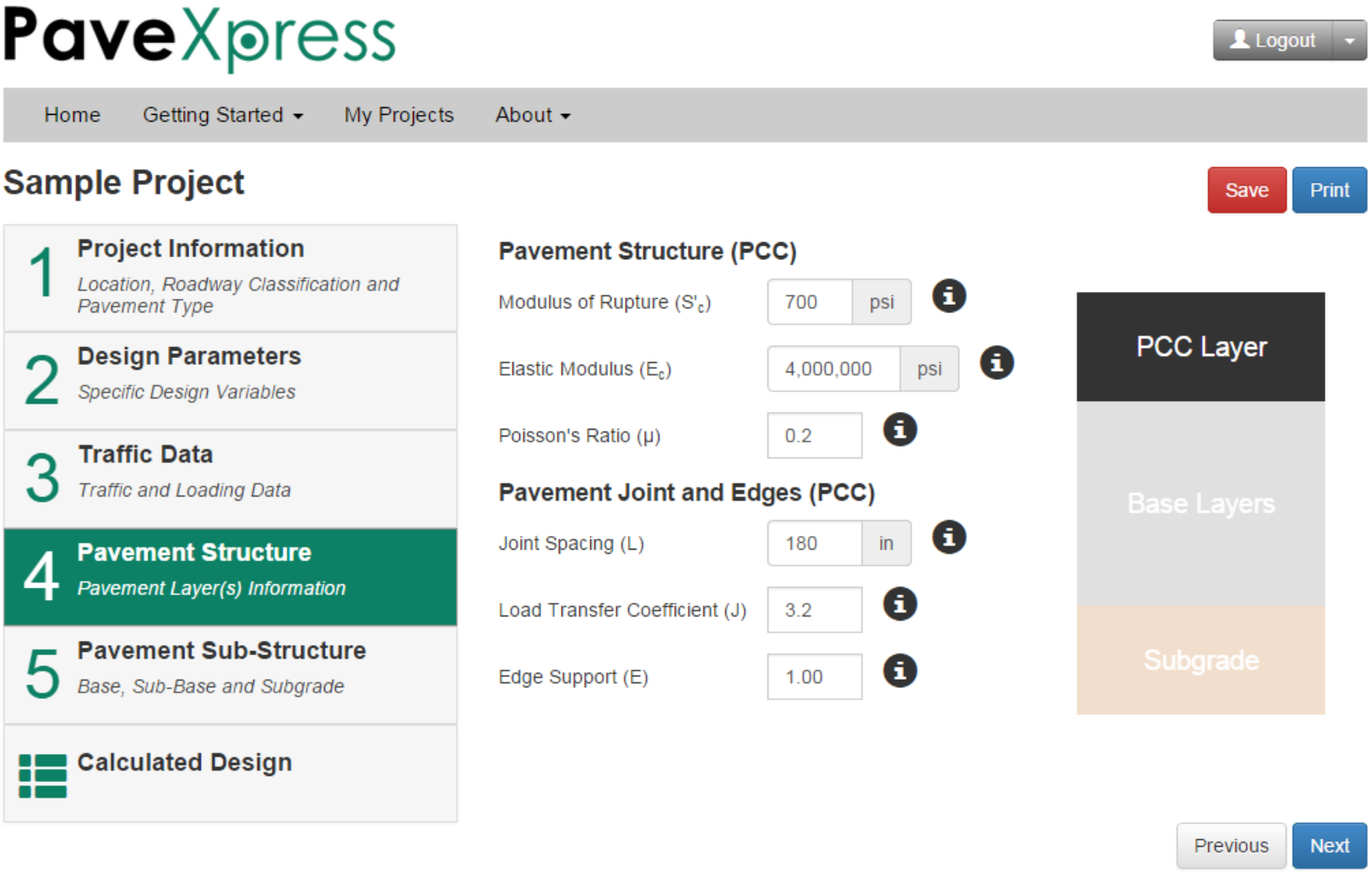
Iterate back and forth to check sensitivity, add layers



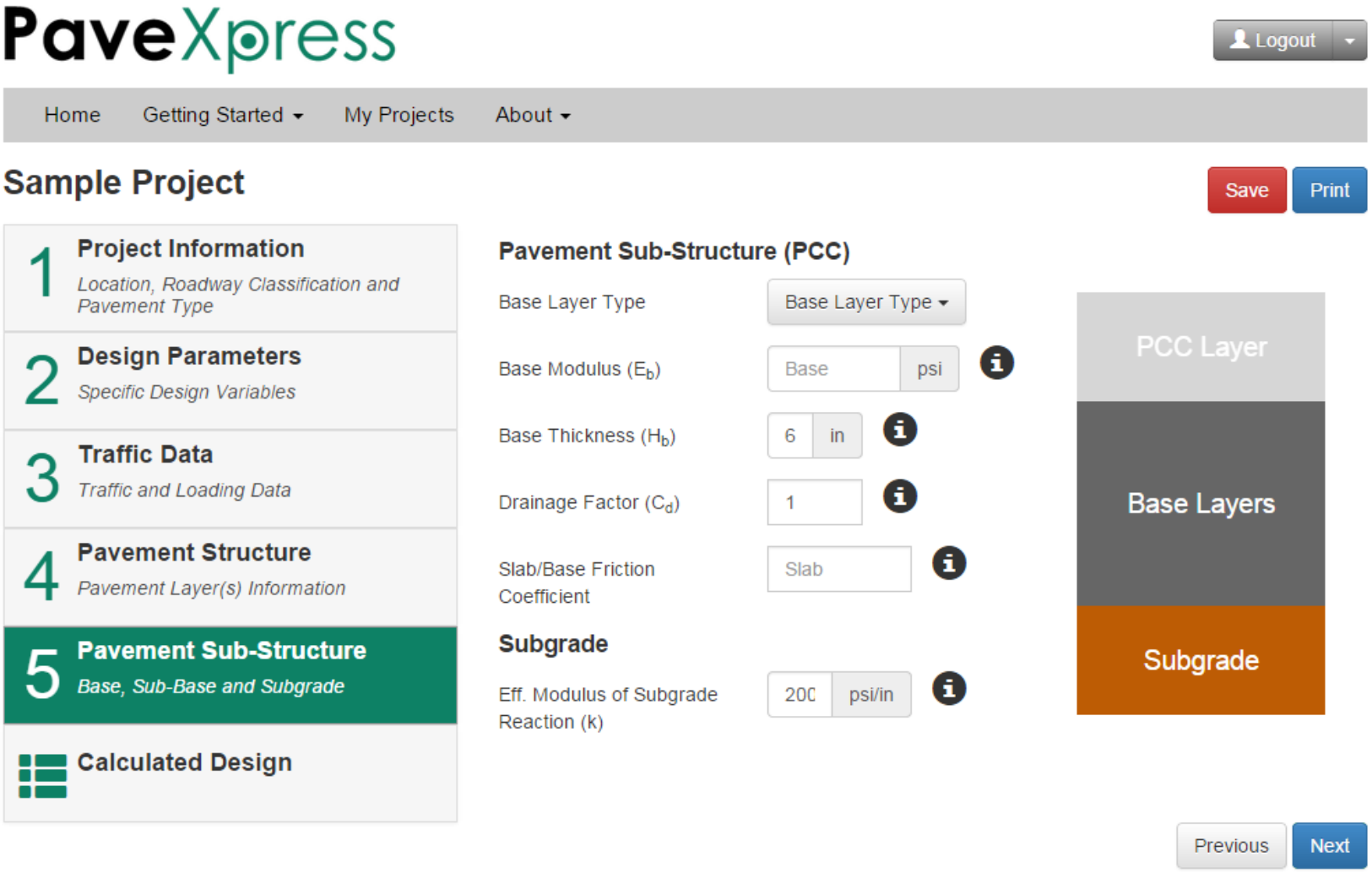
For Rigid, a similar process with a few alterations



Additional design parameters for weather



Specify the surface characteristics



Specify the base characteristics

PaveXpress

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Sample Project

Save | Print

1 **Project Information**
Location, Roadway Classification and Pavement Type

2 **Design Parameters**
Specific Design Variables

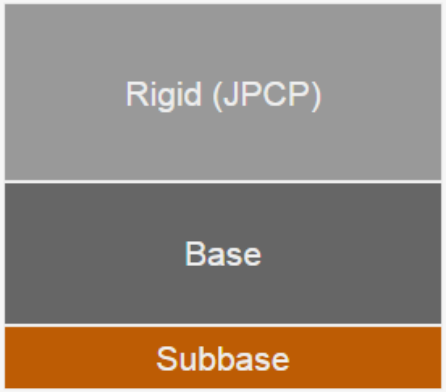
3 **Traffic Data**
Traffic and Loading Data

4 **Pavement Structure**
Pavement Layer(s) Information

5 **Pavement Sub-Structure**
Base, Sub-Base and Subgrade

Calculated Design

Scoped Design



Layer Thicknesses (in)

Rigid (JPCP): 7.5

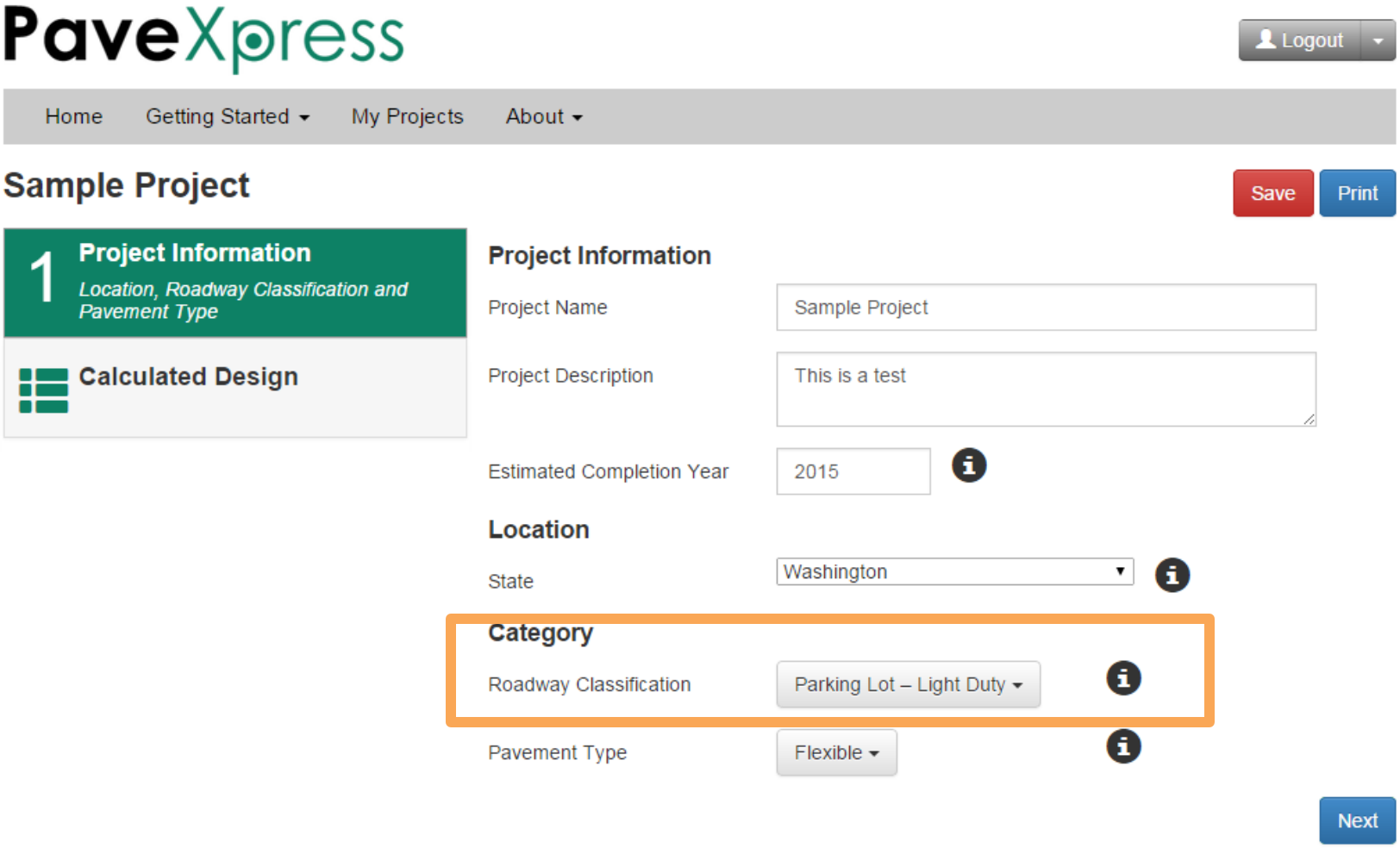
Base: 6.00

See Calculation Details

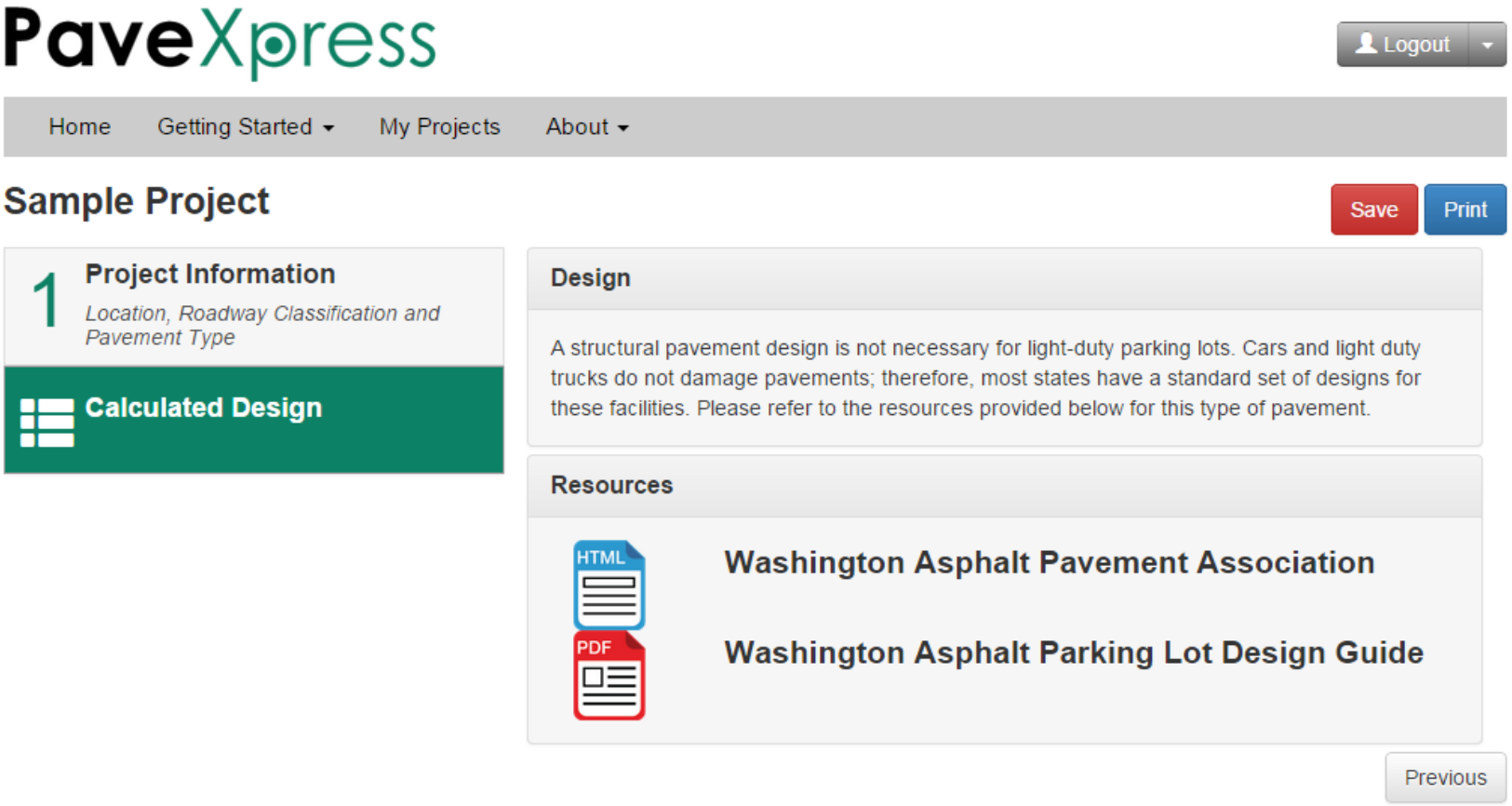
Resources

Previous

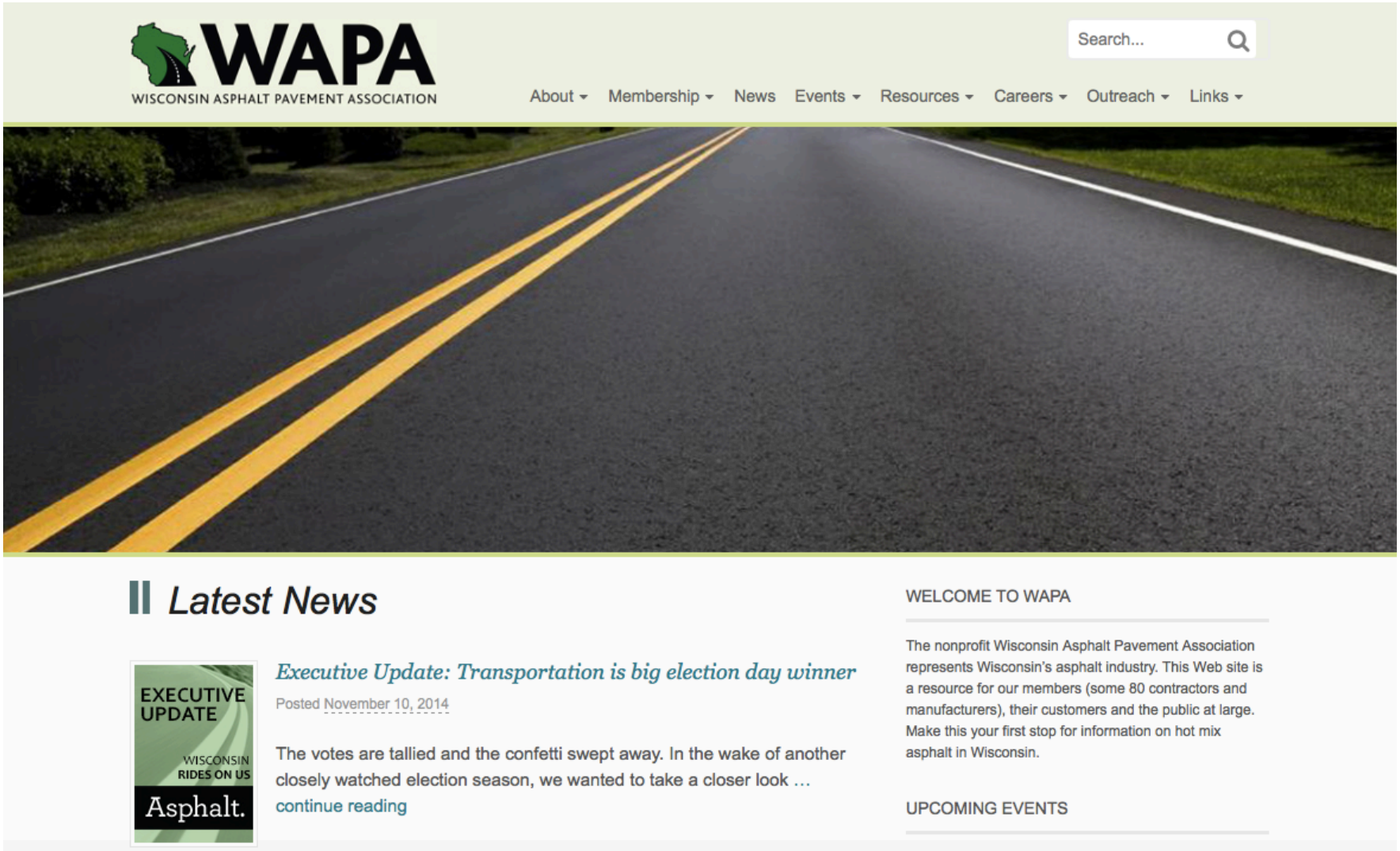
And again, voila, a design is presented with calculations



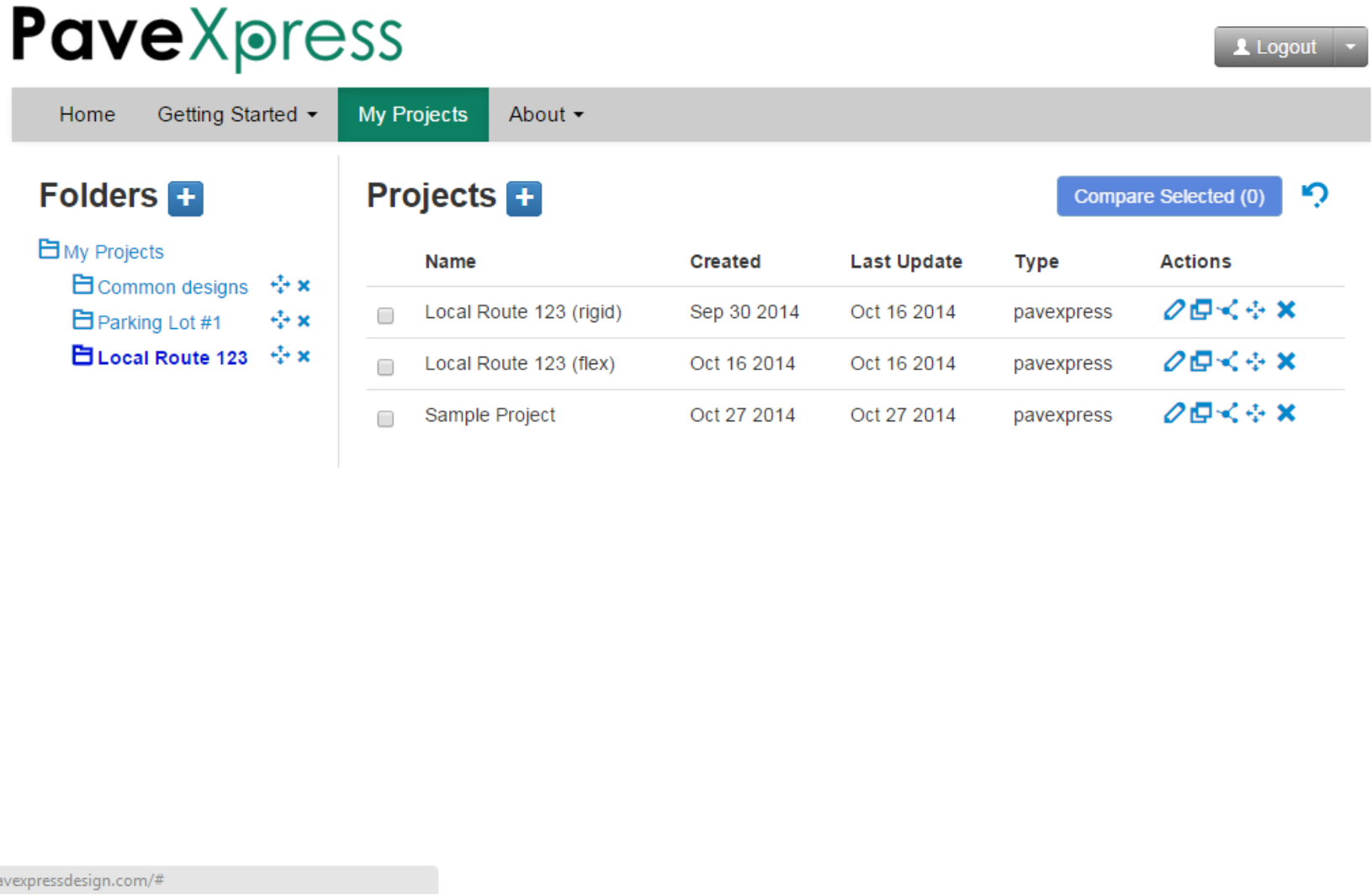
Parking lots you ask?



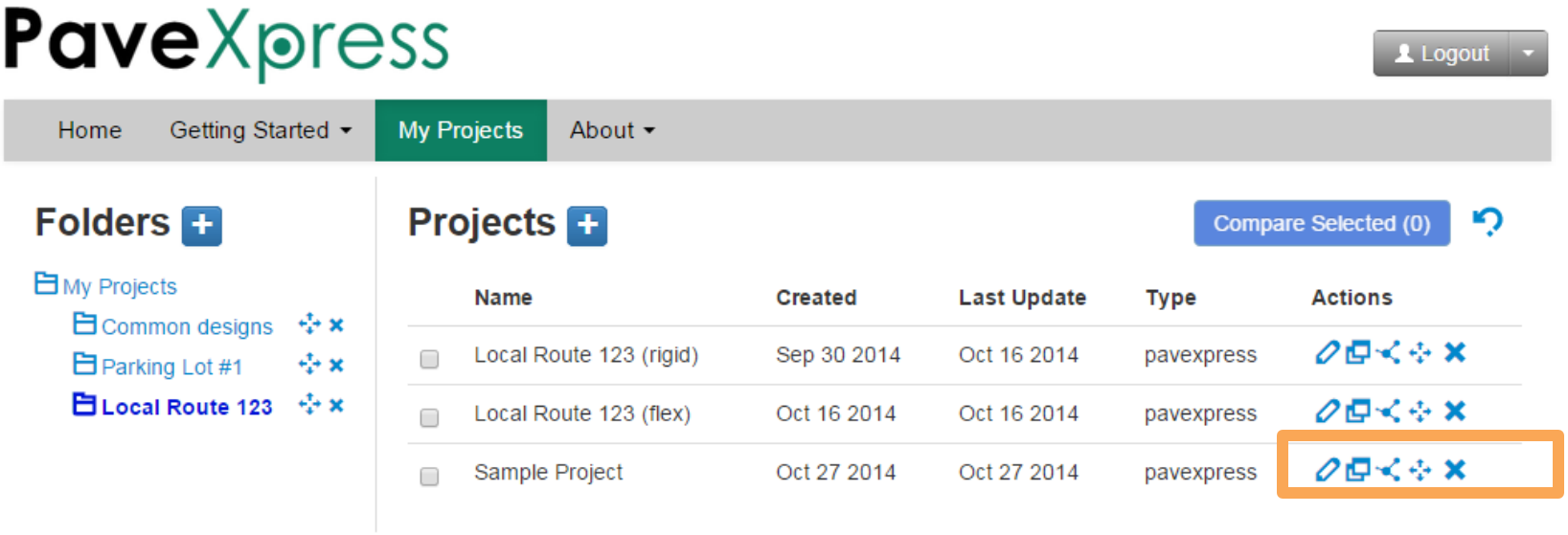
Light duty points directly to local guidance (catalogs)



Takes you to local guidance from WAPA

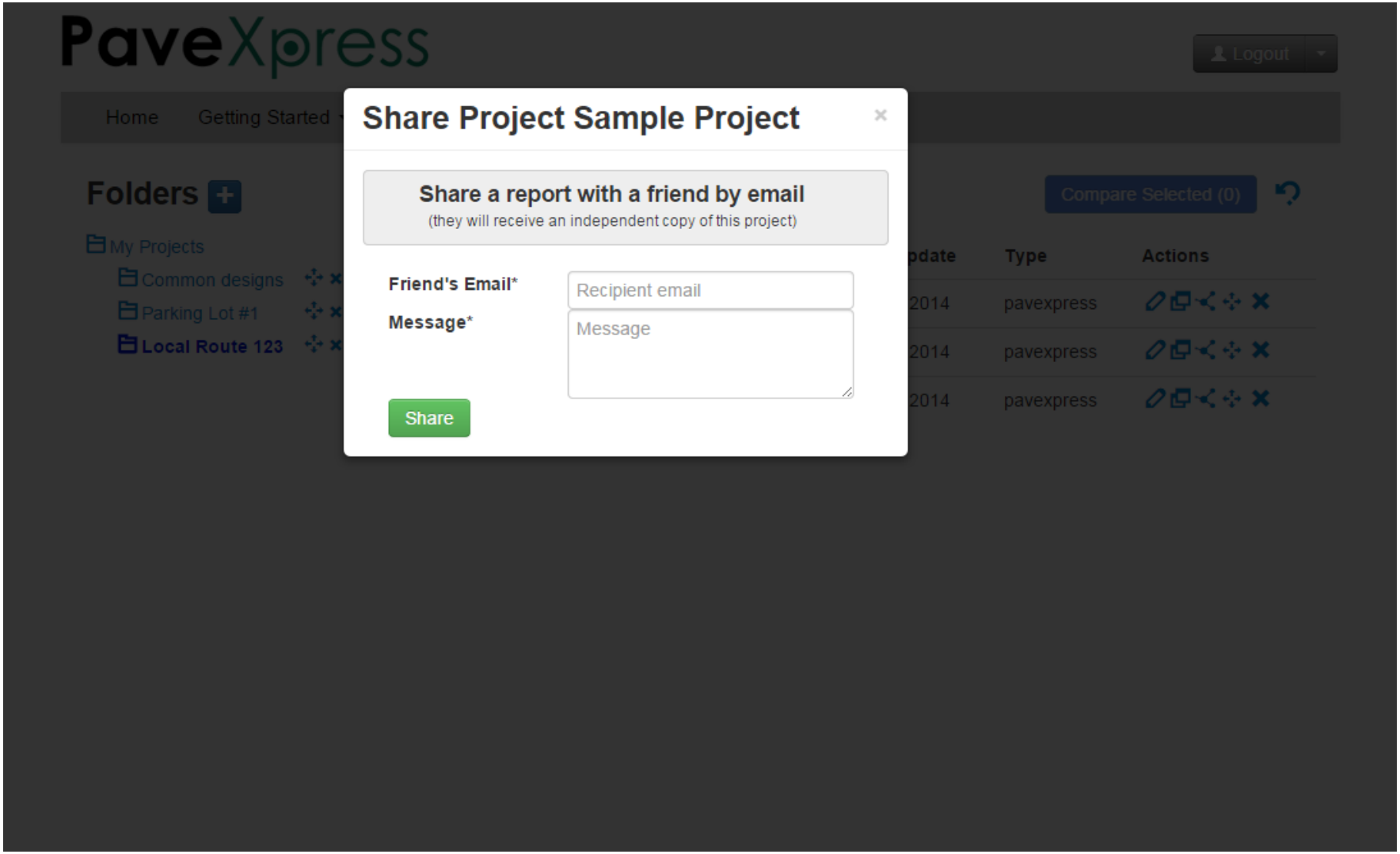


Some other capabilities you should be aware of



www.pavexpressdesign.com/#

Organize, store, and print your designs



Share your design directly from PaveXpress via email

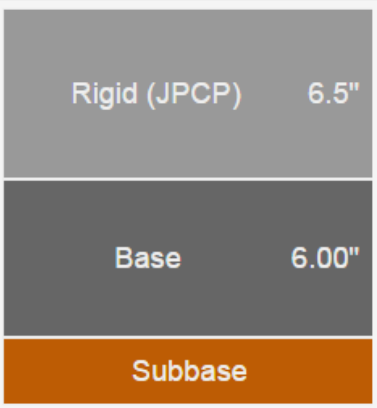
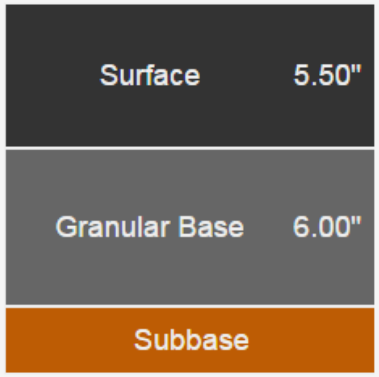
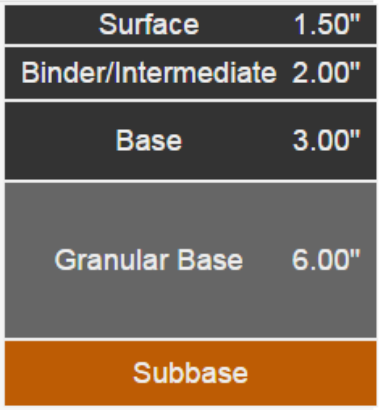
Roadway Classification	Local	Local	Local
Pavement Type	Rigid	Flexible	Flexible

Design Parameters

Traffic Parameters

Pavement Structure

Design Recommendation

Report Title	Local Route 123 (rigid)	Local Route 123 (flex)	Sample Project
Design Thickness	12.5"	11.5"	12.5"
Cross Section			

Compare up to 3 designs side by side

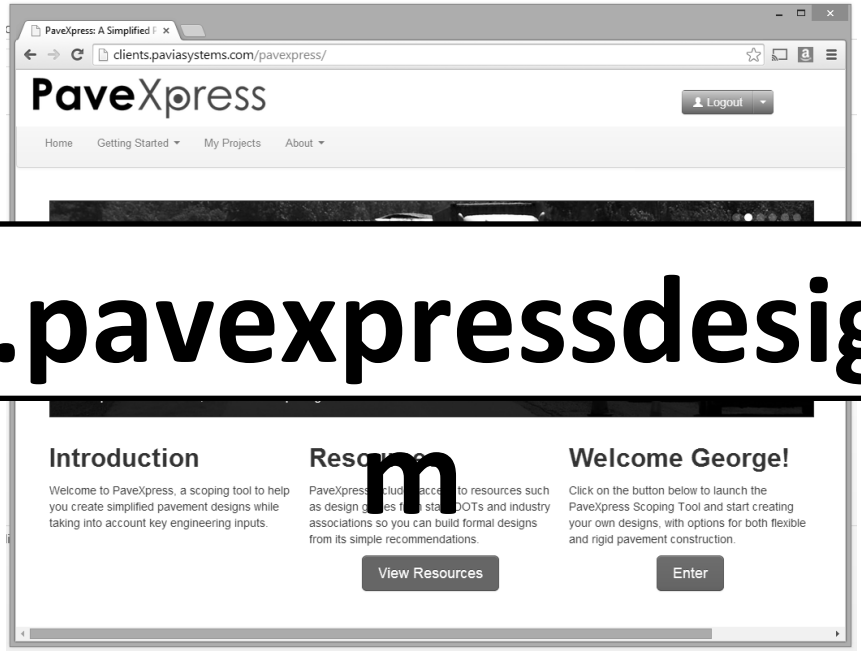
Future of ***PaveXpress***

A framework to continue to build upon:

- Overlay design (empirical)
- Simplified mechanistic design for both new construction and overlays
- Comparison tools for mechanistic and empirical methods
- And more

PaveXpress

A Simplified Pavement Design Tool



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george@paviasystems.com

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PACKERS