PaveXpress – A Simplified Pavement Design Tool!

Trenton M. Clark, P.E. President – Virginia Asphalt Association

October 22, 2020 1:00 pm MDT



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PaveXpress – A Simplified Pavement Engineering Tool!

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Who Do You Work For?

- 1. Local Government Agency
- 2. A/E/C Firm
- 3. Idaho DOT
- 4. FHWA
- 5. Contractor
- 6. Other



Sli.do Code 81078



What Is Your Knowledge of Pavement Engineering?

- 1. I am regularly performing pavement designs and analysis
- 2. I am familiar with the pavement design and analysis process, but rarely do it
- 3. I know very little or nothing about pavement design and analysis, but want to learn more
- 4. None and I am being forced to listen to a guy from Virginia that I can barely understand due to his accent.



Basics of Pavement Engineering

Pavement Design Pavement Analysis Economic Analysis Pavement Management



Recalibration Procedures For The Structural Asphalt Layer Coefficient In The 1993 AASHTO Pavement Design Guide NCAT Report 14-08

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AASHTO 93/98 Design

The Design tool uses the empirical AASHTO93 and AASHTO98 equations to design flexible and rigid pavements respectively, including new structures and rehabilitation.



Life-Cycle Cost Analysis (LCCA)

The LCCA tool estimates and compares costs of alternative pavement designs throughout their design life, including both direct (agency) and indirect (user) costs.



Agency Cost

The Agency Cost calculator quickly estimates direct costs implied by a pavement's materials and geometry.



PerRoad

PeRoad supports Perpetual Pavement philosophy and determines pavement design using mechanistic-empirical (ME) concepts.

History of PaveXpress

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What Is PaveXpress?

A free, online tool to help you create and evaluate pavement designs and overlays using key engineering inputs, based on the empirical and mechanistic-empirical pavement design processes

- ✓ Free no cost to use
- ✓ Accessible via the web and mobile
- Standards Based AASHTO and/or industry standard practices
- ✓ User-friendly streamlined UI/UX
- ✓ Collaborative share, save, and print
- ✓ Interactive help and resources





Don't we already have tools for this?

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Pavement ME is generally used for high volume roads, and a gap exists for easy to use tools for local and lower volume roads



The Evolution of PaveXpress

- Version 1.0
 - New Asphalt
 Pavement Designs
 - New Concrete
 Pavement Designs
 - Parking Lot Design and Guidance





Introduction

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

Resources

View Resources



Logout -

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.



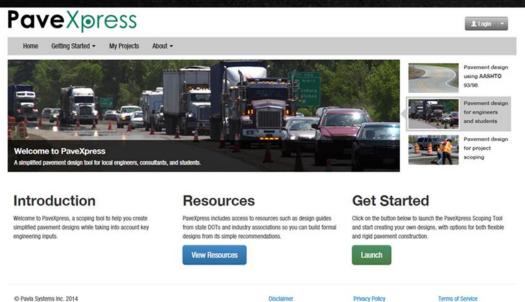


New Construction – Asphalt





The Evolution of PaveXpress



Version 2.0

 Rehabilitation and **Overlay Design with** AC for Flexible Pavements Version 3.0 Structural Porous **Asphalt Pavement**

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Parking Lots and Overlays







Additional Modules

- Simple Cost Estimating
- Mechanistic Pavement Analysis with EverStress
- LCCA with FHWA's RealCost
- PaveInstruct



PAVEXpress Statistics

Sessions		Users	
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131,996 % of Total: 100.00% (131,996)	1.4	1 5,200	

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States with heaviest usage

		6.	New York	1,436	(4.00%)
		7.	Virginia	1,289	(3.59%)
			Missouri	1,107	(3.08%)
		9.	Florida	1,077	(3.00%)
		10.	Colorado	1,018	(2.84%)
1 5,200 5 000 (c) co		11.	Pennsylvania	1,007	(2.81%)
1. Washington	5,200 (14.49%)	12.	Ohio	950	(2.65%)
2. California	2,781 (7.75%)	13.	New Jersey	890	(2.48%)
3. Texas	2,458 (6.85%)		•		(2.10.0)
4. Michigan	1,507 (4.20%)	14.	South Carolina	862	(2.40%)
5. Illinois	1,448 (4.03%)	15.	Indiana	799	(2.23%)





User Survey

- 2018 Survey of PaveXpress Users
- Three Common Requests for Enhancements
 - Metric Capability
 - Simplified LCCA for Agencies
 - Mechanistic-Empirical Pavement Design Methodology (i.e., PerRoad)



Metric Capability

- Implemented in 2020
- Allows user to toggle between units
- Beneficial for non-US markets



What Is LCCA?

 "an engineering economic analysis tool that allows transportation officials to quantify the differential costs of alternative investment options for a given project."
 – FHWA

Source: https://www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.cfm



Two Approaches to LCCA

Real Cost

- Includes deterministic and probabilistic modeling
- Incorporates user costs
- Considers impacts of work zones
- Data input intensive

Simplified Agency

- Deterministic modeling
- Focuses on agency costs





LCCA Overview in PaveXpress

Activities

- New Construction
- Reconstruction
- Rehabilitation
- Resurfacing
- Corrective Maintenance
- Preventive Maintenance





M-E Pavement Design

- Based on PerRoad
- Uses engineering properties of materials
- Focuses on bottom up cracking and subgrade rutting





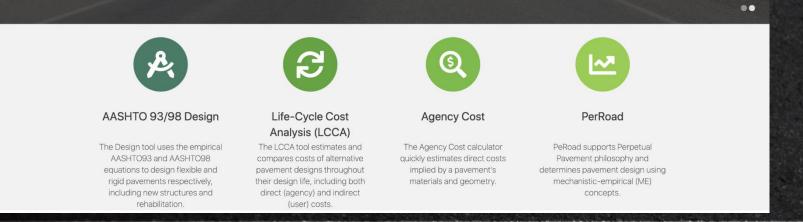
Let's walk through PaveXpress together

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PRODUCTS - LEARNING CENTER - RESOURCES -

Recalibration Procedures For The Structural Asphalt Layer Coefficient In The 1993 AASHTO Pavement Design Guide NCAT Report 14-08

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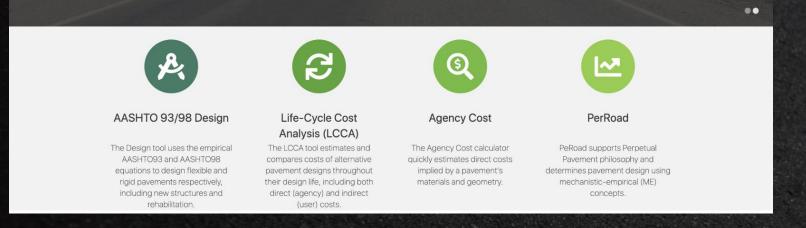
http://beta.pavexpress.com

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Takeaways

- PaveXpress uses 1993/1998 AASHTO and PerRoad for Designs
- AC Overlays can be designed using current distress and structural condition
- Pavement thickness is influenced by traffic loadings, subgrade strength and material properties
- Users can modify LCCA scenarios and unit costs



QUESTIONS

