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

AASHTO 93/98 Design
The Design tool uses the empirical AASHTO93 and AASHTO95 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
PerRoad supports Perpetual Pavement philosophy and determines pavement design using mechanistic-empirical (ME) concepts.

History of PaveXpress
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?

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
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
Parking Lots and Overlays
Additional Modules

- Simple Cost Estimating
- Mechanistic Pavement Analysis with EverStress
- LCCA with FHWA’s RealCost
- PaveInstruct
PAVEXpress Statistics

Sessions
97,716
% of Total: 100.00% (97,716)

Users
56,002
% of Total: 100.00% (56,002)

Avg. Session Duration
00:04:31
Avg for View: 00:04:31 (0.00%)

% New Sessions
56.82%
Avg for View: 56.82% (0.00%)

Pages / Session
2.30
Avg for View: 2.30 (0.00%)

Pageviews
224,394
% of Total: 100.00% (224,394)

Unique Pageviews
131,996
% of Total: 100.00% (131,996)
## States with heaviest usage

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<th>State</th>
<th>Usage</th>
<th>Percentage</th>
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<tr>
<td>2</td>
<td>California</td>
<td>2,781</td>
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<td>Indiana</td>
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</tbody>
</table>
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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Visit

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