Competitive Environment
Market Research Efforts
What’s Next?

- Mixture Quality & Performance
- Life-Cycle Cost Analysis
- Legislative
- Life Cycle Assessment
Financial status

- $2.4 Million Approved
- $1.778 Million Spent
- 38 SAPAs Supported in 2017

Deliverables status

- 38 Projects Total
- 27 Projects are Complete or Near Completion

www.AsphaltPavement.org
PAVEMENT DESIGN
Simplified

Web-Based Pavement Design Tool

Designing the right pavement for the job just got easier thanks to PaveXpress, a free web-based pavement design tool for roadway and parking lot pavements.

Projects created in PaveXpress can be printed, shared, and saved, and design options can easily be evaluated in a side-by-side comparison. As a browser-based tool, PaveXpress is always up to date and can be accessed from any computer or mobile device, regardless of screen size or operating system.

PaveXpressDesign.com
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
The evolution of PaveXpress....

- New Flexible
- New Rigid
- Parking Lots

- Cost Module
- LEA Module
- UI/UX Update

Upcoming modules:
Integration with PerRoad LCCA framework (ie: RealCost)
Porous Asphalt Pavement Design

- Overlay design
- Condition Survey
- NDT
Over 26,000 users with 1/3 returning
Users from every state in the U.S.
Users from 157 countries -> 66% from U.S.
Mechanistic-Empirical Pavement Design

• How best to implement M-E Design?
  — Perpetual Pavements?

• How do advanced and sustainable materials fit into pavement design?
Scope of Work

- Pavement Design State of the Practice
- Need for local validation and calibration of ME Design software
- Evaluate Performance Criteria and Reliability in ME Design Software
- Develop Recommendations for Maximum Thickness and Recalibration of 1993 Design Guide
Advancements in Flexible Pavement Design

http://eng.auburn.edu/research/centers/ncat/info-pubs/technical-reports.html
This award honors asphalt pavements that were designed and built with outstanding care and exceptional quality. The result is a long-lasting pavement, one that serves the traveling public well, provides true value to the taxpayers, and demonstrates both the convenience and the quality of asphalt pavements.

Criteria:
• 35+ years old
• 13+ years between overlays (average)
• No increase > 4"

Awards:
• 117 Pavements
• 31 States
PerRoad Update (v4.4)

- Implement strain distribution design criteria within PerRoad.
  - Layered elastic analysis with a statistical analysis procedure to estimate stresses & strains within a pavement.

- Revise PerRoad to include mechanistic design of ALL pavements.

http://www.eng.auburn.edu/users/timmdav/PerRoad44.msi
Porous Asphalt

• Recommended Layer Coefficients
  • OGFC Surface 0.40-0.42
  • ATPB 0.30-0.35
  • Stone bed 0.10-0.14
Website: mylearning.asce.org
Search: “Flexible Pavement Design”
Mixture Quality and Performance

Education & Training

Thinlays
Education Program
• Module 1: Basic LCCA concepts, steps, and inputs (60 min.)
• Module 2: Concrete marketing myths and reality (20 min.)
• Module 3: Example LCCA (30 min.)
LCCA Training Materials
Pavement–Vehicle Interaction
What Comes to Mind?
Sustainable Development

• “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”
  • *Our Common Future*, 1987
Life Cycle Cost Analysis

Life Cycle Assessment

S-LCA

Emerald ECO LABEL

Economic

Equitable

Social

Sustainable development

Viable

Bearable

Environment
Life Cycle Assessment

• International Organization for Standardization (ISO 2006)
• “addresses the environmental aspects and potential environmental impacts (e.g., use of resources and the environmental consequences of releases) throughout a product’s life cycle from raw material acquisition, through production, use, end-of-life treatment, recycling, and final disposal (i.e., cradle to grave).”
LCA History

• 1960’s – Energy and raw material concerns
• Harold Smith (1963): calculate cumulative energy requirements for production of chemical intermediates
• *The Limits of Growth* and *A Blueprint for Survival*
• Dozen studies to look at costs and environmental impacts
• Who laid the groundwork?
LCA History

• The Coca-Cola Company (1969) developed methods and groundwork for LCA of today
  • Compared different beverage containers to determine environmental releases and required raw materials
• Other companies followed suit
How is an Environmental Product Declaration created?

PCR  LCA  EPD
The Family of Acronyms

• **Product Category Rule (PCR): The Framework**
  • “Set of specific rules, requirements, and guidelines for developing Type III environmental product declarations for one or more product categories” (ISO 14025)

• **Life-cycle Assessment (LCA): The Process**
  • “Compilation and evaluation of the inputs, outputs, and potential environmental impacts of a product system throughout its life cycle” (ISO 14040)

• **Environmental Product Declaration (EPD): The Declaration**
  • “Providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information” (ISO 14025)

Adapted from N. Santero
Steps to Getting a Typical EPD:

1. Select a program operator
2. Find or commission an LCA study of your product type
3. Develop a PCR committee
4. Make all relevant decisions in committee
5. Have your draft PCR reviewed by at least three experts (and open comment period)
6. Publish corrected PCR
7. Conduct your LCA and draft the EPD
8. Have the EPD reviewed by an expert
9. Publish your reviewed EPD

List from Institute for Environmental Research and Education
Steps to Getting a Typical EPD

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4. Make all relevant decisions in committee
5. Have your draft PCR reviewed by at least three experts (and open comment period)
6. Publish corrected PCR
7. Create an EPD using a verified tool

List from Institute for Environmental Research and Education
EPDs will be Cradle-to-Gate
Welcome to the NAPA Asphalt Mixture EPD Tool

What are Environmental Product Declarations?

An Environmental Product Declaration (EPD) is a Type III Environmental Label as defined in ISO Standard 14025:2006, Environmental Labels and Declarations.

ISO 14025 is a recommendation on the collection and presentation of environmental data and the processes should be used to ensure consistent data collection, analysis and reporting requirements supported by third-party verification. This ensures the reliability of the information communicated through an EPD. Typically an EPD development process adheres to various international standards, chief among them is the ISO 14025 standard.

What does the NAPA EPD program intend to do?

The goal of the NAPA EPD program is to provide comprehensive, credible, and comparable environmental data to stakeholders (engineers, specifiers, users, and producers) that may be used in future pavement designs. The data published through the program will allow decision-makers to make informed comparisons among asphalt mixes and reduces the risk of overlooking the environmental impact of pavements. The EPD program will help accountants, industry-specific LA assumptions, allowing for credible and transparent reporting.

The EPD produced by this tool complies with the NAPA Product Category Note for asphalt mixtures.

Who can use this tool?

Asphalt plant owners, producers, contractors and anyone who is a supplier in the asphalt materials industry and intends to communicate the cradle-to-gate environmental impacts of their asphalt mixes using an EPD.

How can this tool be used?

Please create an account following the link in the side bar menu. Then follow each of the steps as indicated to develop a profile of energy use for your asphalt plant, the distances traveled by raw material coming into your plant, and the design information for mixtures you intend to get an EPD for.
Welcome to the EPD Tool data gathering sheet. It is meant to be used in conjunction with the EPD Tool Instructions (pdf).

1. Organizational and Production (plant) level information
2. Supplier level information
3. Mix level information

Rows 4-8 are for gathering data on the sources of substances in mixes.
Rows 9-21 are for specifying mixes.

Welcome to the EPD Tool data gathering sheet. It is meant to be used in conjunction with the EPD Tool Instructions (pdf).

It is provided to help you gather the relevant data needed to create your first EPD using the Asphalt EPD tool.

The data caries divided into three categories:

1. Organizational and Production (plant) level information
2. Supplier level information
3. Mix level information

Rows 4-8 are for gathering data on the sources of substances in mixes.
Rows 9-21 are for specifying mixes.

All data entered into the EPD tool is confidential. Only the downstream environmental impacts will appear in the final EPD. No sensitive data about mix design or energy usage will be revealed in the EPD.

<table>
<thead>
<tr>
<th>Organisational Data</th>
<th>Units</th>
<th>Comments &amp; Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name</td>
<td></td>
<td>In the EPD Tool, “Organization” refers to a whole company. For smaller operations, this may be the same as some of the “Plant” data.</td>
</tr>
<tr>
<td>Contact information for headquarters or billing department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name and contact information for the person who will be the lead for EPD creation at your company</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Production Facilities | | |
|-----------------------|-----------------|
| Plant name            | A user can create multiple plants. |
| Physical address      | Cannot be a P.O. Box. The 775 code will be used for certain calculations. |
| Name and contact for head of EPD creation for this plant | May be the same person for several plants. Does not need to be the Technical Lead. |

<table>
<thead>
<tr>
<th>Production Facility Resource Use</th>
<th>Units</th>
<th>Comments &amp; Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Production &amp; Electricity</td>
<td></td>
<td>All quantities reported in the Production Facility section will be over a cumulative period of 12 months, within the last five years. Enter the start date of the twelve month period during which the data was recorded. The reported data for all subsequent categories (in Production Facility) must have been measured for the same twelve month period.</td>
</tr>
</tbody>
</table>
• Web-based tool
• Tool hosted by a third party to ensure confidentiality of data
• Inexpensive, easy-to-use method to create EPDs
• Results are calculated and displayed on a printable PDF that can easily be shared with your customer
“The Authority requires EPDs to be collected by our design-build contractor for our construction package, called CP4. We have required EPDs from suppliers of concrete and steel products. For other contracts, we have reached out directly to suppliers for EPDs.”

*Margaret Cederoth*, AICP LEED AP, Sustainability Manager, California High-Speed Rail Authority
“Oregon’s 2012 Green Chemistry Executive Order led to ‘Green Chemistry Procurement Guidelines’ for state purchasing activities. This guidance encourages state agencies to use a variety of optional tools (including EPDs) to make more sustainable purchasing decisions. Both Oregon DEQ and Oregon DAS are expected to implement this guidance with more staffing and technical expertise in future state procurement activities. Thus, EPDs may become one of the many tools state agencies use in future procurements to buy more sustainable materials and products.”

*Jordan Palmeri, Materials Management Program, Oregon Department of Environmental Quality*
An act to amend and renumber the heading of Article 5 (commencing with Section 3400) of Chapter 3 of Part 1 of Division 2 of, and to add Article 5 (commencing with Section 3800) to Chapter 3 of Part 1 of Division 2 of, the Public Contract Code, relating to public contracts.

[ Approved by Governor October 15, 2017; filed with Secretary of State October 15, 2017. ]

LEGISLATIVE COUNSEL'S DIGEST


The State Contract Act governs the bidding and award of public works contracts by specific state departments and requires an awarding department, before entering into any contract for a project, to prepare full, complete, and accurate plans and specifications and estimates of cost.

Other existing law establishes specific requirements for competitive bidding for building and improvement projects by the Regents of the University of California, including requiring the Regents to prepare plans and specifications before entering into a contract for a project.

The California State University Contract Law governs contracting for building and improvement projects by the California State University and imposes specific competitive bidding requirements for the Trustees of the California State University, including requiring the Trustees to prepare full, complete, and accurate plans and specifications for a project.

This bill, the Buy Clean California Act, would, by January 1, 2019, require the Department of General Services to establish, and publish in the State Contracting Manual, a maximum acceptable global warming potential for each category of eligible materials, in accordance with requirements set out in the bill. The bill, by January 1, 2022, and every 3 years thereafter, would require the department to review the maximum acceptable global warming potential for each category of eligible materials established, and would authorize the department to adjust that number downward for any eligible material to reflect industry improvements, as provided.

The bill, for specified types of contracts entered into on or after July 1, 2019, would require an awarding authority to require a successful bidder to submit a current Environmental Product Declaration, developed in accordance with specified standards, for that type of product. The bill would require an awarding authority to include in a specification for a bid for an eligible project, as defined, that the facility-specific global warming potential for any eligible materials does not exceed the maximum global warming potential for that material determined by the department in accordance with the process described above. The bill would also authorize an awarding authority to include in a specification for bids for an eligible project a facility-specific global warming potential for any eligible material that is lower than the maximum global warming potential for that material as determined by the department in accordance with the process described above. The bill would prohibit a successful bidder from installing any eligible materials on an eligible project until that bidder submits an
LC 3021
2017 Regular Session
2/23/17 (TSB/pa)

DRAFT

SUMMARY

Requires Department of Transportation to establish pilot program to assess how products that department or contractor for department procures affect emissions of carbon dioxide. Provides that pilot program must require prospective contractors to declare environmental product cost of certain products in response to invitation to bid for public improvement contract. Requires department to determine lowest responsible bidder after adding environmental product cost to product.

Provides that local contracting agency may adopt practices of department.

Requires all state contracting agencies to adopt practices of department beginning January 1, 2021.

Requires Department of Environmental Quality to adopt and keep updated rules for calculating environmental product cost of certain products.

Becomes operative January 1, 2018.
Sustainability measures key to long-lasting concrete pavements

Chris Hill | November 28, 2017
Pollutant Emissions from Asphalt Pavement Mixture (APM) Plants

- APM plants have engineering controls to minimize pollutant emissions
- Regulation of APM plants
  - Qualify as minor sources
  - Baghouse required per federal regulations
  - Many states have streamlined permitting procedures as emissions are below *de minimis* thresholds
What’s in Dryer Stack-Gas?

Asphalt Pavement Mixture Plant Effluent Composition (by Mass)

- Nitrogen: 69%
- Oxygen: 11%
- CO2: 7%
- Water: 13%
- Other: 0.06%

PM-10: 0.006%
VOCs: 0.008%
Formaldehyde: 0.0038%
Benzene: 0.0001%
CO: 0.03%
SO2: 0.0009%
NOx: 0.007%
Pollutant Emissions from APM Plants

- APM plants release small quantities of pollutants, but so do many other sources. Over the course of a year, the following sources release the same level of emissions as an APM plant:
  - Benzene
    - 19 residential woodstoves
    - 1 gasoline filling station
  - Polycyclic aromatic hydrocarbons (PAHs)
    - 176 residential woodstoves
  - Formaldehyde
    - 150 residential fireplaces
Impacts of a Typical APM Plant vs. Background: Formaldehyde

![Bar Chart: Formaldehyde Concentrations]

- Facility impact at 1000 feet: 0.1 ppm
- Background level in US: 1.5 ppm
- Conventional Homes Indoor: 20 ppm
LCCA on the National Level

- MAP-21 – MEPDG, Alternative Bids, LCCA, GAO Report
- FY12 Commerce Appropriations Bill — Material-Specific Discount Rates
- FAST Act – Alternate Bids
- FY16 Transportation Appropriations Bill — Alternate Bid Guidance
- FY17 Transportation Appropriations Bill — MEPDG + LCCA Incentive
- FY18 Transportation Appropriations Bill — MEPDG + LCCA Incentive
- U.S. DOT INFRA Grant Program — LCCA Requirement
- FHWA LCCA Guidance Update
- Open Competition Proposal — Alternate Bids
- P3 Performance Warranties
What to Expect in 2018?

• LCCA Best Practices Manual
• Groundbreaking Reconstruction Impacts Report
• How bio-binders might impact contractors
• Comparative emissions study for plant permitting
THANK YOU!

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