FHWA SUSTAINABLE PAVEMENTS PROGRAM

Program and Products
Vision and Mission

• To advance the knowledge and practice of designing, constructing, and maintaining more sustainable pavement through:
  – Stakeholder engagement
  – Education
  – Development of guidance and tools
FHWA Sustainability Ambassadors

A group of FHWA employees from different disciplines.

Sustainability Ambassadors Goal

To expand the knowledge and outreach within their field that complements the Sustainable Pavements Program.
Key Takeaways

• Definition and characteristics of pavement sustainability
• Benefits of moving toward sustainable pavement systems
• Current sustainability practices
• Emerging trends and technologies
• Tools to measure and quantify sustainability

https://www.fhwa.dot.gov/pavement/sustainability/ref_doc.cfm
SUSTAINABLE PAVEMENTS
AND
THE PAVEMENT LIFE CYCLE
Definition: Sustainable Pavements

1. Achieve the engineering goals.
2. Preserve and (ideally) restore surrounding ecosystems.
3. Use financial, human, and environmental resources wisely.
4. Meet basic human needs such as health, safety, equity, employment, comfort, and happiness.
Opportunities for Improving Sustainability Exist Throughout the Pavement Life Cycle
WHY SHOULD WE CARE ABOUT PAVEMENT SUSTAINABILITY?
Benefits of Being More Sustainable

- Reduced pavement life-cycle costs
- Reduced energy
- Reduced noise
- Improved air quality
- Improved safety
- Improved ride
- Conservation of resources
HOW DO WE CONSIDER SUSTAINABILITY IN DESIGN?
Characteristics of Sustainability

• Sustainability is a continuum
• Sustainability is not an add-on value
• Sustainability requires innovation
• Sustainability is context sensitive
Sustainability = Good Engineering Practice

### Example Sustainability Priorities/Values

<table>
<thead>
<tr>
<th>Access</th>
<th>Finances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Life</td>
<td>Cost-Benefit</td>
</tr>
<tr>
<td>Safety</td>
<td>Clean Air</td>
</tr>
<tr>
<td>Culture/History</td>
<td>Clean Water</td>
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<tr>
<td>Aesthetics</td>
<td>Clean Land</td>
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<tr>
<td>Education</td>
<td>Ecological Res.</td>
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<td>Equality</td>
<td>Water Res.</td>
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<td>Fair Wages</td>
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<td>Governance</td>
<td>Renewables</td>
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<td>Transition</td>
<td>Emissions</td>
</tr>
<tr>
<td>Livability</td>
<td>Employment</td>
</tr>
</tbody>
</table>

Sustainability…

- Considers **all** life cycle stages
- Looks for continuous and ongoing improvements
- Prioritizes and operationalizes values through a conscious effort
- **IS NOT** an add-on value to a system
Trade-Off Considerations

• Improving one outcome may compromise another

• Consideration of **Opportunity Costs**

• Priorities/values of the organization/project
  – Which sustainability components are particularly valued?
  – How do we prioritize these values?
  – How do we operationalize these values?

• Risk
  – What risks do we face?
  – How much risk is acceptable?
SUMMARY
Key Takeaways

• “Sustainable” in the context of pavements refers to system characteristics that encompass a pavement’s ability to:
  – Achieve engineering goals
  – Preserve ecosystems
  – Use resources judiciously
  – Meet basic human needs

• Consider the entire pavement life-cycle
Key Takeaways

• Sustainability is a continuum
• Sustainability is not an add-on value
• Sustainability requires innovation
• Sustainability is context sensitive
• Sustainability can be measured
• Sustainability involves trade-offs
• The FHWA’s *Sustainable Pavements Program* provides many resources to help agencies
How do we Measure Sustainability?

Tribal Transportation Program Webinar
Sustainable Pavement Systems

Monica Jurado
February 17, 2021
HOW DO WE MEASURE PAVEMENT SUSTAINABILITY?
Balance of the Triple Bottom Line

- Sustainability Rating Systems (e.g., INVEST)
- Life-Cycle Assessment (LCA)
- Performance Testing

Life-Cycle Cost Analysis (LCCA)
Performance Tests

Photo credit: S. Muench
Life-Cycle Cost Analysis

Title: Life-Cycle Cost Analysis in Pavement Design – Interim Technical Bulletin

Authors: Walls and Smith (for FHWA)

Published: 1998

Description: Recommends procedures for conducting LCCA of pavements. Set’s standard for inclusion of user costs (WZ only) and probabilistic analysis.

Where: USDOT and various other websites
Life-Cycle Assessment

INTRODUCTION
An ever-growing number of agencies, companies, organizations, institutions, and governing bodies are embracing principles of sustainability in managing their activities and conducting business. This approach focuses on the overarching goal of emphasizing key life cycle economic, environmental, and social factors in the decision-making process. Sustainability considerations are not new, and in fact have often been considered indirectly or informally, but in recent years increased efforts are being made to quantify sustainability effects and to incorporate them into the decision-making process in a more systematic and organized fashion.

One instrument that can be used to quantify the environmental performance of sustainability considerations is life cycle assessment (LCA). LCA is a structured methodology that quantifies environmental impacts over the full life cycle of a product or system, including impacts that occur throughout the supply chain. The purpose of this Tech Brief is to describe LCA principles, define the main elements of LCA, and provide an introductory overview of how LCA may be applied to pavements.

ORIGIN, PRINCIPLES AND PURPOSE OF LCA
Origin of LCA
The precursors to LCA were originally developed in the late 1960s to analyze air, land, and water emissions from solid wastes. The principles were later broadened to include energy, resource use, and chemical emissions, with a focus on consumer products and product packaging rather than complex infrastructure systems (Hunt and Franklin 1996; Guinée 2012). Between 1990 and 2000, developments shifted to the creation of full-lifecycle impact assessment methods and the standardization of methods by the International Organization for Standardization (ISO) (SAIC 2000). In the transportation area, LCA topics have included assessing asphalt binder and cement production, evaluating low carbon fuel standards for on-road vehicles, examination of transportation networks, and examination of interactions between transportation infrastructure, vehicles, and human behavior.

Principles and Purpose of LCA
LCA provides a comprehensive approach to evaluating the total environmental burden of a particular product (such as a ton of aggregate) or more complex systems of products or processes (such as a transportation facility or network), examining all the inputs and outputs over its life cycle, from raw material production to the end of the product's life. A generic model of the life cycle of a product for LCA is shown in Figure 1. As can be seen, the life cycle begins at the acquisition of raw materials, proceeds through several distinct stages including material processing, manufacturing, use, and terminates at the end-of-life (EOL).

https://www.fhwa.dot.gov/pavement/pub_details.cfm?id=935
https://www.fhwa.dot.gov/pavement/pub_details.cfm?id=998
Infrastructure Sustainability Rating Systems Examples

• INVEST
• Greenroads
• Envision
• LEED for Neighborhood Development

https://www.sustainablehighways.org/
Reasons to Measure Sustainability

• Achieving sustainability and performance goals
• Satisfying accounting mandates
• Providing decision support
• Improving agency processes
• Improving public image
What Can I Learn from This Presentation?

- What is life-cycle cost analysis (LCCA) and how can it help highway agencies?
- What are the steps in the pavement LCCA process?
- What are some tools available to conduct LCCA?
- Where can I find more information on LCCA?
WHAT IS LIFE-CYCLE COST ANALYSIS (LCCA)?
What Is LCCA?

• Analytical tool to provide cost comparisons between two or more competing alternatives on a project
• Alternatives are assumed to produce equivalent benefits
• For pavements, LCCA considers
  – Direct agency costs
  – User costs
What Are the Benefits of Conducting LCCA?

- Reduced pavement life-cycle costs and impact to users
- Reduced energy
- Reduced noise
- Improved air quality
- Improved safety
- Improved ride
- Conservation of resources

Primary LCCA Benefit

LCCA can be used with Life Cycle Assessment (LCA) and Sustainability Rating Systems to improve environmental and social performance.
How Can LCCA Help Highway Agencies?

- Comparing materials for pavements
- Comparing maintenance, preservation, and rehabilitation strategies
- Comparing construction work zone effects
- Comparing alternative bids

- LCCA helps identify opportunities to reduce agency and user costs throughout the pavement life cycle
- LCCA helps inform and guide decision-making for policy, planning, or design
WHAT ARE SOME TOOLS AVAILABLE TO CONDUCT LCCA?
FHWA RealCost Software

- Widely accepted and adopted LCCA tool for pavements (in the U.S.)

https://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm
WHERE CAN I FIND MORE INFORMATION ON LCCA?
Available Resources and Tools

- FHWA LCCA Technical Bulletin
- FHWA RealCost Tool
- FHWA LCCA Primer
- FHWA LCCA Factsheet
- FHWA LCCA Webpage
SUMMARY
Key Takeaways

- Economic impact is an important component of pavement sustainability
- LCCA is a well-established process for assessing and comparing the monetarily quantifiable aspects of competing pavement design and rehab alternatives
- LCCA should be used with appropriate inputs
- *RealCost* is a pavement LCCA tool available.
Maintenance and Preservation Treatments to Improve Sustainability

Tribal Transportation Program Webinar
Sustainable Pavement Systems

Migdalia Carrion
February 17, 2021
What Can I Learn From This Presentation?

• What is pavement preservation?
• What are the impacts of preservation on pavement sustainability?
• What are some common pavement preservation techniques for asphalt- and concrete-surface pavements?
• What are some future opportunities?
Opportunities for Improving Sustainability Exist Throughout the Pavement Life Cycle

Image Source: FHWA/APTech
WHAT IS PAVEMENT PRESERVATION?
What is Pavement Preservation?

- Keeping good roads in good condition
- Employs maintenance, preventive maintenance, and minor rehabilitation treatments
  - Typically low-cost, low-environmental-impact activities

Images Source: APTech
Impact of Pavement Preservation

![Diagram showing the impact of pavement preservation over time, with stages of excellent, preservation, rehabilitation, and reconstruction. The diagram illustrates how preservation treatments can delay the transition from excellent condition to failed condition.]
Selection of Preservation Techniques

**Consider:**
- Pavement type
- Type and extent of distress
- Climate
- Cost
- Expected life
- Functional requirements

**Other factors:**
- Traffic management
- Traffic volumes
- Contractor and material availability
WHAT ARE THE IMPACTS OF PRESERVATION ON PAVEMENT SUSTAINABILITY?
Preservation Sustainability Benefits

• Conserves energy and virgin materials
• Restores/maintains functionality
  – Improves safety
  – Reduces noise
  – Improves smoothness and fuel efficiency
  – Enhanced aesthetics
• Extends pavement life
• Impacts are context-sensitive
Preservation on Low-Volume Roads

• Use-stage impacts less important
  – Agency impacts dominate decision making
  – Minimize treatment application and the amount of material used for each treatment
  – Optimize treatment selection and timing to avoid major structural damage
Preservation on High-Volume Roads

• Use-stage impacts more important
  – Impacts of preservation activities minor in comparison
  – Vehicle operations can dominate
• Agency and user impacts/costs must be considered
Agency Impacts vs. User Impacts

• Agencies typically focused on minimizing life-cycle costs
  – Appropriate for low-volume facilities

• Agencies need to consider broader sustainability impact of their choices for high-volume roads
  – Keep smooth pavements smooth, safe pavements safe, and quiet pavements quiet
WHAT ARE SOME COMMON PRESERVATION TREATMENTS FOR ASPHALT-SURFACED PAVEMENTS?
Crack Filling/Sealing

- Placement of adhesive material into or over asphalt pavement cracks
- Extends pavement life by keeping pavement sealed against moisture infiltration

Image Source: FHWA
Patching

• Used to treat localized distresses
  – Partial-depth patches for surface defects
  – Full-depth patches to address structural issues

• Restores structural integrity and ride quality
Fog Seal/Rejuvenator

• Addition of fresh asphalt binder to existing asphalt surface
  – Seals pavement surface
  – Prevents or slows oxidation
  – Prevents further loss of aggregates from existing pavement

Image Source: FHWA
Chip Seal

- Asphalt binder applied to pavement surface followed by aggregate chips rolled into binder
  - Seals pavement surface
  - Extends service life
  - Improve aesthetics

Image Source: FHWA
Slurry Seal

- Mixture of well-graded aggregate and asphalt emulsion spread over pavement surface
  - Seals pavement service
  - Extends service life
  - Improves friction
  - Improves aesthetics

Image Source: FHWA
Microsurfacing

- Mixture of well-graded aggregate, mineral filler, and polymer-modified asphalt emulsion spread over pavement surface
  - Seals pavement service
  - Extends service life
  - Improves friction
  - Improves aesthetics
Ultra-Thin and Thin Asphalt Overlays

- Ultra-Thin: 0.625 to 0.75 inches
- Thin: 0.75 to 1.50 inches
- Addresses minor surface distress
- Restores friction
- Improves ride quality
- Improves aesthetics

Image Source: FHWA
Hot In-Place Recycling (HIR)

• Binder softened and loosened, mixed with recycled aggregates/rejuvenators/virgin asphalt before placement and compaction
• Limited to top 2 inches
• Addresses minor surface defects
• Improves ride quality
• Improves aesthetics
Cold In-Place Recycling (CIR)

- Cold milling; sizing reclaimed asphalt pavement (RAP); mixing RAP with asphalt emulsion, recycling additives, and new aggregate to produce cold mix
- Addresses surface distresses, fixes rutting
- Corrects minor profile deficiencies
Ultra-Thin Bonded Wearing Course

• Gap-graded or open-graded polymer or rubber-modified asphalt layer placed on thick tack coat
  – Seals pavement surface
  – Addresses surface defects
  – Restores friction
  – Improve ride quality
  – Improves aesthetics
Bonded Concrete Overlays

- Placement of thin concrete layer (2 to 6 inches) onto a cold-milled asphalt pavement
  - Short panel dimensions
  - May include fibers
- Extends service life
- Restores friction and eliminates profile issues
- Improves aesthetics

Image Source: FHWA
## Relative Sustainability Impacts

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Relative Treatment Life</th>
<th>Relative Initial Cost</th>
<th>Relative Environmental Impact</th>
<th>Societal Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crack Filling and Sealing</td>
<td>✓</td>
<td>$</td>
<td>Low</td>
<td>Reduced traffic delays, less pleasing aesthetics, potentially rough</td>
</tr>
<tr>
<td>Asphalt Patching</td>
<td>✓ ✓</td>
<td>$</td>
<td>Variable</td>
<td>Reduced traffic delays, negative impact on ride quality and noise</td>
</tr>
<tr>
<td>Fog Seal</td>
<td>✓</td>
<td>$</td>
<td>Med</td>
<td>Reduced traffic delays, improves aesthetics</td>
</tr>
<tr>
<td>Chip Seal</td>
<td>✓ ✓</td>
<td>$$</td>
<td>Med</td>
<td>Increased safety (friction), reduced traffic delays, rough surface, noise</td>
</tr>
<tr>
<td>Slurry Seal</td>
<td>✓ ✓</td>
<td>$$</td>
<td>Med</td>
<td>Increased safety (friction), reduced traffic delays, improved aesthetics</td>
</tr>
</tbody>
</table>
## Relative Sustainability Impacts

<table>
<thead>
<tr>
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<th>Relative Environmental Impact</th>
<th>Societal Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsurfacing</td>
<td>✔ ✔ ✔</td>
<td>$$</td>
<td>Med to High</td>
<td>Increased safety (friction), reduced traffic delays, improved aesthetics</td>
</tr>
<tr>
<td>Ultra-thin HMA Overlay</td>
<td>✔ ✔ ✔ ✔</td>
<td>$$$</td>
<td>High</td>
<td>Improved ride quality, fuel savings, increased safety (friction, splash/spray), improved aesthetics</td>
</tr>
<tr>
<td>Hot In-Place Recycling</td>
<td>✔ ✔ ✔</td>
<td>$$$</td>
<td>Med to High</td>
<td></td>
</tr>
<tr>
<td>Cold In-Place Recycling</td>
<td>✔ ✔ ✔</td>
<td>$$$</td>
<td>Med to High</td>
<td></td>
</tr>
<tr>
<td>Bonded Concrete Overlay</td>
<td>✔ ✔ ✔ ✔</td>
<td>$$$$$</td>
<td>Med</td>
<td>Improved safety (friction and drainage), improved ride quality and aesthetics</td>
</tr>
</tbody>
</table>
ASPHALT PAVEMENT PRESERVATION: WHAT ARE SOME FUTURE OPPORTUNITIES?
Future Opportunities

- Improved treatments that last longer and use less materials
- Optimization of treatment selection using pavement management systems
- Improvements in paving machines: tack coat placement immediately ahead of hot-mix laydown
- Improved compaction
- Improvements in construction quality
WHAT ARE SOME COMMON PRESERVATION TREATMENTS FOR CONCRETE-SURFACED PAVEMENTS?
Joint Resealing/Crack Sealing

• Preparation of joints/crack and installation of new sealant material
• Extends pavement life by keeping pavement sealed against moisture infiltration

Image Source: FHWA
Diamond Grinding

• Removal of thin layer of material (0.12 to 0.25 inches) from concrete surface
• Addresses faulting and other surface irregularities
• Provides riding surface that is as good or better than original pavement

Image Source: ACPA
Bonded Concrete Overlays

- Placement of relatively thin concrete layer (2 to 4 inches) over existing pavement after deteriorated areas are repaired
- Improves friction and ride quality
- Reduces noise emissions
- Improves aesthetics

Image Source: FHWA
Diamond Grooving

• Cutting of narrow, discrete grooves on concrete pavement surface
• Improves safety
  – Reduces hydroplaning
  – Reduces splash/spray
• Reduces noise

Image Source: APTech
Slab Stabilization/Slab Jacking

- Slab Stabilization: Fill voids under concrete pavement and restores support
- Slab Jacking: Injection of cement grout or expansive polyurethane material to restore settled slab to original profile
- Restores slab support and reduces deflections
Partial-Depth Repairs

• Used to address distresses limited to top one-third/one-half of slab

• Restores ride quality and structural integrity of localized areas
Full-Depth Repairs

• Used to address deteriorated joints or entire slabs
• Extends through entire thickness of existing slab
• Restores ride quality and structural integrity

Image Source: APTech
Dowel Bar Retrofit

- Placement of dowel bars across joints or cracks with poor load transfer
  - Provides/restores load transfer
  - Reduces deflections

Image Source: FHWA
Cross Stitching

- Technique to maintain load transfer across non-working cracks
- Keeps crack tight
- Alternative to full-depth repairs if implemented properly

Image Source: ACPA
Relative Sustainability Impacts

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Relative Treatment Life</th>
<th>Relative Initial Cost</th>
<th>Relative Environmental Impact</th>
<th>Societal Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Resealing</td>
<td>✓</td>
<td>$</td>
<td>Low</td>
<td>Reduced traffic delays, less pleasing aesthetics, potentially rough</td>
</tr>
<tr>
<td>Slab Stabilization/Slab Jacking</td>
<td>✓</td>
<td>$$$</td>
<td>Low to Medium</td>
<td>Improves ride quality when combined with other treatments</td>
</tr>
<tr>
<td>Diamond Grinding</td>
<td>✓ ✓ ✓</td>
<td>$</td>
<td>Med to High</td>
<td>Increases safety (friction), reduces tire-pavement noise</td>
</tr>
<tr>
<td>Diamond Grooving</td>
<td>✓ ✓ ✓</td>
<td>$</td>
<td>Low to Med</td>
<td>Increases safety, reduces tire-pavement noise</td>
</tr>
<tr>
<td>Partial-Depth Repair</td>
<td>✓ ✓</td>
<td>$$$</td>
<td>Variable</td>
<td>Improved ride quality, rapid-set materials can reduce traffic delays</td>
</tr>
</tbody>
</table>
## Relative Sustainability Impacts

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Relative Treatment Life</th>
<th>Relative Initial Cost</th>
<th>Relative Environmental Impact</th>
<th>Societal Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Depth Repair</td>
<td>✓ ✓ ✓ ✓</td>
<td>$$$$</td>
<td>Med to High</td>
<td>Precast panels can reduce traffic delays, potential aesthetic issues</td>
</tr>
<tr>
<td>Dowel Bar Retrofit</td>
<td>✓ ✓ ✓ ✓</td>
<td>$$$</td>
<td>Variable</td>
<td>Improves ride quality (controls faulting), aesthetics negatively affected</td>
</tr>
<tr>
<td>Cross Stitching</td>
<td>✓ ✓</td>
<td>$$$</td>
<td>Low</td>
<td>Improves long-term performance</td>
</tr>
<tr>
<td>Retrofitted Edge Drains</td>
<td>✓ ✓ ✓</td>
<td>$$$$</td>
<td>Variable</td>
<td>Improves long-term performance</td>
</tr>
<tr>
<td>Bonded Concrete Overlay</td>
<td>✓ ✓ ✓ ✓</td>
<td>$$$</td>
<td>Medium</td>
<td>Improved friction, ride quality, drainage, and aesthetics</td>
</tr>
</tbody>
</table>
CONCRETE PAVEMENT PRESERVATION: WHAT ARE SOME FUTURE OPPORTUNITIES?
Future Opportunities

• Improved treatments that last longer and use less materials
• Optimization of treatment selection using pavement management systems
• Use of precast solutions
• Alternative repair materials
Key Takeaways

• Keep good pavements good, smooth pavements smooth, quiet pavements quiet, and safe pavements safe

• Multiple treatment options exist for asphalt and concrete pavements

• Relationship between pavement preservation and sustainability is context sensitive

• Consider entire life cycle when making treatment selection decisions
Example Products

• Guide Documents:
  – *Towards Sustainable Pavement Systems*
  – *Pavement Life Cycle Assessment Framework*

• **Tech Briefs** on following topics:
  – *Pavement Sustainability*
  – *Life Cycle Assessment*
  – *Improving Resiliency of Pavement Systems*
  – *Strategies for Improving Sustainability of Asphalt/Concrete Pavements*

• Webinar series on pavement sustainability

• **Sustainable Pavements Program Road Map**
To Learn More:

<table>
<thead>
<tr>
<th>WEBINAR EVENT</th>
<th>WHAT WILL YOU LEARN?</th>
<th>DATE &amp; TIME</th>
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<tbody>
<tr>
<td>1 Pavement Sustainability Basics</td>
<td>Sustainability concepts and assessment tools</td>
<td>October 17, 2019 2:30–3:30 PM ET</td>
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<tr>
<td>2 Sustainable Pavement Materials</td>
<td>Sustainability implications of aggregate, asphalt, and concrete pavement materials</td>
<td>November 21, 2019 2:30–3:30 PM ET</td>
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<tr>
<td>3 Sustainable Design Approaches</td>
<td>Design considerations related to sustainability, general and specific design strategies, emerging trends</td>
<td>December 19, 2019 2:30–3:30 PM ET</td>
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<td>4 Sustainable Pavement Construction</td>
<td>Construction considerations to improve pavement sustainability, future directions, and emerging trends</td>
<td>January 30, 2020 2:30–3:30 PM ET</td>
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<td>5 Maintenance and Preservation</td>
<td>Pavement preservation basics, impacts of preservation on sustainability, sustainable preservation techniques</td>
<td>February 13, 2020 2:30–3:30 PM ET</td>
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<td>6 EOL Considerations</td>
<td>End-of-Life (EOL) considerations related to pavement sustainability, EOL options for asphalt and concrete pavements</td>
<td>March 19, 2020 2:30–3:30 PM ET</td>
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<td>7 LCCA Part I: Fundamentals</td>
<td>Life-Cycle Cost Analysis (LCCA) concepts, steps in pavement LCCA process, tools to conduct LCCA</td>
<td>April 16, 2020 2:30–3:30 PM ET</td>
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<td>8 LCCA Part II: Applications</td>
<td>Key considerations in pavement LCCA, example LCCA applications in sustainability-related applications</td>
<td>May 21, 2020 2:30–3:30 PM ET</td>
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<td>9 LCA Part I: Fundamentals</td>
<td>Life-Cycle Assessment (LCA) concepts, benefits and uses; steps in the pavement LCA process; tools and resources on LCA</td>
<td>June 18, 2020 2:30–3:30 PM ET</td>
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<td>10 LCA Part II: EPDs and PCRs</td>
<td>Fundamentals on Environmental Product Declarations (EPDs) and Product Category Rules (PCRs)</td>
<td>July 23, 2020 2:30–3:30 PM ET</td>
</tr>
</tbody>
</table>
For More Information

• FHWA Sustainable Pavements Website
  – www.fhwa.dot.gov/pavement/sustainability

• FHWA Contacts:
  – Heather Dylla (Heather.Dylla@dot.gov)
  – Monica Jurado (Monica.Jurado@dot.gov)
Q&A

http://www.fhwa.dot.gov/pavement/sustainability