FHWA’s INVESTment in Sustainability

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Overview of Sustainability

- The satisfaction of basic social and economic needs, both present and future, and the responsible use of natural resources, all while maintaining or improving the well-being of the environment on which life depends.
What is a Sustainable Highway System?

• Integral part of sustainable development
• Fulfills transportation goals and needs
• Addresses development and economic growth
• Avoids, minimizes, reduces impacts
  – Environment
  – Consumption of natural resources
Sustainability and the Project Lifecycle

• For sustainability to be fully integrated into highway and transit programs, it must be considered throughout the project lifecycle.
Sustainability and FHWA

- Deliver the Federal Aid Highway and Federal Lands Programs in a more sustainable way
- Include sustainability throughout the decision making process
- Make wise investment decisions with limited resources
- Encourage change in professional practice
- Go beyond compliance
- Seek balanced solutions
- Stress implementation of sustainable practices: **sustainability = action**
Sustainable Highways Initiative

- Promote coordination within FHWA and with other FHWA initiatives (e.g., Sustainable Pavements Program)
- Strengthen engagement with DOTs and MPOs
- Coordination with partners:
  - ASCE, ACEC, APWA, AASHTO, AMPO, etc.
  - FTA, EPA and other Federal agencies
- Case Studies to highlight sustainable practices
- Website to serve as portal to access information on activities and available resources: www.sustainablehighways.dot.gov
- Develop tools: INVEST
FHWA Sustainable Pavements Program Goals

• Support the US DOT goals for livability and sustainable transportation.

• Increase the body of knowledge regarding “sustainability” aspects of asphalt and concrete materials in pavement design, construction, preservation, and maintenance.

• Increase the use of “sustainable” technologies and practices in pavement design, construction, preservation and maintenance.
Current Program Framework

1) Establishment and Coordination of a Sustainable Pavements Technical Working Group (TWG)

2) Development of Reference Documents on Sustainable Pavements and Materials
   • Reference document is under development and will be published in 2013

3) Evaluation and Assessment of Existing Tools
   • Life Cycle Assessment and Rating Systems

4) Evaluation and Assessment of Sustainable Techniques
   • Materials, Design Practices, Construction Practices

5) Technology Transfer and Deployment

Subject to funding availability
What is INVEST?

**INVEST** - **Infrastructure** **Voluntary** **Evaluation** **Sustainability** **Tool**

A voluntary, web-based self-evaluation tool for assessing sustainability over the life cycle of a transportation project or program — from system and project planning through design and construction, to operations and maintenance
INVEST Goals

- Help agencies assess sustainability and support internal improvement
- Provide a framework for communicating with stakeholders and decision makers about sustainability
- Establish a method for identifying sustainable highway systems, projects, programs
- Encourage sustainable practices
INVEST Structure and Criteria

• Project Development (PD) Criteria
  – Focus is on the development of a specific project once the general need and proposal for a solution to a transportation problem have been programmed

• Operations & Maintenance (OM) Criteria
  – Focus is on agency-wide practices, policies and procedures required for the overall functionality and efficiency of a highway network

• System Planning (SP) Criteria
  – Focus is on agency-wide management and planning of highway networks
  – Typically involve the owner-agency having policies, procedures and systems in place to address them
INVEST Uses

• Assess single or multiple projects
• Prospective vs. retrospective assessment of projects
• Planning or O&M programs and processes
• Inform SOP’s at a program-level (e.g. standard specifications)
• Communicate sustainability goals and performance to stakeholders
• Other?
Evolution of INVEST

**Beta Test Version**
- Released Fall 2010
- Over 700 comments from AASHTO, EPA, SMEs, others

**Pilot Test Version**
- Released Fall 2011
- Over 1200 comments from pilot test participants, SMEs, FTA, others

**Version 1.0**
- Will be released on October 10th during Virtual Launch Webinar

Available on the web for public review and use
Pilot Testing of INVEST

• Testing done on the Project Development (PD), System Planning (SP) and Operations & Maintenance (OM) criteria from July 2011 – February 2012

• Objectives were to obtain input on:
  – further refinements to the criteria
  – scoring and achievement levels
  – making the tool easier to use

• Process varied across pilot test agencies
INVEST Pilot Test Locations

- **Montana DOT** (4 projects)
- **Western Federal Lands**
- **Oregon DOT**
- **City of Peoria, AZ**
- **Central Federal Lands**
- **Washoe County, NV**
- **Monterey County, CA**
- **Nevada DOT**
- **Utah DOT**
- **Arizona DOT**
- **Western Federal Lands**
- **Ohio DOT**
- **Pioneer Valley Planning Commission**
- **D.C. DOT**
- **Maryland DOT**
- **North Carolina DOT**
- **Georgia DOT**
- **Puget Sound Regional Council**
- **North Central Texas Council of Governments**
- **Oregon DOT**
- **D.C. DOT**
- **Nashville Area MPO**
- **Georgia DOT**
- **Pioneer Valley Planning Commission**

**Legend:**
- Orange: PD Criteria Testing
- Blue: OM Criteria Testing
- Dark Blue: SP Criteria Testing
- Pink: Independent test of Beta/Pilot version
PD Pilot: Ohio DOT – Cleveland Innerbelt Bridge

• Reviewed while under construction → scored Silver
• Key Takeaways:
  – Early Planning is Key to ensure Sustainability Success: Establishing precedent provides clear expectations and allows innovative approaches.
  – Multi-Disciplinary Approach is Critical: Collaborative process allows people to directly contribute to the body of knowledge and documentation strategy.
  – Plan Ahead for Continual Monitoring and Documentation: Setting expectations and establishing documentation approach reduces overall efforts
Going-to-the-Sun Road Rehabilitation, Glacier National Park

- 50-mile highway through the heart of Glacier NP; National Historic Landmark
- Multi-year rehabilitation began in 2007; $70M in funding awarded thus far
- Major challenges related to terrain, seasonal access, and visitor impacts
- Gold rating in the Pilot Test version of INVEST

SP Pilot: North Central Texas Council of Governments (NCTCOG)

- Scored well in many areas, including integrated planning, travel demand management, and planning analysis methods
- Areas of improvement in asset management and infrastructure resiliency
- Suggested adding more gradation to scoring and adding public health and transportation criterion
Lessons Learned from Pilots

• Overall pilot agencies were supportive and enthusiastic about INVEST

• Pilot agencies suggested many good technical and contextual changes to the criteria and web interface

• Pilot agencies would like to see:
  – More information and a guide for using the tool
  – Additional examples of sustainable practices, case studies, etc.

• Have made significant changes to INVEST as a result of pilot feedback
Changes for INVEST 1.0

- More flexibility in selecting relevant PD criteria to address urban vs. rural and large vs. small project concerns
- Separate scorecard for Paving projects

INVEST PROJECT DEVELOPMENT (PD) PROPOSED SCORECARD OPTIONS

**BASIC**
Basic projects are defined as small reconstruction or bridge replacement projects that do not expand capacity of the roadway. Basic projects do not include those devoted exclusively to pavement preservation or restoration (see Option 5 below).

1. Basic Urban
   Urban projects are located within Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

2. Basic Rural
   Rural projects are located outside Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

**EXTENDED**
Extended projects are defined as:
- New construction projects for a new roadway facility or structure where nothing of its type currently exists; and
- Major reconstruction projects that add travel lanes to an existing roadway or bridge.

3. Extended Urban
   Urban projects are located within Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

4. Extended Rural
   Rural projects are located outside Urbanized Areas or Urban Clusters, as defined by the 2010 Census.

**OTHER OPTIONS**
Two additional scoring options have been developed for projects that do not fit into the Basic or Extended Scorecard options above.

5. Paving
   Paving projects are defined as:
   - Pavement preservation projects that extend the service life of existing facilities and enhance safety; and
   - Pavement restoration projects that restore pavement structure, ride quality, and spot safety.

6. Custom
   A Custom Scorecard may be developed for any project, provided a core set of criteria are included. Core criteria include...
Changes for INVEST 1.0 (cont.)

- Improvements to web interface to make the scoring process easier to complete and clarify sustainability linkages.
• Provide ability to record notes or comments within INVEST
Changes for INVEST 1.0 (cont.)

- Added workspace area for users to see and edit multiple projects.
Changes for INVEST 1.0 (cont.)

• Significant changes to the criteria in all three modules
• More opportunities for partial credit (i.e., gradation in point scale within criteria)
• Putting more emphasis on the process of using the tool and learning (not the score!)
### INVEST 1.0 Project Development Criteria

<table>
<thead>
<tr>
<th>PD-1</th>
<th>Economic Analyses</th>
<th>PD-10</th>
<th>Pedestrian Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD-2</td>
<td>Lifecycle Cost Analysis</td>
<td>PD-11</td>
<td>Bicycle Access</td>
</tr>
<tr>
<td>PD-3</td>
<td>Context Sensitive Project Development</td>
<td>PD-12</td>
<td>Transit &amp; HOV Access</td>
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<tr>
<td>PD-4</td>
<td>Highway and Traffic Safety</td>
<td>PD-13</td>
<td>Freight Mobility</td>
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<td>PD-5</td>
<td>Educational Outreach</td>
<td>PD-14</td>
<td>ITS for System Operations</td>
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<tr>
<td>PD-6</td>
<td>Tracking Environmental Commitments</td>
<td>PD-15</td>
<td>Historical, Archaeological, and Cultural Preservation</td>
</tr>
<tr>
<td>PD-7</td>
<td>Habitat Restoration</td>
<td>PD-16</td>
<td>Scenic, Natural, or Recreational Qualities</td>
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<tr>
<td>PD-8</td>
<td>Stormwater</td>
<td>PD-17</td>
<td>Energy Efficiency</td>
</tr>
<tr>
<td>PD-9</td>
<td>Ecological Connectivity</td>
<td>PD-18</td>
<td>Site Vegetation</td>
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</tbody>
</table>
INVEST 1.0 Project Development Criteria

- PD-19 Reduce and Reuse Materials
- PD-20 Recycle Materials
- PD-21 Earthwork Balance
- PD-22 Long-Life Pavement Design
- PD-23 Reduced Energy and Emissions in Pavement Materials
- PD-24 Contractor Warranty
- PD-25 Construction Environmental Training
- PD-26 Construction Equipment Emission Reduction
- PD-27 Construction Noise Mitigation
- PD-28 Construction Quality Control Plan
- PD-29 Construction Waste Management
Paving Project Scorecard

Total Points Available: 57
- 17 points needed for Bronze
- 23 points needed for Silver
- 29 points needed for Gold
- 34 points needed for Platinum

<table>
<thead>
<tr>
<th>Included Criteria</th>
<th>Possible Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD-02 Lifecycle Cost Analyses</td>
<td>3</td>
</tr>
<tr>
<td>PD-04 Highway and Traffic Safety</td>
<td>1</td>
</tr>
<tr>
<td>PD-05 Educational Outreach</td>
<td>2</td>
</tr>
<tr>
<td>PD-06 Tracking Environmental Commitments</td>
<td>5</td>
</tr>
<tr>
<td>PD-19 Reduce and Reuse Materials</td>
<td>8</td>
</tr>
<tr>
<td>PD-20 Recycle Materials</td>
<td>8</td>
</tr>
<tr>
<td>PD-22 Long-Life Pavement Design</td>
<td>5</td>
</tr>
<tr>
<td>PD-23 Reduced Energy and Emissions in Pavement Materials</td>
<td>3</td>
</tr>
<tr>
<td>PD-24 Contractor Warranty</td>
<td>3</td>
</tr>
<tr>
<td>PD-26 Construction Equipment Emission Reduction</td>
<td>2</td>
</tr>
<tr>
<td>PD-28 Construction Quality Control Plan</td>
<td>5</td>
</tr>
<tr>
<td>PD-29 Construction Waste Management</td>
<td>3</td>
</tr>
</tbody>
</table>
## PD-22 Long-Life Pavement Design

<table>
<thead>
<tr>
<th>Goal</th>
<th>Minimize life cycle costs by promoting design of long-lasting pavement structures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>5 points</td>
</tr>
<tr>
<td>Requirements</td>
<td>Both requirements must be met to achieve this criterion:</td>
</tr>
<tr>
<td>Requirement 1: Design at least 75 percent of the total new or reconstructed pavement surface area for regularly trafficked lanes of pavement to meet long-life pavement design criteria. Compute the total surface area of all trafficked lanes and show that, at a minimum, 75 percent of that area is designed for long-life. Do not include shoulders, medians, sidewalks, and other paved areas in the computation.</td>
<td></td>
</tr>
<tr>
<td>AND</td>
<td>Requirement 2: Pavement design is in accordance with a design procedure that is formally recognized, adopted, and documented by the project owner. In many instances (but not all), this could be the process described in the 1993 AASHTO Design of Pavement Structures manual or the process described in AASHTO MEPDG-1 Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice.</td>
</tr>
</tbody>
</table>
# PD-23 Reduced Energy and Emissions in Pavement Materials

<table>
<thead>
<tr>
<th><strong>Goal</strong></th>
<th>Reduce energy use in the production of pavement materials.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Points</strong></td>
<td>3 points</td>
</tr>
<tr>
<td><strong>Requirements</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Asphalt Production:** | Use Warm Mix Asphalt. Reduce the mixing temperature of hot mix asphalt by a minimum of 50°F from that recommended as the mixing temperature by the asphalt binder supplier.  
or  
Burn recycled oil, waste materials, or other fuel saving technologies in HMA plant to reduce conventional fuel usage by a minimum of 25 percent. |
| **Cement Production:** | Use an ENERGY STAR® certified cement production plant for cement materials used on the project.  
or  
Burn recycled oil, waste materials, or other fuel saving technologies in cement production plant to reduce conventional fuel usage by a minimum of 25 percent. |

Continued on following slide…
<table>
<thead>
<tr>
<th>Requirements</th>
<th>Concrete Production:</th>
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<tbody>
<tr>
<td>Con’t.</td>
<td>Concrete shall be supplied from a concrete plant that can demonstrate a carbon footprint and embodied energy 15 percent below the national averages as established in the National Ready Mixed Concrete Association's (NRMCA) Sustainable Concrete Plant Guidelines</td>
</tr>
<tr>
<td></td>
<td>or</td>
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<tr>
<td></td>
<td>Concrete shall be supplied from a concrete plant that is an NRMCA Sustainable Concrete Plant Certified Silver</td>
</tr>
</tbody>
</table>
INVEST 1.0 Operations & Maintenance Criteria

- OM-01: Internal Sustainability Plan
- OM-02: Electrical Energy Efficiency and Use
- OM-03: Vehicle Fuel Efficiency and Use
- OM-04: Reuse and Recycle
- OM-05: Safety Management
- OM-06: Environmental Commitments Tracking System
- **OM-07: Pavement Management System**
- OM-08: Bridge Management System
- OM-09: Maintenance Management System
- OM-10: Highway Infrastructure Preservation and Maintenance
- OM-11: Traffic Control Infrastructure Maintenance
- OM-12: Road Weather Management Program
- OM-13: Transportation Management and Operations
- OM-14: Work Zone Traffic Control
OM-7 Pavement Management System

<table>
<thead>
<tr>
<th>Goal</th>
<th>Leverage a pavement management system to balance activities that extend the life and function of pavements with impacts to the human and natural environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>1-15 points</td>
</tr>
<tr>
<td>Requirements</td>
<td>1 point. The agency has a pavement management system (PMS). 3 points. <strong>Track pavement network performance:</strong></td>
</tr>
<tr>
<td></td>
<td>• 1 point: Overall network condition using common metrics. 2 points: Project timeliness.</td>
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<tr>
<td></td>
<td><strong>2 points:</strong> Set quantifiable goals relating to both condition and project timeliness, including when these goals are to be achieved, and monitor progress towards goals for at least one year after goal establishment.</td>
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<td><strong>Continued on following slide...</strong></td>
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</table>
**Requirements Con’t.**

<table>
<thead>
<tr>
<th>7 points. Leverage Data to Demonstrate Sustainable Outcomes:</th>
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<tr>
<td>• 2 points: Prioritize projects based on system modeling, scenario analyses, trade-off analyses, and system optimization rather than a “worst-first” approach.</td>
</tr>
<tr>
<td>• 2 points: Leverage life-cycle cost analysis (LCCA) techniques to predict costs and to perform short- and long-term budget forecasting.</td>
</tr>
<tr>
<td>• 1 point: Include routine pavement preservation needs in the annual UPWP or STIP/TIP that are based on the condition and timeliness goals set above.</td>
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<tr>
<td>• 2 points: Leverage PMS to link pavement repair, preservation, and maintenance projects to adjacent capital projects.</td>
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</tbody>
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<thead>
<tr>
<th>2 points. Sustainable Specifications:</th>
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<tr>
<td>• The agency has special provisions specific to at least one sustainable pavement solution</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>• 2 points: The agency has standard specifications and/or special provisions specific to at least one sustainable pavement solution and requires the consideration of sustainable pavements as a first solution.</td>
</tr>
</tbody>
</table>
INVEST 1.0 System Planning Criteria

- SP-01: Integrated Planning: Economic Development and Land Use
- SP-02: Integrated Planning: Natural Environment
- SP-03: Integrated Planning: Social
- SP-04: Integrated Planning: Bonus
- SP-05: Access & Affordability
- SP-06: Safety Planning
- SP-07: Multimodal Transportation and Public Health
- SP-08: Freight and Goods Movement
- SP-09: Travel Demand Management
- SP-10: Air Quality
- SP-11: Energy and Fuels
- SP-12: Financial Sustainability
- SP-13: Analysis Methods
- SP-14: Transportation Systems Management & Operations
- SP-15: Linking Asset Management and Planning
- SP-16: Infrastructure Resiliency
- SP-17: Linking Planning and NEPA
Next Steps

• INVEST 1.0 will be released October 10, 2012
• Marketing and communications plan
• National Initiative in FHWA PY2013 Strategic Implementation Plan to encourage use of INVEST 1.0 by State DOTs, MPOs, and Federal Land Management Agencies
• INVEST 1.0 deployment program in FY 2013
• Track use of INVEST 1.0 and assess extent to which it is inspiring action on sustainability
• INVEST 2.0?
Thank You!

www.sustainablehighways.org
www.sustainablehighways.dot.gov

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