Federal Highway Administration, U.S. Department of Transporation
Sustainable Highways Program

FHWA's Sustainable Highways Self-Evaluation Tool

Canadian User Producer Group for Asphalt
November 28th
Edmonton, Alberta

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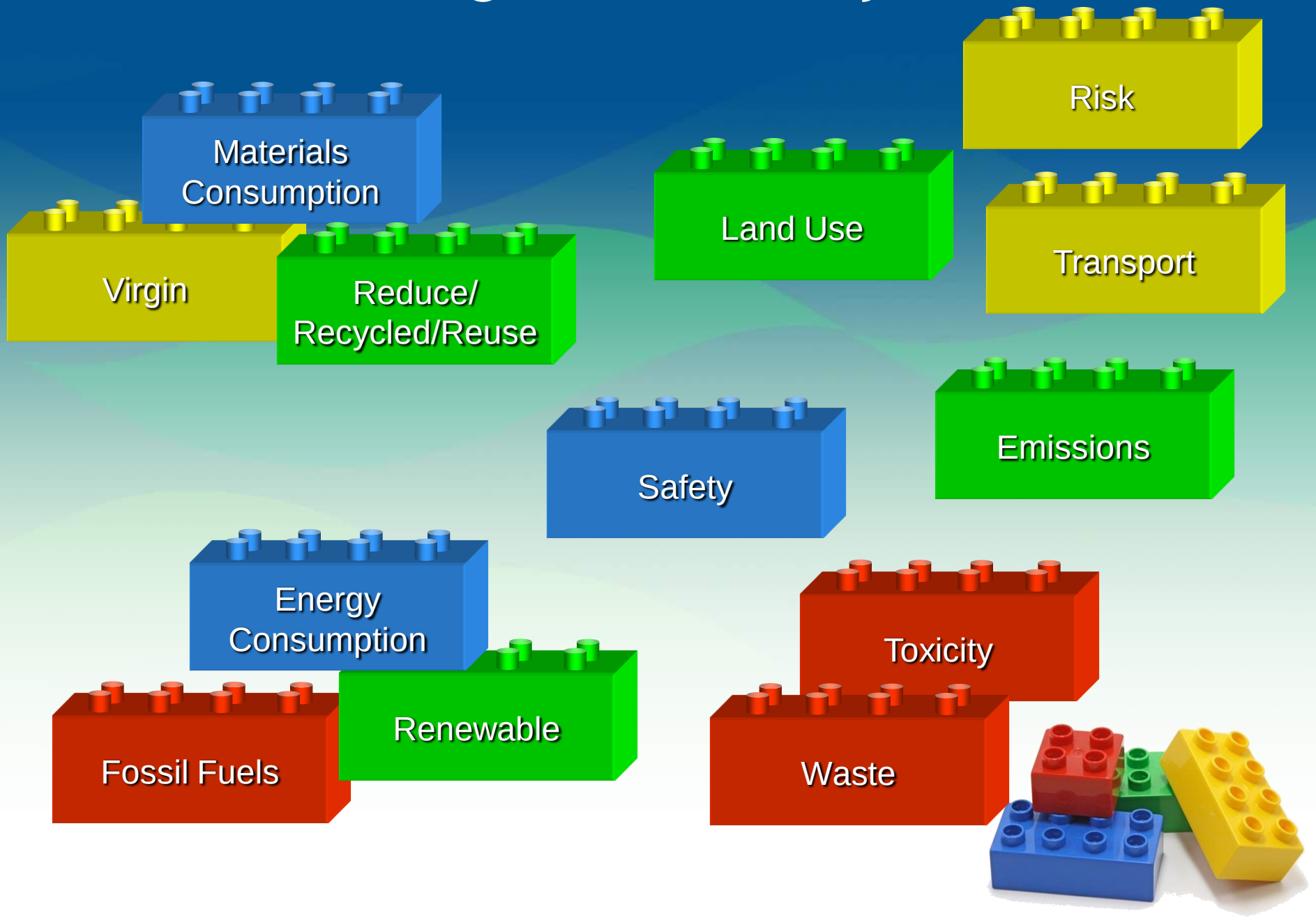
Sustainable Highways Tool

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

EPA's Sustainability Definition

Sustainability means "meeting the needs of the present without compromising the ability of future generations to meet their own needs."

Understanding Sustainability…



Goals

- Encourage sustainable highway practices
  - Internal improvement
  - External recognition
- Help agencies measure sustainability and quantify tradeoffs
- Provide a framework for communicating with stakeholders about sustainability
- Establish a method for evaluating sustainable highways

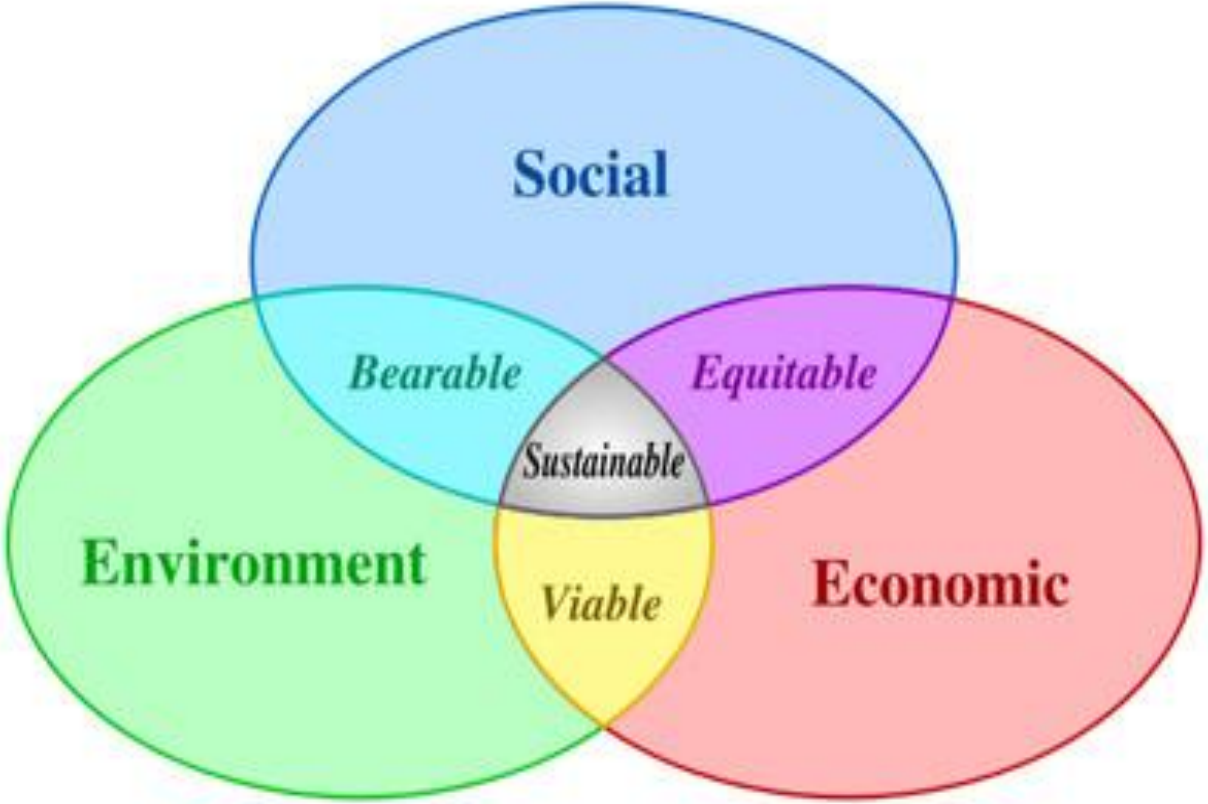
What the tool is NOT…

- The tool is not final. Ongoing work on a Beta-version
- The tool is not required. Use is purely voluntary.

What is a sustainable highway?

- Satisfies functional requirements
  - Fulfills transportation goals and needs (e.g. congestion reduction)
  - Addresses development and economic growth
- Reduces impacts
  - Environment
  - Consumption of resources
- Addresses environmental, economic, and social equity dimensions (triple bottom line)
- Addresses sustainability from planning through operations

The triple bottom line



What is included in the tool?

- Collection of **best practices**
- Repository of **real-world examples** where best practices have been applied
- **Self-evaluation tool** to measure sustainability

What are some of the tool's characteristics?

- Web-based
- Criteria based on best practices (total of 68)
- Each criterion assigned a point value based on expected sustainability impact
- In coordination with ASCE effort
- Other sustainable highways tools used as references (GreenLITES, I-LAST, Greenroads)

How are the criteria organized?

- Project-Based : project development
- Systems-Based: system planning
- Systems-Based: operations and maintenance

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Sustainable Highways Self-Evaluation Tool

Beta Version

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Welcome!

FHWA Sustainable Highways Self-Evaluation Tool

The Sustainable Highways Self-Evaluation Tool identifies characteristics of sustainable highways and provides procedures and techniques to

What do you want to do?

Learn

A guided tour through this website to learn about

Internet 100%

Federal Highway Administration, U.S. Department of Transportation

Sustainable Highways Self-Evaluation Tool

Beta Version

Learn

This section is a guided tour through the Sustainable Highways Self-Evaluation Tool website to learn about sustainable highways and integrating sustainability best practices into System Planning, Project Development, and Operations and Maintenance. You will:

- Learn more about **Sustainability** and **Sustainable Highways**,
- Learn how **Context** influences sustainability,
- Download and browse the **Sustainable Highways Credits**,
- Learn **how to apply, incorporate and implement** Sustainable Highways credits,
- **Create a Scorecard** of custom-selected credits, and
- **Score Your Project or Agency's Systems & Practices** with the Sustainable Highways Self-Evaluation Tool.

Start > What is Sustainability?

Table of Contents

Federal Highway Administration, U.S. Department of Transportation

Sustainable Highways Self-Evaluation Tool

Beta Version

Browse the Credits

Self-Evaluation Scorecard

System Planning & Processes

Credit	Points
SP-1 **Comprehensive and Integrated Planning** Incorporate environmental, economic, and social sustainability goals into long-range transportation plans (LRTP) and ensure integration of...	10
SP-2 **Environmental Management System** Improve environmental stewardship by having an environmental management system.	10
SP-3 **Context Sensitive Solutions** Ensure that a system-wide context sensitive solutions (CSS) approach to project and program development is integrated into the Agencys...	10
SP-4 **Equity Analysis** Provide a transportation system that fairly benefits affected geographic or demographic groups.	10

List All Credits

By Code

By Title

Filter by Phase

System Planning & Processes

Project Development

Transportation Systems Management, Operations & Maintenance

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http://www.sustainablehighways.org/122/browse.html

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Browse the Credits | Sustainable

PD-24 **Long-Life Pavement**
Minimize life cycle costs by promoti
structures.

PD-25 **Pavement and Structure**
Reuse existing pavement and struc

PD-26 **Stormwater Cost Analysi**
Determine lifecycle costs and saving
development techniques and best
stormwater...

PD-27 **Thermal Pavement**
Use pavement thermal properties t

PD-28 **Contractor Warranty**
Incorporate construction quality into
the use of warranties.

PD-29 **Stormwater Pollution Pre**
Reduce pollution and associated ef

PD-30 **Environmental Training**
Provide construction personnel with
environmental issues and best prac
environmental...

PD-31 **Equipment Emission Red**
Reduce air emissions from nonroad
encouraging early achievement of t

PD-32 **Fossil Fuel Reduction**
Reduce the overall consumption of
equipment.

http://www.sustainablehighways.org/?id=42 - Credit Details - Windows Internet Explorer

PD-24 Long-Life Pavement

Details

Goal

Minimize life cycle costs by promoting design of long-lasting pavement structures.

Requirements

The first requirement AND EITHER the second or third requirement must be met to achieve points.

Requirement 1: Design at least 75% 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 a
trafficked lanes and show that 75% minimum of that area is designed for long-life. Do not include shoulders
medians, sidewalks and other paved areas in the computation. Long-life pavement is defined as a pavemen
structure that is designed using a minimum 40-year design life.

AND

Requirement 2: Meet the requirements of Figure 1.

OR

Requirement 3: Pavement design is in accordance with a design procedure that is formally recognized, ado
and documented by the project owner.

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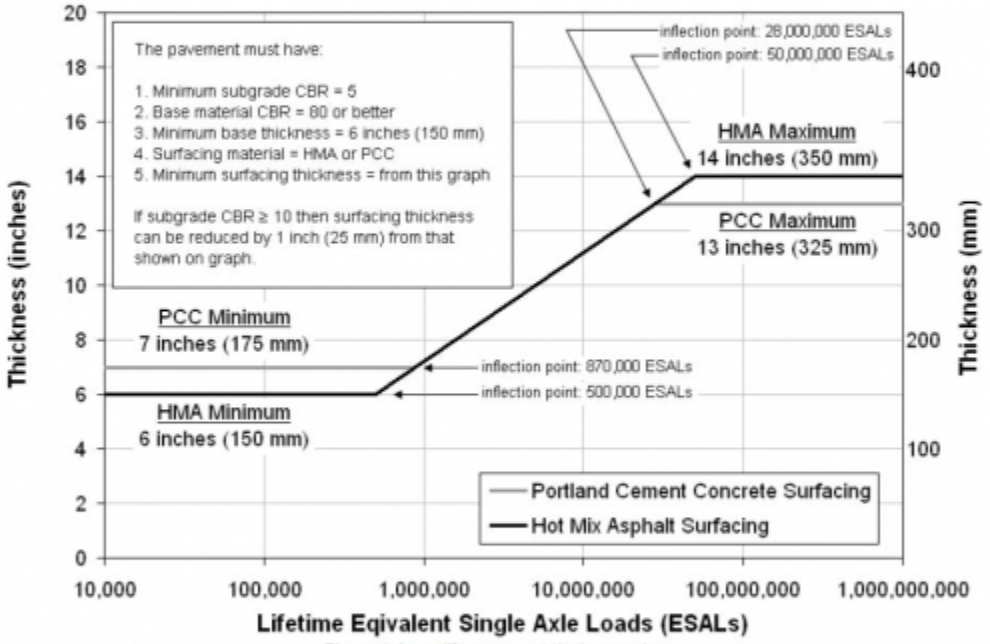

Figure 1: Long-life pavement design graph.

Download

PD-24 Long-Life Pavement

PD-24: Long-Life Pavement

Goal

Minimize life cycle costs by promoting design of long-lasting design pavement structures.

Points

5 points

Requirements

The first requirement AND EITHER the second or third requirement must be met to achieve points.

Requirement 1: Design at least 75% 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 75% minimum of that area is designed for long-life. Do not include shoulders, medians, sidewalks and other paved areas in the computation. Long-life pavement is defined as a pavement structure that is designed using a minimum 40-year design life.

AND

Requirement 2: Meet the requirements of Figure 1.

OR

Requirement 3: Pavement design is in accordance with a design procedure that is formally recognized, adopted and documented by the project owner.

Details

Generally, not all pavement sections on a project will be designed as long-lasting sections. Also, this credit is not applicable to roads that are not surfaced with hot mix asphalt (HMA) or portland cement concrete (PCC), such as gravel roads, dirt roads, and roads sealed with bituminous surface treatments.

Figure 1 Method. Requirements for subgrade California Bearing Ratio (CBR) and base material CBR can be taken as averages across the entire project where more than one test is done. If subgrade or base support is not measured by CBR, use the common conversion techniques in Table 1 or any local conversion that is commonly used in design and has a basis in empirical evidence. Soils testing data should support the conversion used.

Table 1: Commonly Accepted CBR Conversion Methods (AASHTO, 1993)

Conversion	Equation	Limitation
CBR - Resilient Modulus (M_R)	$CBR = \frac{M_R}{1500}$	Fine grained soils with a soaked CBR of 10 or less only
CBR - Resistance Value (R-value)	$CBR = \frac{555(R\ value) + 1155}{1500}$	Fine grained, non-expansive soils with a soaked CBR of 8 or less only

Design Procedure Method. The intention is to allow an owner agency to use its existing design procedure to design the pavement section as long as a sufficiently long design life is chosen (at least 40 years). Some common design procedures include (but are not limited to):

- **1993 AASHTO Method**. The method described in the 1993 version of the *AASHTO Guide for Design of Pavement Structures* (1993) and computerized in *DARWin*, and AASHTOware product.
- **Asphalt Institute Method**. The method described in the Asphalt Institute's *MS-1 Asphalt Pavements for Highways and Streets* and computerized in the Asphalt Institute's publication, *SW-1 Asphalt Thickness Design Software for Highways, Airports, Heavy Wheel Loads and other applications* (1981).
- **Mechanistic-Empirical Pavement Design Guide (MEPDG)**. The method described in *AASHTO MEPDG-1 Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice* (2008). This method is eventually intended to replace the 1993 AASHTO method.

Existing Pavements. Existing pavements that are to at least partially remain in place (in any condition) can also qualify for this credit. In these cases, evaluation for this credit shall be based on the final pavement structure, which may include (1) existing pavement remaining in place, and (2) any new pavement structure added. In this manner, a diamond grind of an existing PCC pavement or an overlay of an existing HMA pavement can qualify for this credit if the resultant pavement structure meets the criteria of this credit.

Documentation

- A list of pavement sections to be built (or reconstructed) and their associated pavement material type, surface areas, design thicknesses if design was intended to be long-life or not in accordance with the requirements of this credit. This may be included as part of the standard project documentation or as a separate document.
- A calculation to indicate the total percentage of trafficked lane pavement surface areas that are designed for long-life.
- A drawing or project map showing locations of pavement sections designed for long-life. These pavement sections should be highlighted on the plan, a scale should be on the plan, and the total surface area of each pavement section should be called out as a note on the plan.

FHWA Sustainable Highways Self-Evaluation Tool
PD-24: Long-Life Pavement
Draft Version, October 2010
PD-24

Which credits are pavement-related?

Credit	Title	Requirements	Point Range
System Planning and Processes			
SP-13	Noise Reduction Management Plan	Establish a Noise Reduction Management Plan (NRMP) for transportation systems.	1-10
Project Development			
PD-4	Lifecycle Assessment	Incorporate energy and emissions information into the decision-making process for pavement design rehabilitation alternatives.	2
PD-5	Lifecycle Cost Analysis	Determine the total lifecycle cost for pavements section alternatives to aid in project decision making.	2
PD-13	Recycled Materials	Reduce lifecycle impacts from extraction and production of virgin materials.	1-5
PD-21	Low-Emitting Materials	Reduce human exposure to hazardous airborne compounds from construction materials.	2-5
PD-24	Long-Life Pavement	Minimize life cycle costs by promoting design of long-lasting design pavement structures.	5
PD-25	Pavement and Structure Reuse	Reuse existing pavement and structural materials.	1-5
PD-27	Thermal Pavement	Use pavement thermal properties to enhance sustainability.	3
PD-28	Contractor Warranty	Incorporate contractor warranty and construction quality into the public low-bid process through the use of warranties.	3
PD-31	Equipment Emission Reduction	Reduce air emissions from nonroad construction equipment by encouraging early achievement of the EPA Tier 4 emission standard.	2
PD-35	Reduced Energy Materials	Reduce fossil fuels use at the hot mix asphalt or cement plant, decrease emissions at the plant, and decrease worker exposure to emissions during placement.	3
Transportation Systems, Management, Operations and Maintenance			
OM-2	Pavement Management System	Make pavements last longer and perform better by preserving and maintaining them.	1-10
OM-4	Paved Surfaces Management System	Make paved surfaces last longer and perform better by performing routine maintenance and preservation activities on them.	1-10

How are the criteria weighted?

- Grounded in studies that measure the value our resources
- Based on a few key principles:
  - Effectiveness of the sustainability measure
  - Longevity of the benefit
  - Value of the sustainability benefit
- Project Development credits 5 points max.
- Systems-level credit scores still in development (all 10 points max.)

Why are pavements emphasized?

"Highways and streets are the largest component of public transportation infrastructure spending. Pavement is by far the largest part of that spending, accounting for about 70 percent of state and local roadway expenditures."

~ Bureau of Transportation Statistics

- Because pavements and their supporting structure make up a majority of roadway infrastructure cost and materials quantities, they should be given commensurate attention.

How do I score a project?

- Identify phase of Project
- Establish Context of project
- Review criteria and applicability to project
- Use online tool to perform self-evaluation (Score your project)

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Sustainable Highways Self-Evaluation Tool

Beta Version

Scorecard

This beta version of the scorecard is for review purposes only and does not tabulate. Projects will soon be able to choose a phase and score, but for this demo, the project development phase has been selected.

Project Development

CreditPoints

☐	PD-01 Using the principles of cost benefit analysis, ensure that users benefits, including environmental and social benefits, exceed full...	1
☐	PD-02 Improve human health by implementing projects that reduce serious injuries and fatalities.	10
☐	PD-03 Deliver projects that synthesize transportation	5

Self-Evaluation Scorecard

Project Score

0

Your Rating: Not Rated

36 points needed for Silver
47 points needed for Gold
65 points needed for Platinum

Help Me Build It

Achievement Levels
How will success be measured?

- Achievement levels are included in Beta version
- Look similar to LEED Rating system
  - Bronze (base level)
  - Silver (level 2)
  - Gold (level 3)
  - Platinum (top level)
- Are designed to encourage improvement

Next Steps

- Beta version release
- Request help from the transportation community in testing and improving the tool
- Evaluate feedback
- Make website improvements
- Release revision (Version 1.0) – likely next year

Federal Highway Administration, U.S. Department of Transporation
Sustainable Highways Program

Website address—www.sustainablehighways.org

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Sustainable Highways Program

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Grand Loop Highway, Yellowstone National Park

Welcome!

FHWA Sustainable Highways Program

The Sustainable Highways Program helps identify characteristics of sustainable highways and provides a scoring tool to self-evaluate the extent to which these characteristics are built into planning and policy, roadway projects and operations/maintenance.

Why Sustainable Highways?

Principles of sustainability are used in many other building and construction industries in order to demonstrate and help achieve commitments to environmental goals and cost savings to society, agency and organizational budgets. However, in the field of transportation there is little formal guidance or information on how to systematically use or incorporate sustainability into transportation organizations and projects. This program is designed as a helpful resource in this area.

Website Organization

This website provides users an opportunity to Learn about sustainable highways and Score their agency or project in the area of sustainability.

What do you want to do?

Learn ▸

A guided tour through the Sustainable Highways Program to learn about integrating sustainability into Planning & Policy, Roadway Projects and Operations & Maintenance.

Score ▸

A Self-Evaluation tool that allows you to evaluate sustainability in agency planning & policy, agency operations & maintenance, or a specific roadway project.

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Federal Highway Administration
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Highways Program

How is safety weighted?

- Safety is both
  - the first priority of any transportation agency and
  - a key element of sustainability.
- It preserves the quality of life for future generations and assures our capacity to endure
- A road that is unsafe is not sustainable
- Safety criteria given premium score score

Why is context important?

- Every project has a unique context
- Context must be taken into account in evaluating sustainability
- Context will present both **constraints** and **opportunities**

Project Development—
What do the criteria address?

- Ensuring durability of Projects
- Quality control
- Increasing **energy efficiency** of materials
- Recycling of pavements and structure materials
- Reducing **environmental impacts**
- Improve **mobility and access**
- Improving safety
- Incorporating s**ustainable procedures**
- Cost-benefit analysis

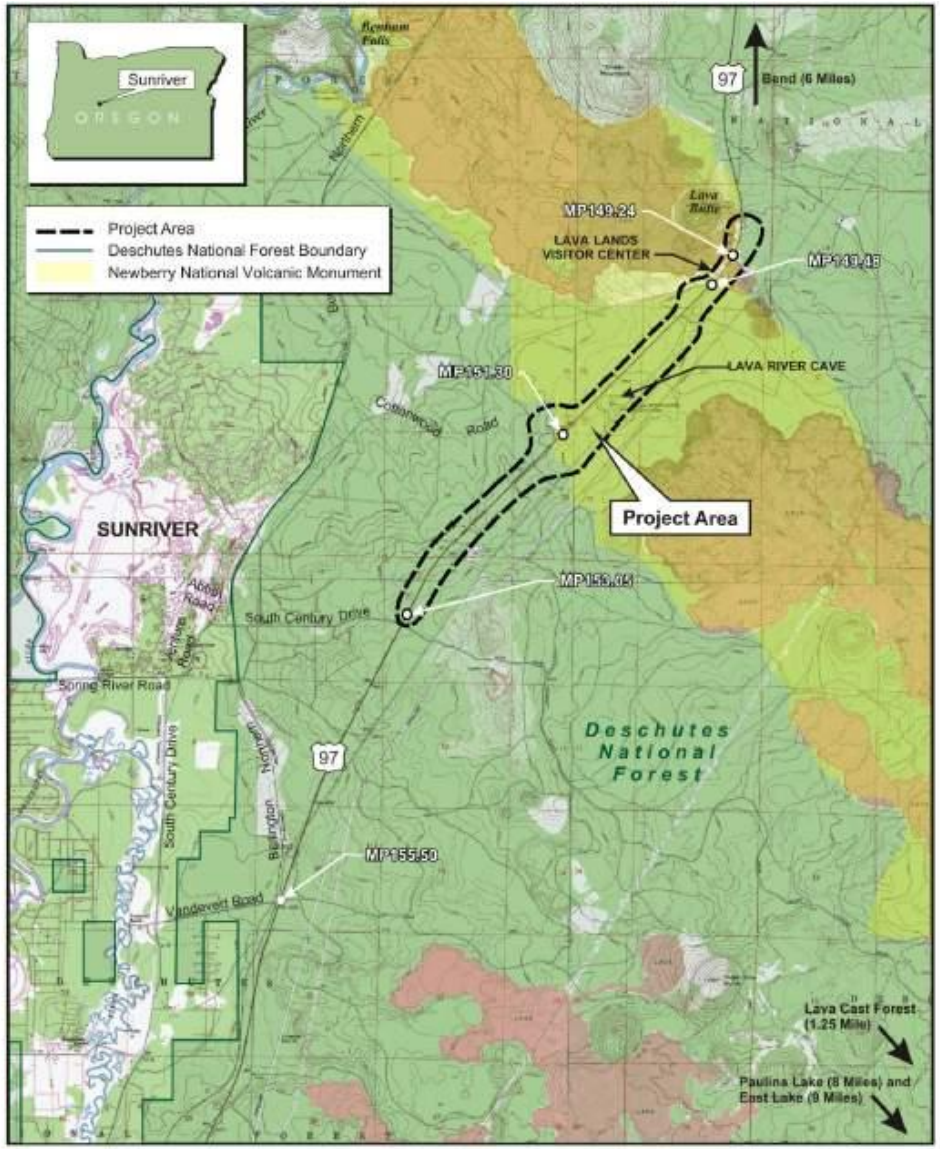
Systems Planning—
What do the criteria address?

- Accounting for climate change impacts
- Enhancing safety management
- Improving asset management
- Travel Demand Management (TDM)
- Reducing Noise
- Reducing Emissions
- Financial sustainability
- Land use planning integration
- Equity analysis

Operations and Maintenance—What do the criteria address?

- Reduce Pollution from O&M
- Create Energy Efficient operation systems
- Adopt internal agency sustainable practices
- Purchase energy efficient fleets
- Preserve infrastructure through maintenance
- Employ low-impact winter maintenance
- Maintain Ecological connectivity
- Reduce delays and improve incident responses
- Reduce crashes

Illustration: Rural Highway



USGS 7.5 Minute Quadrangle Series Lava Butte, Oregon 1963 (rev. 1981); Benham Falls, Oregon 1963 (rev. 1981); Lava Cast Forest, Oregon 1963 (rev. 1981); Anns Butte, Oregon 1963 (rev. 1981)

Ecological Connectivity: Wildlife Crossing

Illustration #1: Rural Highway *Sustainability Features*

- **Recycled Materials**
  - Recycled asphalt pavement (RAP) 30% of the base course and 20% of the wearing course (by weight).
- **Ecological Connectivity**
  - Two exclusive wildlife crossing structures, fencing
- **Roadside Infrastructure Maintenance**
  - Maintenance shared by the Forest Service, County, State Fish and Wildlife and State DOT

Illustration #1: Rural Highway Scorecard

Criteria #	Phase	Title	Score
15	Project Planning	Context Sensitive Solutions	5
16	Project Planning	Economy and Cost Benefit	1
17	Project Planning	Highway and Traffic Safety	1
18	Project Planning	Lifecycle Assessment	0
19	Project Planning	Lifecycle Cost Analysis	2
20	Project Planning	Freight Mobility	0
21	Project Planning	Educational Outreach	2
22	Project Planning	Habitat Restoration	0
23	Project Design	Runoff Flow Control	0
24	Project Design	Runoff Quality	0
25	Project Design	Ecological Connectivity	4
26	Project Design	Low Impact Development	0
27	Project Design	Recycled Materials	5
28	Project Design	Renewable Energy	0
29	Project Design	Site Vegetation	3
30	Project Design	Pedestrian Access	2
31	Project Design	Bicycle Access	2
32	Project Design	Transit & HOV Access	0
33	Project Design	Historic and Cultural Preservation	0
34	Project Design	Noise Abatement	0
35	Project Design	Low-Emitting Materials	0
36	Project Design	Energy Efficiency	0
37	Project Design	Traffic Systems, Management and Operations (TSMO)	4
38	Project Design	Long-Life Pavement	5
39	Project Design	Pavement and Structure Reuse	0
40	Project Design	Stormwater Cost Analysis	0
41	Project Design	Thermal Pavement	0
42	Project Design	Climate Change Considerations in Design	0
43	Project Design	Contractor Warranty	0
44	Project Design	Tracking Environmental Commitments	0
45	Project Design	Water Pollution Prevention Plan	1
46	Project Design	Environmental Training	1
47	Project Construction	Equipment Emission Reduction	0
48	Project Construction	Fossil Fuel Reduction	0
49	Project Construction	Noise Mitigation Plan	0
50	Project Construction	Quality Control Plan	5
51	Project Construction	Reduced Energy Materials	0
52	Project Construction	Waste Management	0
53	Project Construction	Earthwork Balance	0
	Bronze	Project Development Score	43

Estimated Project Development Score: 43

Illustrative Achievement Level: Bronze 38 - 50