INVEST

FHWA's Sustainable Highways Initiative and Self-Evaluation Tool

Constance Hill Galloway
Sustainable Transport and Climate Change Team
Office of Planning, Environment & Realty
Industrial Byproducts Conference
November 2, 2011 - Austin, TX

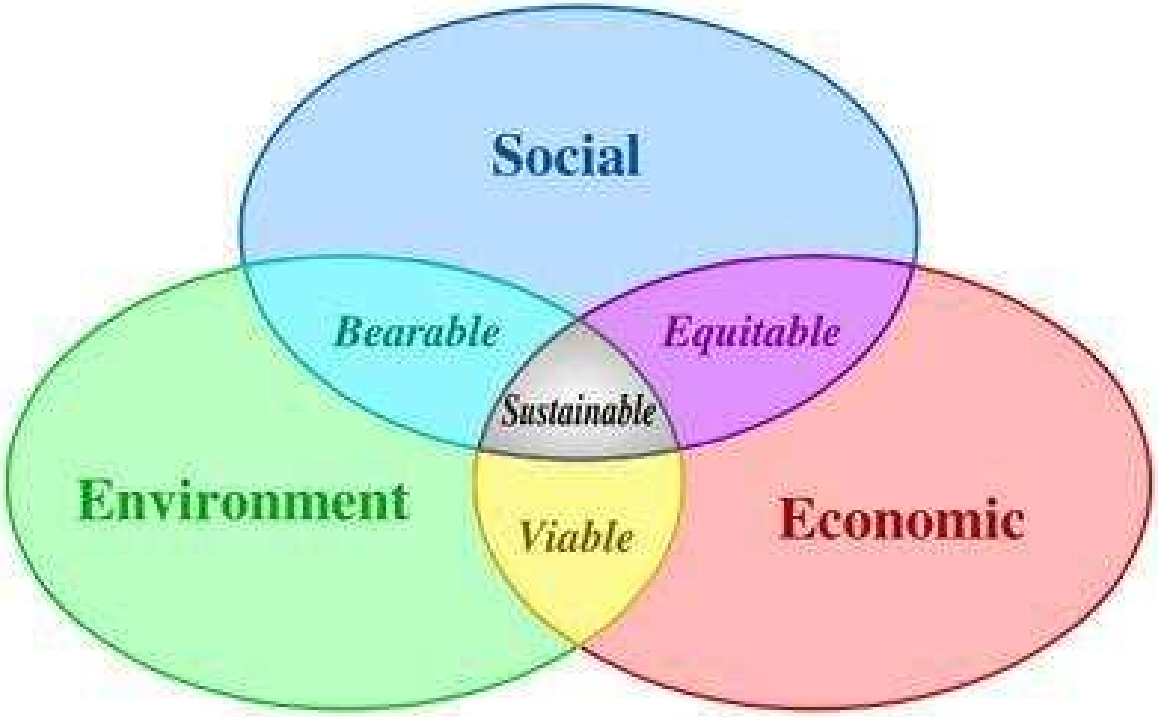
Agenda

- Overview of Sustainability and Highways
- Pilot Test Version of Self Evaluation Tool
- Website Walk-thru
- Pilot Testing
- Next Steps

What is a Sustainable Highway System?

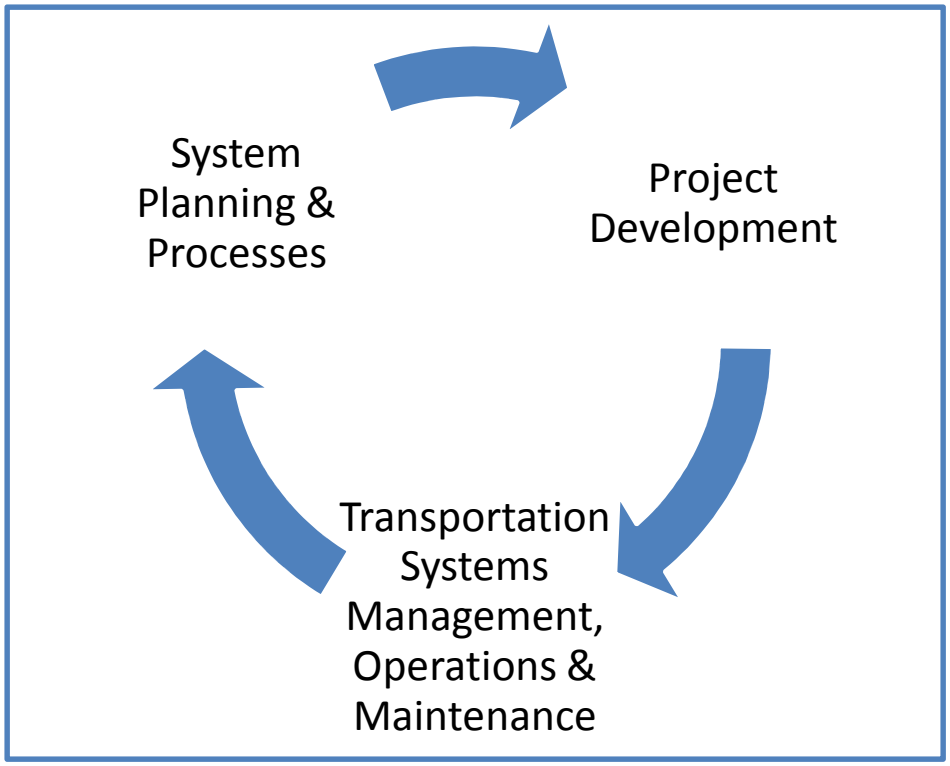
- **Satisfies functional requirements**
  - Fulfills transportation goals and needs
  - Addresses development and economic growth
- **Avoids, minimizes, reduces impacts**
  - Environment
  - Consumption of resources
- **Addresses environmental, economic, and social equity dimensions (triple bottom line)**
- **Sustainability addressed throughout the project lifecycle**

The Triple Bottom Line



Sustainability and the Project Lifecycle

- For sustainability to be fully integrated into highway and transit programs, it must be considered throughout the project lifecycle
- Must address sustainability from planning through operations



Examples of Sustainable Practices

- **System Planning**
  - Integrated Planning
  - Mitigation banking
  - Fiscal planning
- **Project Development**
  - Cost Benefit Analysis
  - Construction Equipment Emission Reduction
  - Recycling and Reuse of materials
- **Operations and Maintenance**
  - Strong asset management
  - Roadside vegetation management

What about Transit?

- Transit is part of system planning and project development
- Is fully considered as a partner in FHWA's activities prior to modal selection

INVEST

(Infrastructure Voluntary Evaluation Sustainability Tool)

FHWA's Sustainable Highways Self-Evaluation Tool

Overview of INVEST

- **Purpose and Goals of the Tool:**
  - Provide best practice information to enable transportation practitioners to incorporate sustainability into their projects and practices
  - Provide a VOLUNTARY method for practitioners to evaluate their transportation projects and to encourage progress in the sustainability arena
- **The Tool is not intended to compare states or MPOs and their projects or practices**
- **Not meant to encourage only compliance…but above and beyond**

Ways INVEST can be used

- **Project Evaluation**
  - Single or multiple projects
  - Score project and/or inform SOP's, program-level
  - Proactive vs. retroactive
- **Programs and processes**
  - Planning or O&M
  - Score and/or inform SOP's
  - Proactive vs. retroactive

Significant Changes from Beta to Pilot Test Version

- **Focuses on the Project Development (PD) criteria only**
  - Beta Version included System Planning and O&M
- **Greatly simplifies criteria and scoring**
  - 1-page write-ups for each criteria
  - Combined or eliminated criteria (e.g., combined stormwater-related criteria)
- **Makes scoring smaller projects easier**
  - Basic Version - includes criteria that would be more appropriate for rehabilitation, resurfacing, and minor reconstruction projects.
  - Extended Version – includes larger number of criteria than basic version and is available to score larger reconstruction and new construction projects.
- **Reduces the Number of Criteria by Eliminating or Consolidating Criteria**
  - Basic Version = 20 Criteria
  - Extended Version = 30 Criteria

Project Development Criteria

- PD-1 Cost Benefit Analysis
- PD-2 Highway and Traffic Safety
- PD-3 Context Sensitive Project Development (or equivalent)
- PD-4 Lifecycle Cost Analysis
- PD-5 Freight Mobility
- PD-6 Educational Outreach
- PD-7 Tracking Environmental Commitments
- PD-8 Habitat Restoration
- PD-9 Stormwater
- PD-10 Ecological Connectivity
- PD-11 Recycle & Reuse Materials
- PD-12 Create Renewable Energy
- PD-13 Site Vegetation
- PD-14 Pedestrian Access
- PD-15 Bicycle Access
- PD-16 Transit & HOV Access

Project Development Criteria

PD-17 Historical, Archaeological, and Cultural Preservation
PD-18 Scenic, Natural, or Recreational Qualities
PD-19 Low-Emitting Materials
PD-20 Energy Efficient Lighting
PD-21 ITS for System Operations
PD-22 Long-Life Pavement Design
PD-23 Reduced Energy and Emissions in Pavement Materials
PD-24 Contractor Warranty
PD-25 Earthwork Balance
PD-26 Construction Environmental Training
PD-27 Construction Equipment Emission Reduction
PD-28 Construction Noise Mitigation
PD-29 Construction Quality Plan
PD-30 Construction Waste Management

System Planning Criteria

SP-1	Integrated Planning: Economic Development
SP-2	Integrated Planning: Environmental
SP-3	Integrated Planning: Community
SP-4	Accessibility
SP-5	Safety Planning
SP-6	Multimodal Planning
SP-7	Freight Planning
SP-8	Travel Demand Management
SP-9	Air Quality
SP-10	Climate Change Considerations
SP-11	Financial Sustainability
SP-12	Travel Forecasting Methods
SP-13	Congestion Management
SP-14 and	Linking Asset Management Planning
SP-15	Linking Planning and NEPA

Operations & Maintenance Criteria

OM-1 Sustainability Plan
OM-2 Environmental Commitments Tracking System
OM-3 Pavement Management System
OM-4 Bridge Management System
OM-5 Maintenance Management System
OM-6 Highway Infrastructure Maintenance
OM-7 Roadside Infrastructure Maintenance
OM-8 Traffic Control Infrastructure Maintenance
OM-9 Snow and Ice Control
OM-10 Work Zone Traffic Control
OM-11 Transportation Management and Operations
OM-12 Safety Management
OM-13 Renewable Energy
OM-14 Fuel Efficiency
OM-15 Recycle and Reuse

PD-11 Recycle and Reuse Materials

Goal	Reduce lifecycle impacts from extraction and production of virgin materials.
Points	1 – 8 points
Requirements	Use recycled materials as a substitute for virgin materials or reuse existing materials or structural elements. Points can be earned for this criterion for both recycling and reusing and combined to a maximum of 8 points.

Table 1: Points for average recycled content

Points Earned	1	2	3	4	5
Percent recycled material required for Options 1 & 2	10%	20%	30%	40%	50%
Percent recycled material required for Options 3 & 4	20%	30%	40%	50%	60%

Table 2: Points for average reuse fraction

Points Earned	1	2	3	4	5
Percent Material Reused	50%	60%	70%	80%	90%

Continued on following slide…

PD-11 Recycle and Reuse Materials

Requirements

The average recycled content (ARC) can be calculated using one of four options below:

1. **Consider only the pavement binder materials.** This typically means the cement or asphalt in the pavement section. No other materials (e.g., aggregate in the pavement, granular base, fill, walls, bridge, signs, other structures, etc.) are considered.
2. **Consider only the hot mix asphalt (HMA) or portland cement concrete (PCC) pavement materials.** This encompasses the material in Option 1 plus the aggregate as well as any other additive materials. No other materials (e.g., granular base, fill, walls, bridge, signs, other structures, etc.) are considered.
3. **Consider all pavement materials including granular base layers.** This encompasses the material in Options 1 and 2 plus the granular base layers (either unbound or bound) as well as any other added materials. No other materials (e.g., fill, walls, bridge, signs, other structures, etc.) are considered.
4. **Consider all project materials.** This encompasses the material in Options 1, 2 and 3 plus, as a minimum, all materials in the fill and wall structures of the project. Other structures (e.g., bridges) and material (e.g., signs, traffic control devices, etc.) may be considered if desired.

Continued on following slide…

PD-11 Recycle and Reuse Materials

Requirements

The percentage of reused material can be calculated using one of three options below:

1. **Consider all pavement materials.** This encompasses all the materials in the existing pavement structure to include the HMA or PCC layers as well as granular base layers (either unbound or bound) as well as any other added materials. No other materials (e.g., fill, walls, bridge, signs, other structures, etc.) are considered.
2. **Consider all structure materials.** This encompasses all materials in existing structures within the project scope. For instance, if a paving project does not address any portion of a bridge structure, then the bridge structure may not be counted as "reused." However, a bridge seismic retrofit would be an appropriate application of this option where all portions of the retrofit bridge remaining on-site could be counted as "reused."
3. **Consider all project materials.** This encompasses the material in Options 1 (if any) and Option 2 (if any) plus, as a minimum, all materials in the fill and wall structures of the project. Other structures (e.g., tunnels) and material (e.g., signs, traffic control devices, etc.) may be considered if desired.

Website Walk-thru

www.sustainablehighways.org

U.S. Department of Transportation
Federal Highway Administration

Search | Feedback

Pilot Test

Login

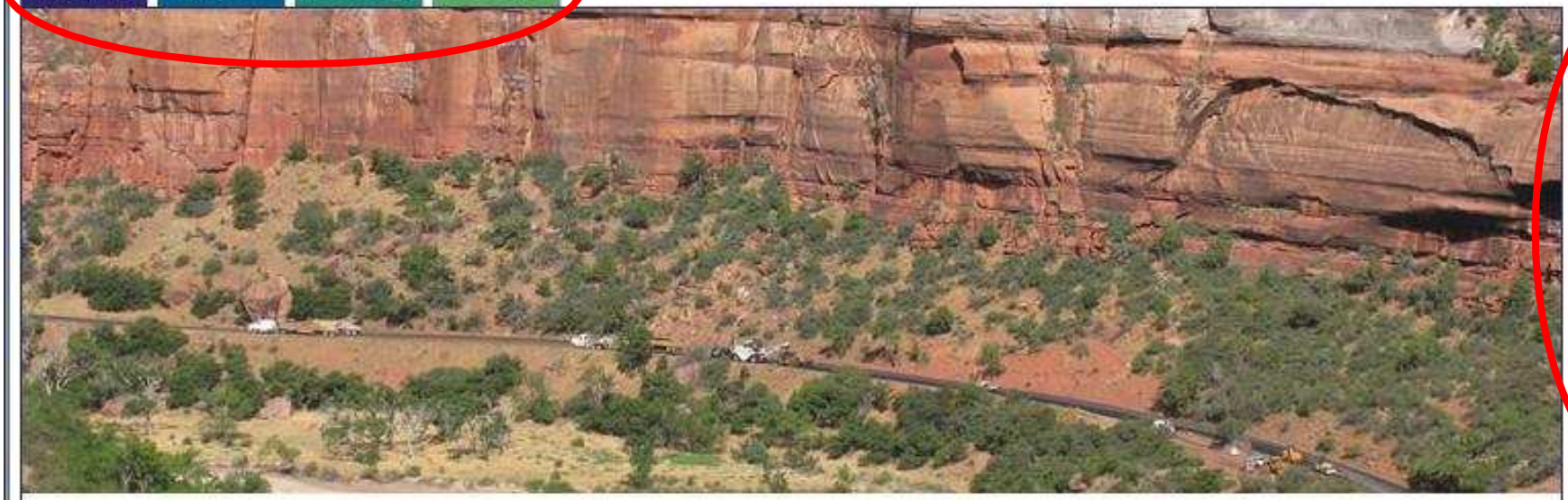
Register

Federal Highway Administration, U.S. Department of Transportation

Sustainable Highways Self-Evaluation Tool

Home | Learn | Browse | Score

search go



- Home
- Learn
- Browse
- Score
- FAQ
- Provide Comments
- Privacy
- Register

Welcome!

Pilot Test Version of INVEST, the FHWA Sustainable Highways Self-Evaluation Tool

This website represents a significant revision of the FHWA Sustainable Highways Self-Evaluation Tool that was released as a Beta Version in the Fall of 2010. Called the "Infrastructure Voluntary Evaluation Sustainability Tool", INVEST is a practical, web-based, collection of best practices that allow states to integrate sustainability into their transportation projects. The use of the tool is voluntary and can be used

What do you want to do?

Learn

A guided tour through this website to learn about sustainable highways and integrating sustainability best practices into projects, programs, and processes.

U.S. Department of Transportation
Federal Highway Administration

Search | Feedback

Admin Begin: Test Extended Go

Logged in as Lisa Reid

Logout

Pilot Test

Federal Highway Administration, U.S. Department of Transportation

Sustainable Highways Self-Evaluation Tool

Home Learn Browse Score

Home > Browse the Criteria

search go

Browse the Criteria

Select "Project Development" to browse complete set of criteria that can be used to evaluate sustainability within project planning, design, and construction.

Select "Operations and Maintenance" to browse the complete set of criteria that can be used to evaluate an Agency's programs and practices within Operations and Maintenance.

Beginning in September 2011, the complete set of "System Planning" criteria will be available to browse to evaluate an Agency's programs and practices within System Planning.

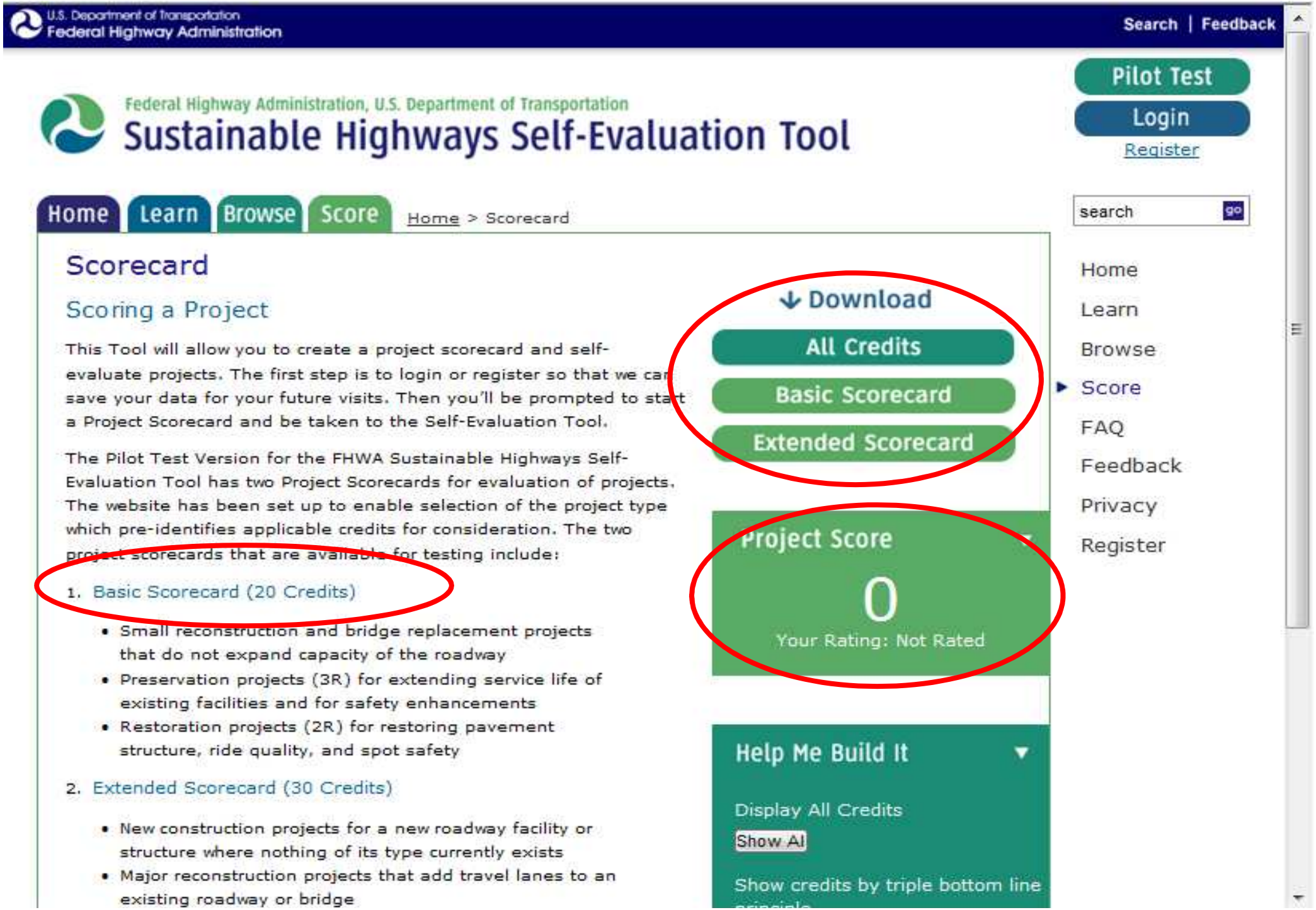
Project Development

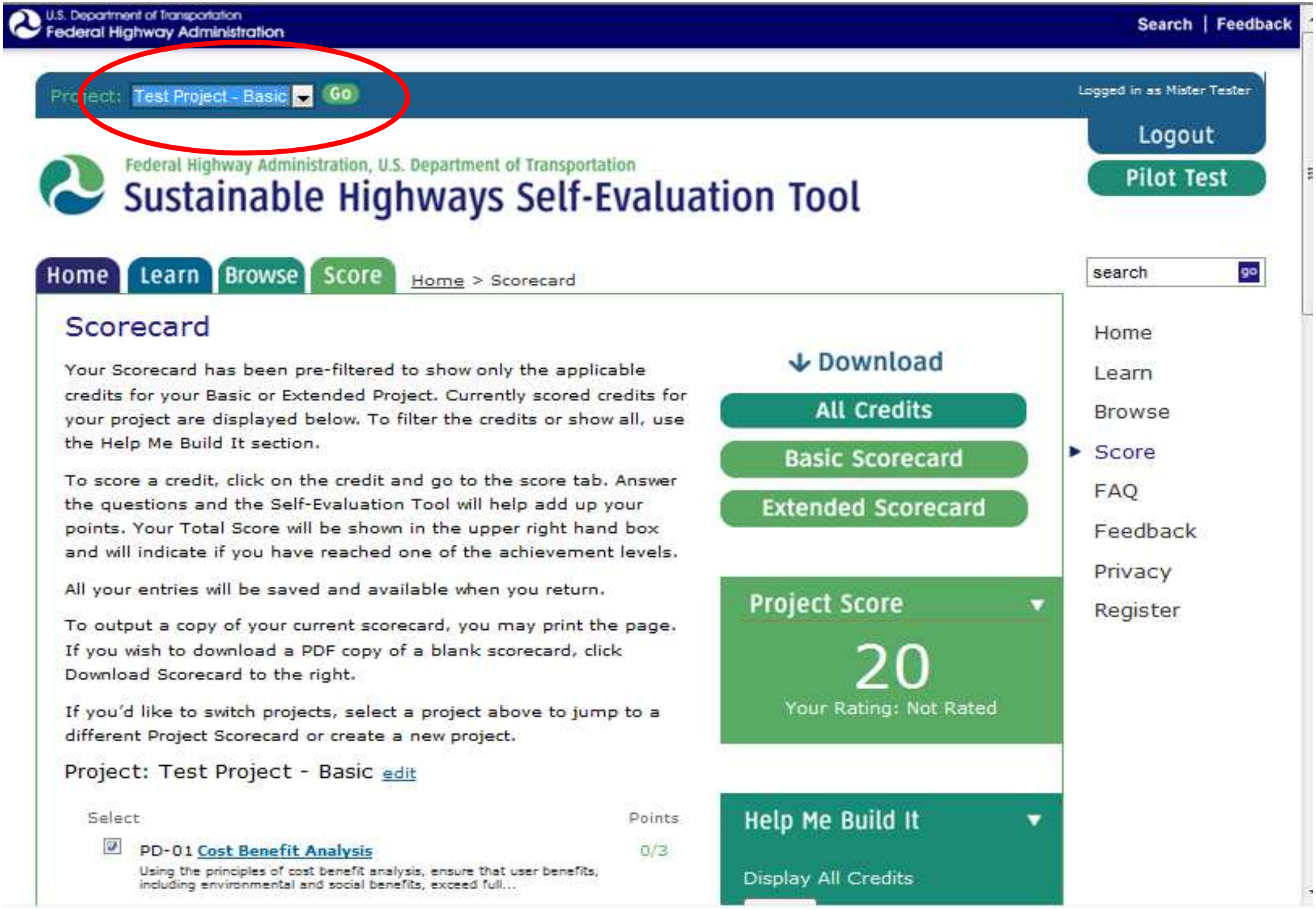
Operations & Maintenance

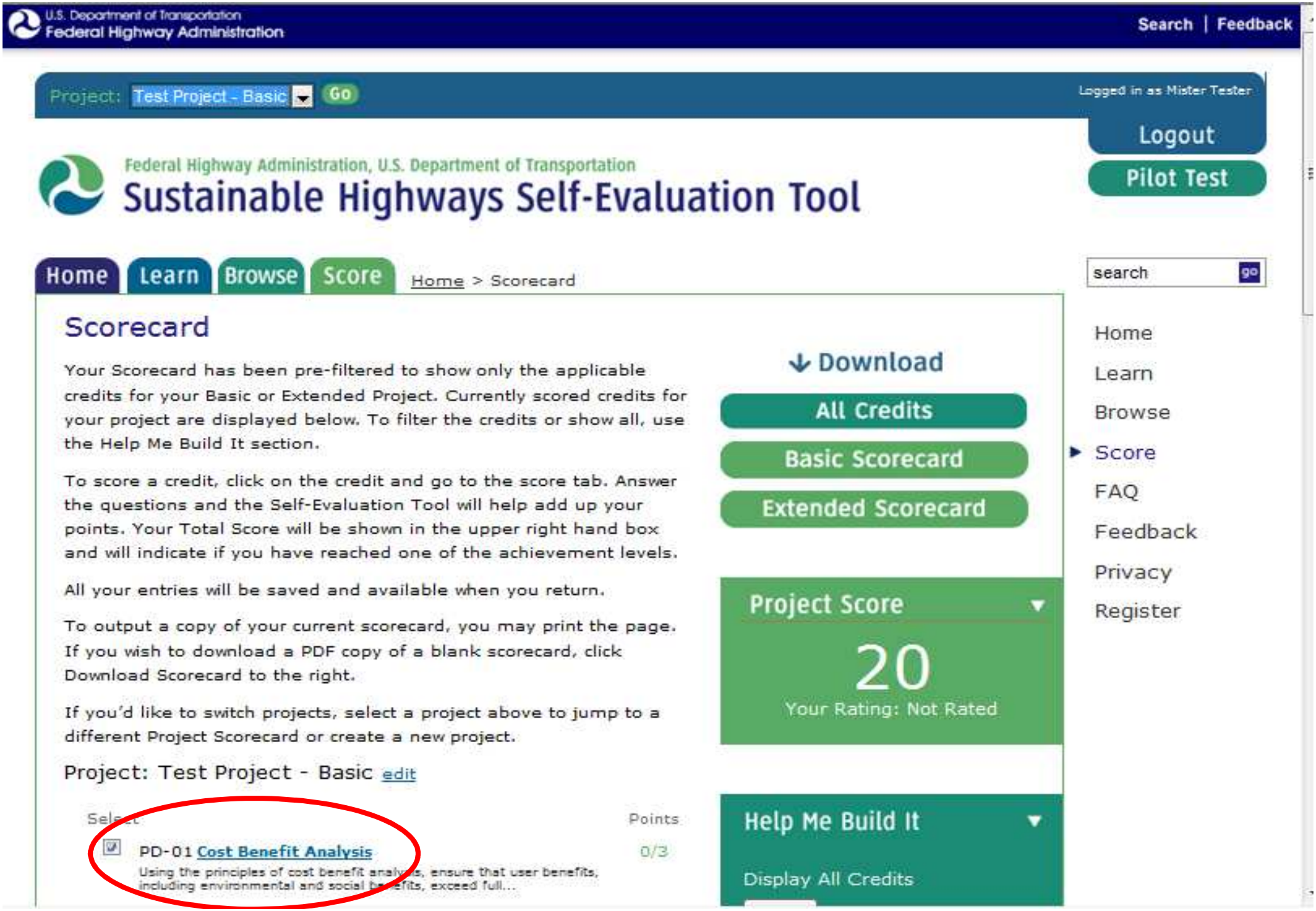
System Planning

Available September 2011

- Home
- Learn
- Browse
- Score
- FAQ
- Provide Comments
- Privacy
- Register


U.S. Department of Transportation
Federal Highway Administration
Search | Feedback
Pilot Test
Login
Register
Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool
Home
Learn
Browse
Score
Home > Scorecard
search
go
Scorecard
Scoring a Project
This Tool will allow you to create a project scorecard and self-evaluate projects. The first step is to login or register so that we can save your data for your future visits. Then you'll be prompted to start a Project Scorecard and be taken to the Self-Evaluation Tool.
The Pilot Test Version for the FHWA Sustainable Highways Self-Evaluation Tool has two Project Scorecards for evaluation of projects. The website has been set up to enable selection of the project type which pre-identifies applicable credits for consideration. The two project scorecards that are available for testing include:
1. Basic Scorecard (20 Credits)
• Small reconstruction and bridge replacement projects that do not expand capacity of the roadway
• Preservation projects (3R) for extending service life of existing facilities and for safety enhancements
• Restoration projects (2R) for restoring pavement structure, ride quality, and spot safety
2. Extended Scorecard (30 Credits)
• New construction projects for a new roadway facility or structure where nothing of its type currently exists
• Major reconstruction projects that add travel lanes to an existing roadway or bridge
Download
All Credits
Basic Scorecard
Extended Scorecard
Project Score
0
Your Rating: Not Rated
Help Me Build It
Display All Credits
Show All
Show credits by triple bottom line
Home
Learn
Browse
Score
FAQ
Feedback
Privacy
Register


U.S. Department of Transportation
Federal Highway Administration
Search | Feedback
Project: Test Project - Basic
Go
Logged in as Mister Tester
Logout
Pilot Test
Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool
Home
Learn
Browse
Score
Home > Scorecard
search
go
Scorecard
Your Scorecard has been pre-filtered to show only the applicable credits for your Basic or Extended Project. Currently scored credits for your project are displayed below. To filter the credits or show all, use the Help Me Build It section.
To score a credit, click on the credit and go to the score tab. Answer the questions and the Self-Evaluation Tool will help add up your points. Your Total Score will be shown in the upper right hand box and will indicate if you have reached one of the achievement levels.
All your entries will be saved and available when you return.
To output a copy of your current scorecard, you may print the page. If you wish to download a PDF copy of a blank scorecard, click Download Scorecard to the right.
If you'd like to switch projects, select a project above to jump to a different Project Scorecard or create a new project.
Project: Test Project - Basic edit
Select
Points
PD-01 Cost Benefit Analysis
0/3
Using the principles of cost benefit analysis, ensure that user benefits, including environmental and social benefits, exceed full...
Download
All Credits
Basic Scorecard
Extended Scorecard
Project Score
20
Your Rating: Not Rated
Help Me Build It
Display All Credits
Home
Learn
Browse
Score
FAQ
Feedback
Privacy
Register


U.S. Department of Transportation
Federal Highway Administration
Search | Feedback
Project: Test Project - Basic
Go
Logged in as Mister Tester
Logout
Pilot Test
Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool
Home
Learn
Browse
Score
Home > Scorecard
search
go
Scorecard
Your Scorecard has been pre-filtered to show only the applicable credits for your Basic or Extended Project. Currently scored credits for your project are displayed below. To filter the credits or show all, use the Help Me Build It section.
To score a credit, click on the credit and go to the score tab. Answer the questions and the Self-Evaluation Tool will help add up your points. Your Total Score will be shown in the upper right hand box and will indicate if you have reached one of the achievement levels.
All your entries will be saved and available when you return.
To output a copy of your current scorecard, you may print the page. If you wish to download a PDF copy of a blank scorecard, click Download Scorecard to the right.
If you'd like to switch projects, select a project above to jump to a different Project Scorecard or create a new project.
Project: Test Project - Basic edit
Select
Points
PD-01 Cost Benefit Analysis
0/3
Using the principles of cost benefit analysis, ensure that user benefits, including environmental and social benefits, exceed full...
Download
All Credits
Basic Scorecard
Extended Scorecard
Project Score
20
Your Rating: Not Rated
Help Me Build It
Display All Credits
Home
Learn
Browse
Score
FAQ
Feedback
Privacy
Register

PD-1: Cost Benefit Analysis

3 points

✓ Basic ✓ Extended

Goal

Using the principles of cost benefit analysis, ensure that user benefits, including environmental and social benefits, exceed full life-cycle costs, including estimates of environmental and social costs.

Affected Triple Bottom Line Elements

Requirements

3 Points. Conduct a cost benefit analysis for the project that shows the net present value (NPV) of expected user benefits exceeds life-cycle costs including social and environmental (e.g. air emissions or safety costs or benefits); and construction and maintenance costs where they can be quantified. For larger projects that reduce travel time, improve trip reliability, expand access to markets, or improve modal accessibility; the cost benefit analysis could be expanded to include broader jobs, income and Gross Domestic Product (GDP)-related benefits alongside user benefits.

As a requirement for receiving the cost benefit analysis points, a cost benefit or economic impact analysis for the project must be completed using minimum acceptable industry practices. Cost benefit analysis and economic impact analysis are different, yet complementary tools for evaluating economic impacts.

Cost Benefit Analysis: Cost benefit analysis assesses the user and agency benefits of projects and programs in comparison to their costs. It normally includes all direct user and agency costs and benefits that the agency is able to estimate, including operating costs, travel time costs, and often other impacts such as crash and pollution costs, but broader economic impacts are excluded in traditional benefit cost analysis. Cost benefit analysis is typically applied in transportation studies to identify the NPV of the societal benefits that can be associated with a project or program, net of the investment costs. This includes benefits that are not reflected in any monetary transaction. FHWA has developed two project-level cost benefit analysis tools including: 1) BCA.Net, which is a web-based benefit-cost analysis tool designed to support the highway project decision-making process; and 2) STEAM, which is a corridor and system-wide analysis tool that computes the net value of mobility and safety benefits attributable to regionally important transportation projects.

Economic Impact Analysis: Economic impact analysis is concerned with the monetary transactions that affect the generation of income in an area's economy due to the investment in the program or project. It does not include the travel time or other costs or benefits for which money is not exchanged, however, it includes indirect and induced impacts on business growth that are not included in benefit/cost analysis. However, it does include much broader estimates of impacts than direct impacts. It asks the question: "What does the economy of interest look like with or without a project or program?" as measured by the quantity of and the types of transactions that are forecasted to occur under each scenario. Impacts are shown by the change in jobs, in worker income, and in GDP or gross state product (GSP) that results in future years as a consequence of the transportation programs or projects.

Sources

The project is considered to have met this credit if the requirements above can be reasonably substantiated through the existence of the results from a Cost Benefit/Economic Impact Analysis that includes documentation of techniques and underlying assumptions for any economic model(s) used to generate results.

PD-1 Cost Benefit Analysis

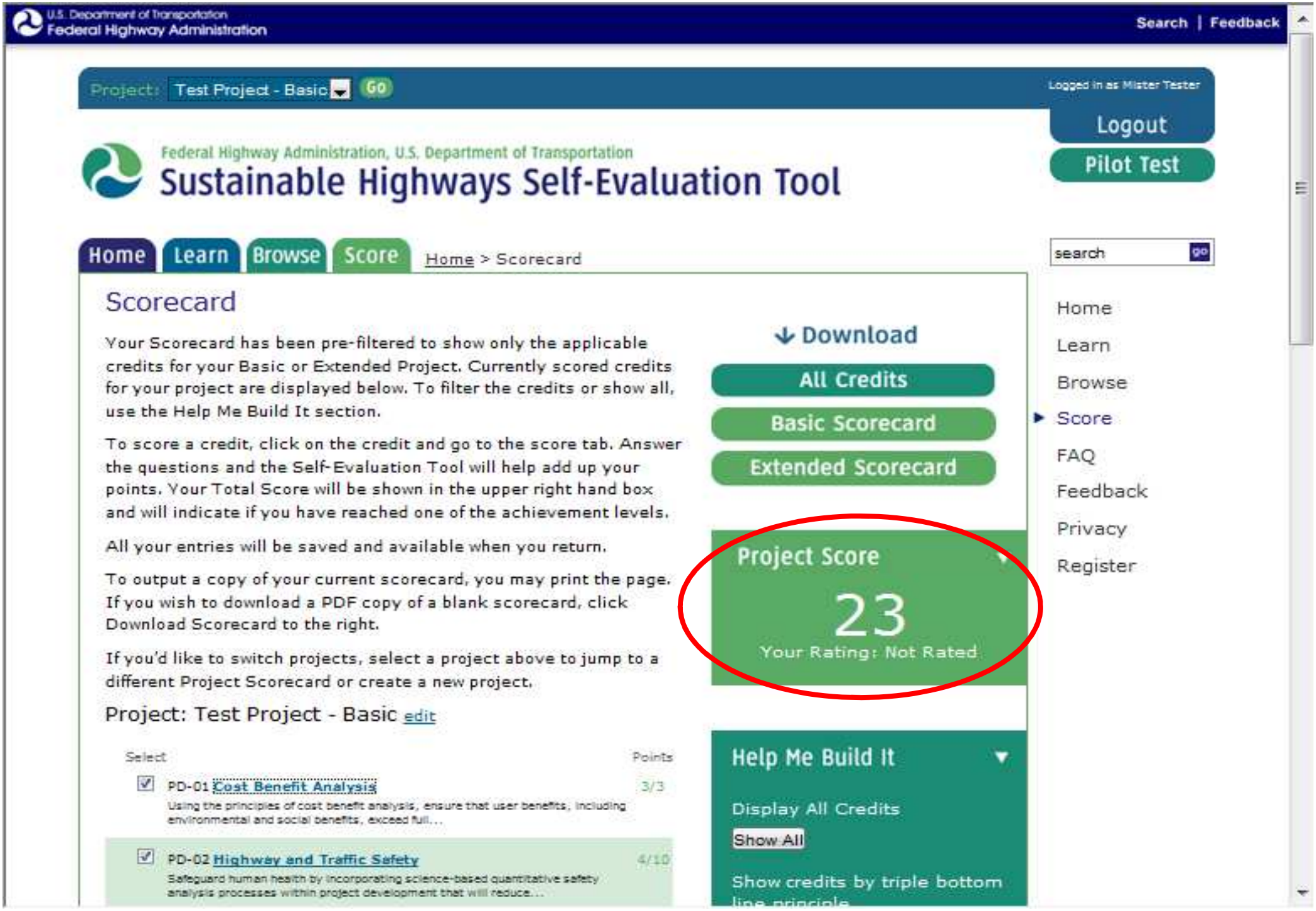
Details | Score

Questions

Using cost benefit analysis, does the net present value of expected users' benefits exceed full life-cycle costs?

- (•) Yes(3 points)
- ( ) No

Save


U.S. Department of Transportation
Federal Highway Administration
Search | Feedback
Project: Test Project - Basic
Go
Logged in as Mister Tester
Logout
Pilot Test
Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool
Home
Learn
Browse
Score
Home > Scorecard
search
go
Scorecard
Your Scorecard has been pre-filtered to show only the applicable credits for your Basic or Extended Project. Currently scored credits for your project are displayed below. To filter the credits or show all, use the Help Me Build It section.
To score a credit, click on the credit and go to the score tab. Answer the questions and the Self-Evaluation Tool will help add up your points. Your Total Score will be shown in the upper right hand box and will indicate if you have reached one of the achievement levels.
All your entries will be saved and available when you return.
To output a copy of your current scorecard, you may print the page. If you wish to download a PDF copy of a blank scorecard, click Download Scorecard to the right.
If you'd like to switch projects, select a project above to jump to a different Project Scorecard or create a new project.
Project: Test Project - Basic edit
Select
Points
PD-01 Cost Benefit Analysis
3/3
Using the principles of cost benefit analysis, ensure that user benefits, including environmental and social benefits, exceed full...
PD-02 Highway and Traffic Safety
4/10
Safeguard human health by incorporating science-based quantitative safety analysis processes within project development that will reduce...
Download
All Credits
Basic Scorecard
Extended Scorecard
Project Score
23
Your Rating: Not Rated
Help Me Build It
Display All Credits
Show All
Show credits by triple bottom line principle
Home
Learn
Browse
Score
FAQ
Feedback
Privacy
Register

Scorecard

Your Scorecard has been pre-filtered to show only the applicable credits for your Basic or Extended Project. Currently scored credits for your project are displayed below. To filter the credits or show all, use the Help Me Build It section.

To score a credit, click on the credit and go to the score tab. Answer the questions and the Self-Evaluation Tool will help add up your points. Your Total Score will be shown in the upper right hand box and will indicate if you have reached one of the achievement levels.

All your entries will be saved and available when you return.

To output a copy of your current scorecard, you may print the page. If you wish to download a PDF copy of a blank scorecard, click Download Scorecard to the right.

If you'd like to switch projects, select a project above to jump to a different Project Scorecard or create a new project.

Project: Test Project - Basic edit

Select		Points
☑	PD-01 Cost Benefit Analysis Using the principles of cost benefit analysis, ensure that user benefits, including environmental and social benefits, exceed full...	3/3
☑	PD-02 Highway and Traffic Safety Safeguard human health by incorporating science-based quantitative safety analysis processes within project development that will reduce...	4/10
☑	PD-04 Lifecycle Cost Analyses Inform the decision-making process for the project through lifecycle cost [illegible] of key project features.	0/3
☑	PD-05 Freight Mobility Decrease the impacts from freight movements.	0/7
☑	PD-06 Educational Outreach Increase public, agency, and stakeholder awareness of roadway sustainability activities.	2/2
☑	PD-07 Tracking Environmental Commitments Ensure that environmental commitments made by the project are completed and	3/5

Download

All Credits

Basic Scorecard

Extended Scorecard

Project Score

23

Your Rating: Not Rated

Help Me Build It

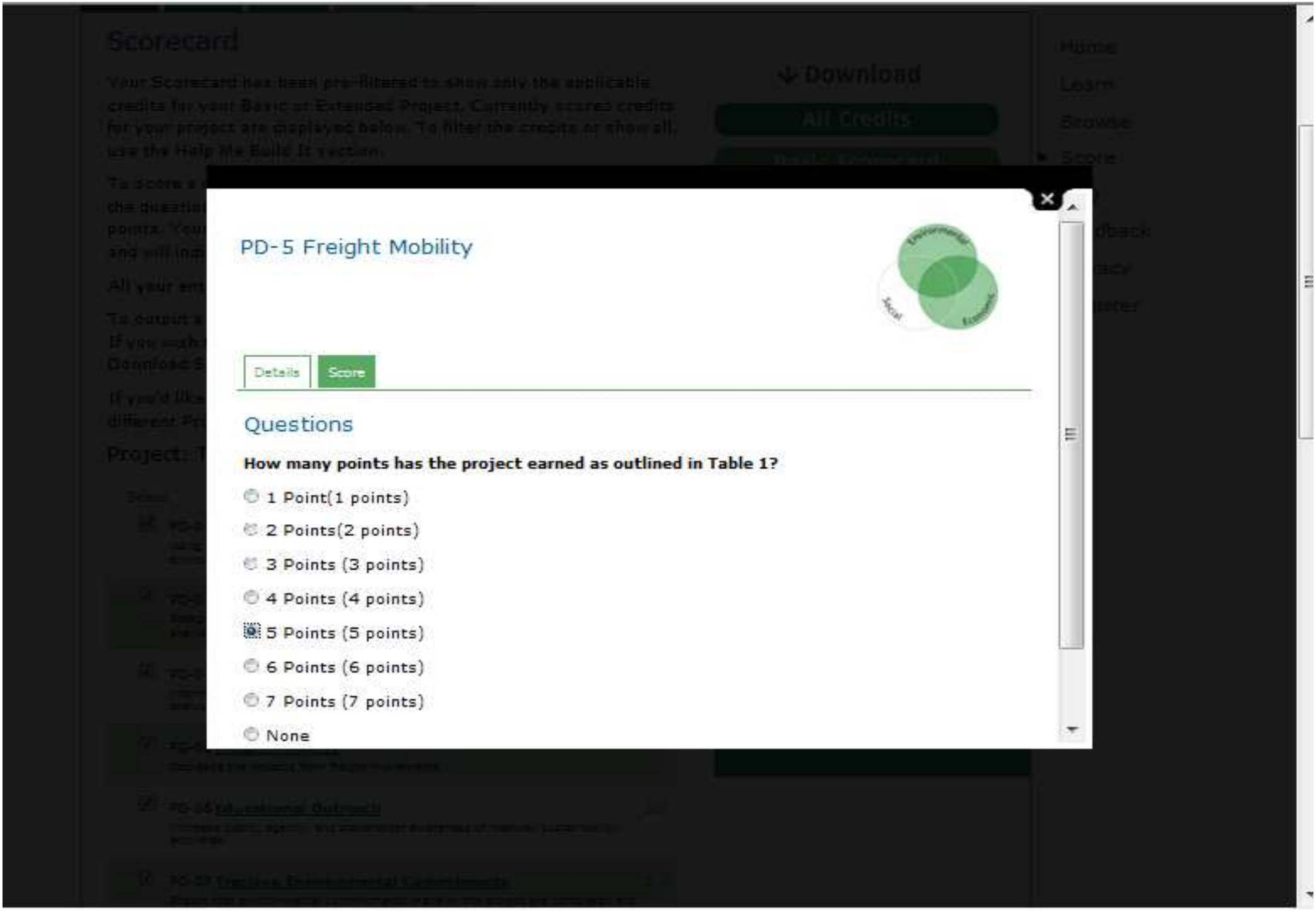
Display All Credits

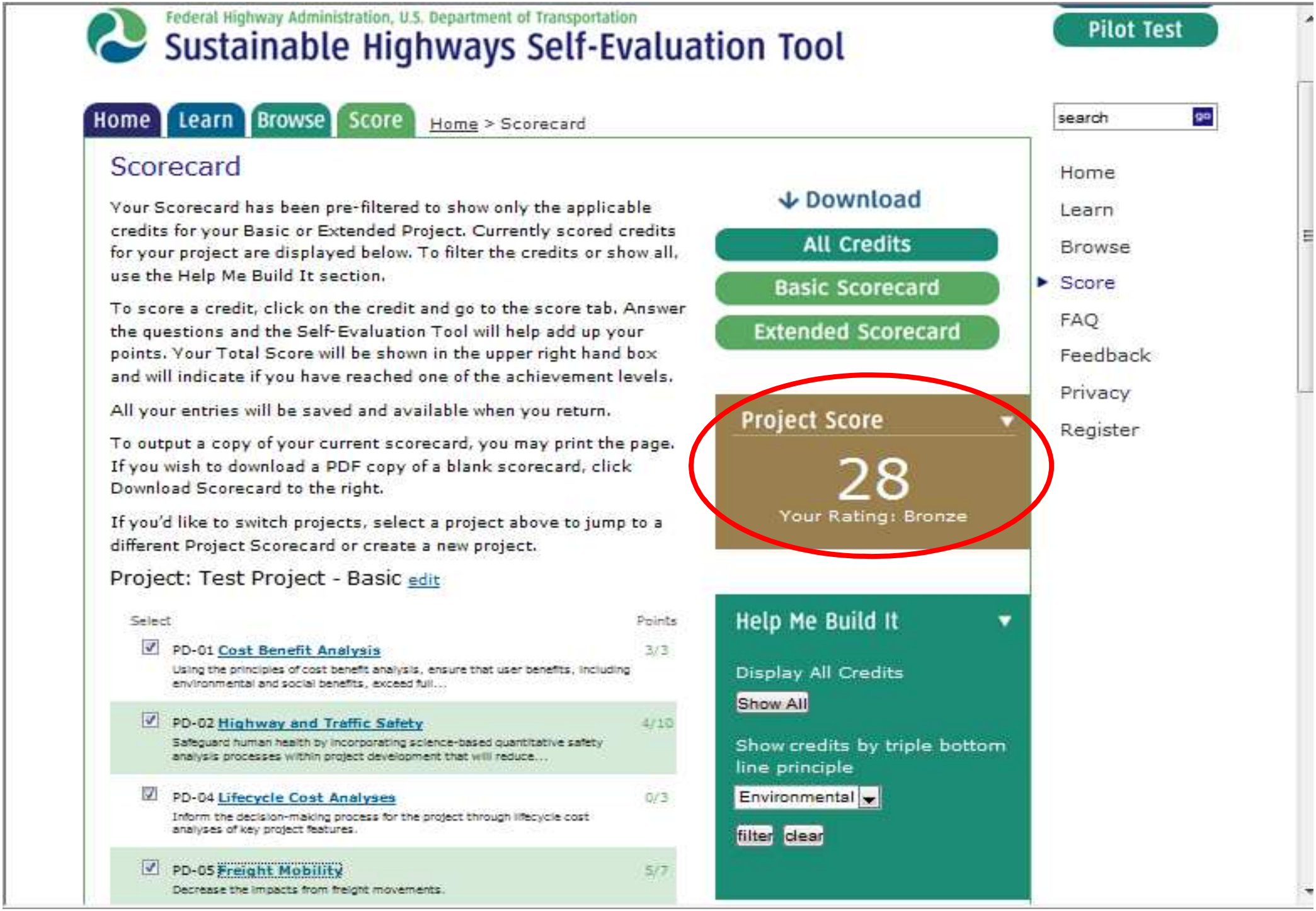
Show All

Show credits by triple bottom line principle

Environmental

filter clear


Scorecard
Download
All credits
Home
Learn
Browse
Score
PD-5 Freight Mobility
Details
Score
Questions
How many points has the project earned as outlined in Table 1?
1 Point(1 points)
2 Points(2 points)
3 Points (3 points)
4 Points (4 points)
5 Points (5 points)
6 Points (6 points)
7 Points (7 points)
None


Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool
Pilot Test
Home
Learn
Browse
Score
Home > Scorecard
search
go
Scorecard
Your Scorecard has been pre-filtered to show only the applicable credits for your Basic or Extended Project. Currently scored credits for your project are displayed below. To filter the credits or show all, use the Help Me Build It section.
To score a credit, click on the credit and go to the score tab. Answer the questions and the Self-Evaluation Tool will help add up your points. Your Total Score will be shown in the upper right hand box and will indicate if you have reached one of the achievement levels.
All your entries will be saved and available when you return.
To output a copy of your current scorecard, you may print the page. If you wish to download a PDF copy of a blank scorecard, click Download Scorecard to the right.
If you'd like to switch projects, select a project above to jump to a different Project Scorecard or create a new project.
Project: Test Project - Basic edit
Select
Points
PD-01 Cost Benefit Analysis 3/3
Using the principles of cost benefit analysis, ensure that user benefits, including environmental and social benefits, exceed full...
PD-02 Highway and Traffic Safety 4/10
Safeguard human health by incorporating science-based quantitative safety analysis processes within project development that will reduce...
PD-04 Lifecycle Cost Analyses 0/3
Inform the decision-making process for the project through lifecycle cost analyses of key project features.
PD-05 Freight Mobility 5/7
Decrease the impacts from freight movements.
Download
All Credits
Basic Scorecard
Extended Scorecard
Project Score
28
Your Rating: Bronze
Help Me Build It
Display All Credits
Show All
Show credits by triple bottom line principle
Environmental
filter
clear
Home
Learn
Browse
Score
FAQ
Feedback
Privacy
Register

Thresholds by Project Category

	Number of Points Required for Each Level	
	Basic Scorecard	Extended Scorecard
Total # of Points Possible	85	117
BRONZE (30%)	26-33	35-46
SILVER (40%)	34-42	47-58
GOLD (50%)	43-50	59-69
PLATINUM (60%)	51+	70+

Thresholds for Operations & Maintenance

	Number of Points Required for Each Level
Total # of Points Possible	150
BRONZE (30%)	45-59
SILVER (40%)	60-74
GOLD (50%)	75-89
PLATINUM (60%)	90+

INVEST

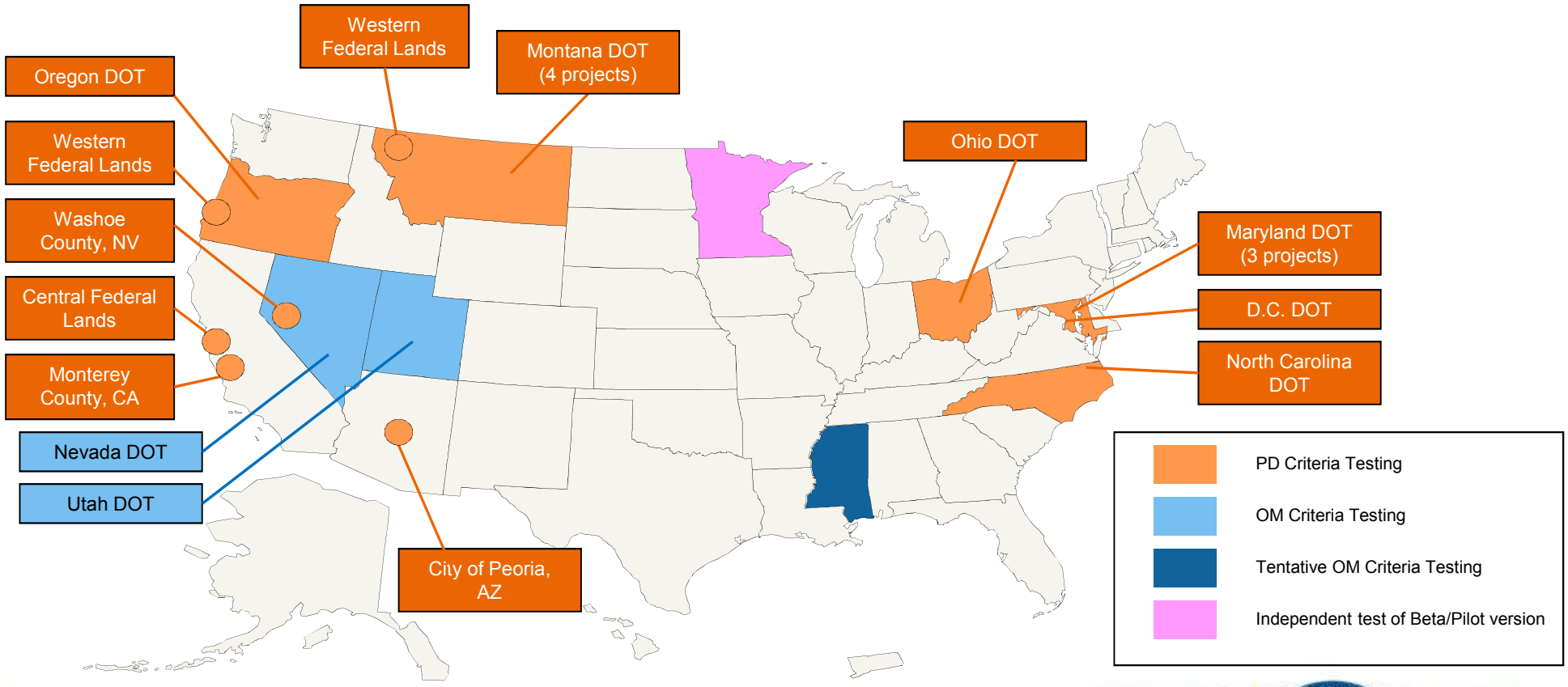
Pilot Testing and Next Steps

Pilot Testing of INVEST

- **Testing will be done on the Project Development (PD), System Planning (SP) and Operations & Maintenance (OM) criteria**
- **Objectives for Conducting the Pilot Test**
  - Provide input on how to make tool easier to use
  - Obtain input on further refinement to criteria
  - For calibration of scoring and achievement levels
- **Schedule for Pilot Testing**
  - July thru October 2011
- **Funding available to defray costs of pilot testing**

INVEST Pilot Test Locations

Updated: September 21, 2011



Pilot Testing Process

- Step 1 – Orientation and Kick-off
- Step 2 – Owner Organization & Team Identification
- Step 3 – Data Collection & Criteria Review
- Step 4 – Scoring Workshop
- Step 5 – Site Visit
- Step 6 – Feedback & Results Discussion

Next Steps

For Sustainable Highways Program

- Continue strong coordination within FHWA and with partners and stakeholders
- Create program structure, partner on key program/research gaps

For INVEST

- Pilot Testing
  - PD ongoing
  - OM ongoing
  - SP starts November 2011
- Weighting & Scoring Review - ongoing
- Updates to Website - ongoing
- Version 1.0 Release
  - PD – December 2011
  - OM – March 2012
  - SP – March 2012

www.sustainablehighways.org

Thank You!

Michael Culp
Michael.culp@dot.gov

Connie Hill
Connie.hill@dot.gov

Heather Holsinger
Heather.holsinger@dot.gov