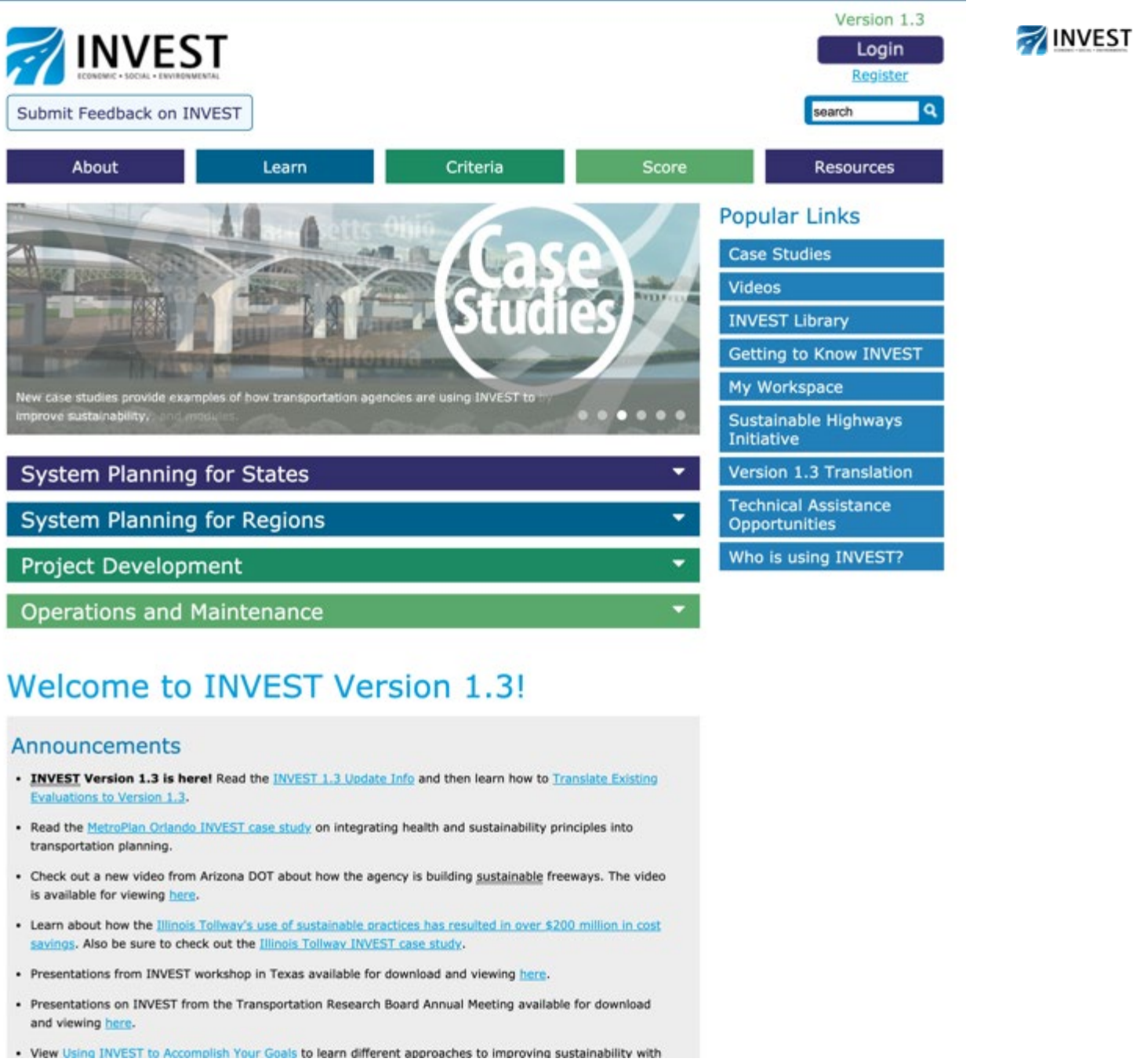
INVEST
ECONOMIC • SOCIAL • ENVIRONMENTAL

LECTURE 12

Using INVEST for Scoring and Evaluation

INVEST — **Infrastructure Voluntary Evaluation Sustainability Tool**

INVEST is a web-based self-evaluation tool



INVEST — Infrastructure Voluntary Evaluation Sustainability Tool

Refresher:

- It includes voluntary sustainability best practices called criteria
- It covers the full life cycle of transportation — system planning, project planning, design, construction, and operations and maintenance
- Developed by the Federal Highway Administration (FHWA)

https://www.sustainablehighways.org/

INVEST Modules

INVEST has modules covering three main areas:

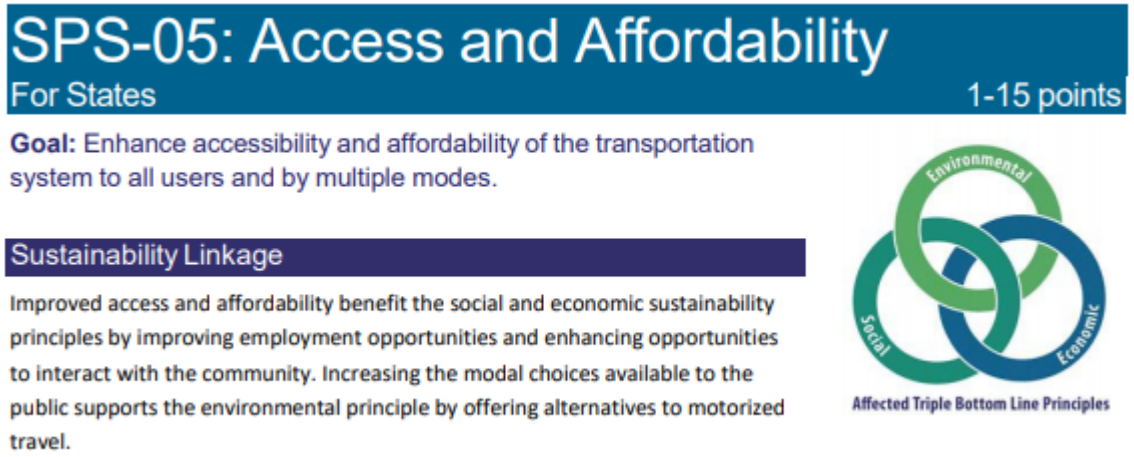
1. **Transportation systems planning** (for states and for regions) — focuses on planning and delivery of transportation infrastructure at the programmatic level
2. **Project development** — covers planning, design, and construction of an individual project; includes different scorecards applicable to different project types
3. **Operations and maintenance** — covers system-level O&M activities (for an agency's internal actions)

INVEST Criteria

Each module has *criteria* that are used to evaluate a particular metric or performance measure

- Criteria represent best practices for sustainability
- Individual criteria have a maximum obtainable score ranging from 1–15
- Linked to one or more of the three sustainability dimensions (affected triple bottom line principles)
- INVEST provides detailed descriptions and instructions for scoring each criterion

INVEST Criteria Example — Access and Affordability



SPS-05: Access and Affordability

For States — 1-15 points

Goal: Enhance accessibility and affordability of the transportation system to all users and by multiple modes.

Sustainability Linkage

Improved access and affordability benefit the social and economic sustainability principles by improving employment opportunities and enhancing opportunities to interact with the community. Increasing the modal choices available to the public supports the environmental principle by offering alternatives to motorized travel.

Affected Triple Bottom Line Principles

- This criterion is from the System Planning for States module
- As shown in the screenshot from the INVEST website, all three triple bottom line principles are affected by this criterion
- Considerations for scoring include physical access, access and equity, and affordability

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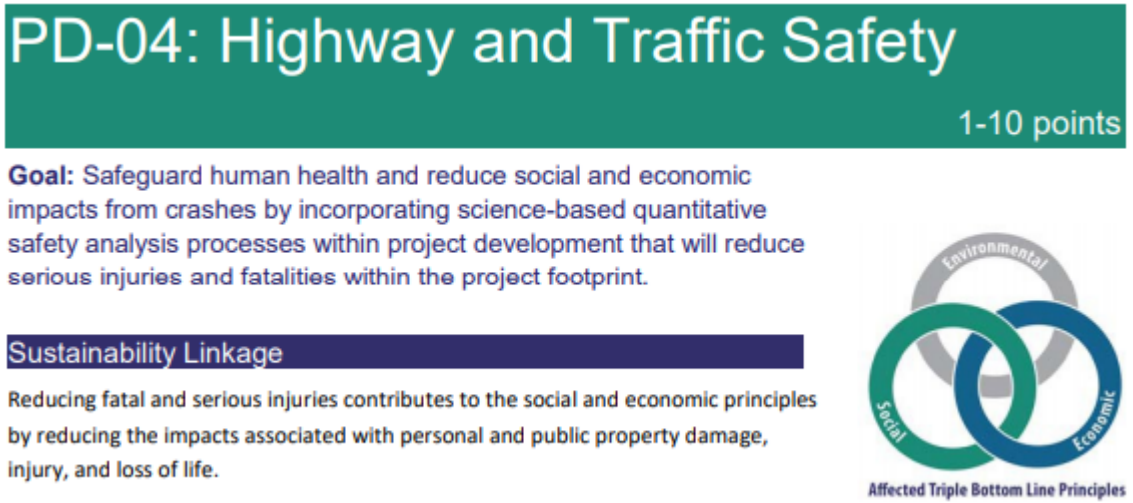
INVEST Criteria Example — Highway and Traffic Safety



- This criterion is from the Project Development module
- As shown in the screenshot from the INVEST website, the social and economic triple bottom line principles are affected by this criterion
- Scoring for this criterion was based on whether human factors are considered in efforts regarding safety, whether public awareness efforts were conducted, and whether scientific methods were used to evaluate safety for the project

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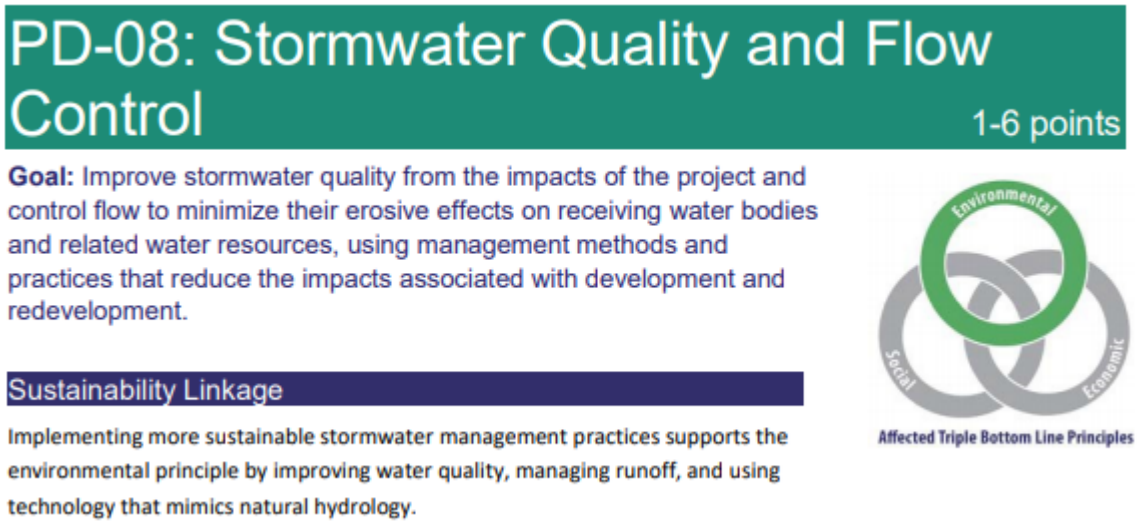
INVEST Criteria Examples — Stormwater Quality and Flow Control



PD-08: Stormwater Quality and Flow Control

1-6 points

Goal: Improve stormwater quality from the impacts of the project and control flow to minimize their erosive effects on receiving water bodies and related water resources, using management methods and practices that reduce the impacts associated with development and redevelopment.

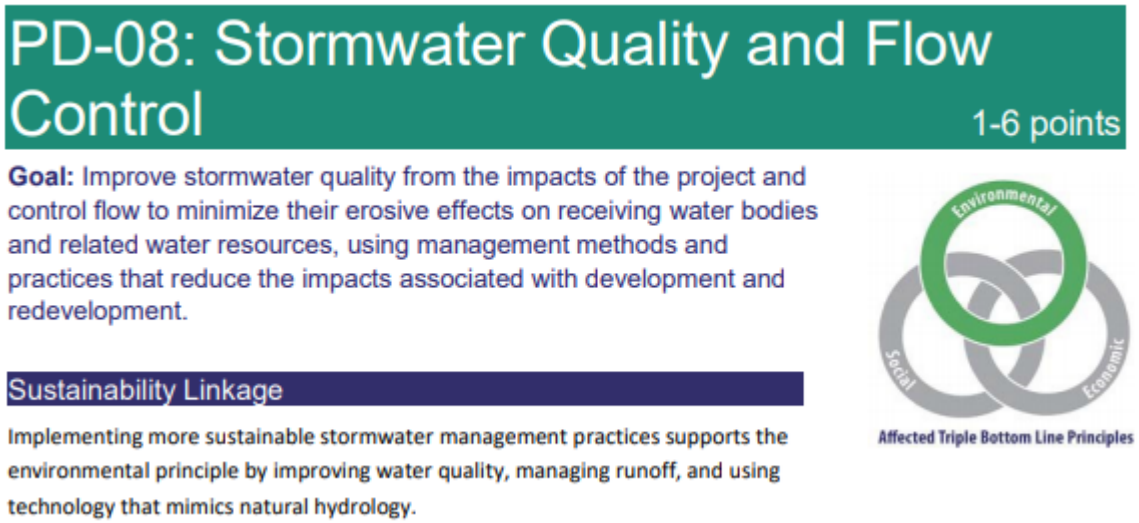
Affected Triple Bottom Line Principles

Sustainability Linkage

Implementing more sustainable stormwater management practices supports the environmental principle by improving water quality, managing runoff, and using technology that mimics natural hydrology.

- This criterion is from the Project Development module
- As shown in the screenshot from the INVEST website, the environmental triple bottom line principle is affected by this criterion
- Scoring for this criterion was based on whether the project treats stormwater runoff and whether flows of the runoff are controlled at the project site

INVEST Criteria Examples — Electrical Energy Efficiency and Use



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Affected Triple Bottom Line Principles

Sustainability Linkage

Implementing more sustainable stormwater management practices supports the environmental principle by improving water quality, managing runoff, and using technology that mimics natural hydrology.

- This criterion is from the Operations and Maintenance module
- As shown in the screenshot from the INVEST website, the environmental triple bottom line principle is affected by this criterion
- Scoring for this criterion was based on whether the agency has energy reduction or renewable energy usage goals or plan, the existence of an electricity monitoring system, employee awareness efforts, and commitments to purchase renewable energy

Project Development Scorecards

- Project Development module has multiple scorecard options, so only applicable criteria are considered
- Custom scorecard can also be created as long as core criteria are included

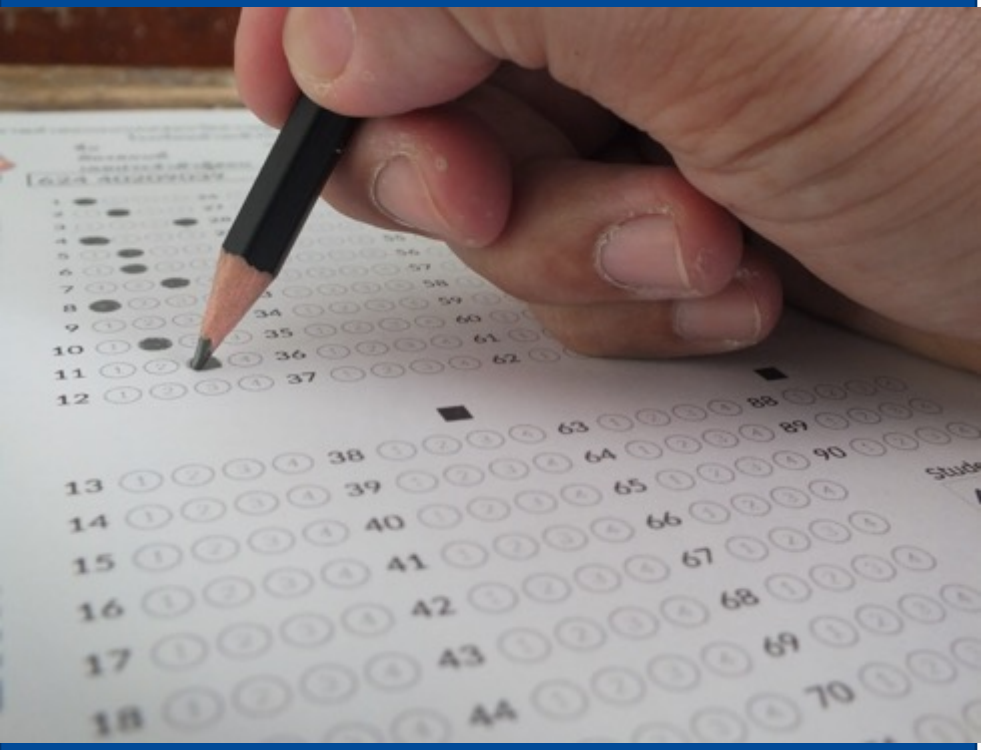
Project Development by Criteria Scorecard

	Paving	Urban Basic	Urban Extended	Rural Basic	Rural Extended	Scenic and Recreational	Custom Core Criteria[1]
PD-01: Economic Analyses			✓		✓		
PD-02: Life-Cycle Cost Analyses	✓	✓	✓	✓	✓		✓
PD-03: Context Sensitive Project Development		✓	✓	✓	✓	✓	
PD-04: Highway and Traffic Safety	✓	✓	✓	✓	✓	✓	✓
PD-05: Educational Outreach		✓	✓	✓	✓	✓	
PD-06: Tracking Environmental Commitments	✓	✓	✓	✓	✓	✓	✓
PD-07: Habitat Restoration		✓	✓	✓	✓	✓	
PD-08: Stormwater Quality and Flow Control		✓	✓	✓	✓	✓	
PD-09: Ecological Connectivity			✓	✓	✓	✓	
PD-10: Pedestrian Facilities		✓	✓			✓	
PD-11: Bicycle Facilities		✓	✓			✓	
PD-12: Transit and HOV Facilities		✓	✓			✓	
PD-13: Freight Mobility			✓		✓		
PD-14: ITS for System Operations		✓	✓		✓		
PD-15: Historic, Archaeological, and Cultural Preservation		✓	✓	✓	✓	✓	
PD-16: Scenic, Natural, or Recreational Qualities			✓	✓	✓	✓	
PD-17: Energy Efficiency		✓	✓	✓	✓		
PD-18: Site Vegetation, Maintenance and Irrigation		✓	✓	✓	✓	✓	
PD-19: Reduce, Reuse, and Repurpose Materials	✓	✓	✓	✓	✓	✓	✓
PD-20: Recycle Materials	✓	✓	✓	✓	✓	✓	✓
PD-21: Earthwork Balance			✓		✓	✓	
PD-22: Long-Life Pavement	✓	✓	✓	✓	✓	✓	✓
PD-23: Reduced Energy and Emissions in Pavement Materials	✓	✓	✓	✓	✓	✓	✓
PD-24: Permeable Pavement	✓	✓	✓	✓	✓	✓	✓
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	✓	✓	✓	✓	✓	✓	✓
PD-30: Low Impact Development		✓	✓	✓	✓	✓	
PD-31: Infrastructure Resiliency Planning and Design			✓		✓	✓	
PD-32: Light Pollution		✓	✓	✓	✓		
PD-33: Noise Abatement		✓	✓				
Total Number of Criteria in Scorecard	11	27	34	23	29	27	11

1 – Indicates the core criteria that must be included in the custom scorecard. The user may choose as many additional criteria as desired.

Source: INVEST. https://www.sustainablehighways.org/

INVEST Scoring



- Depending on the project or program being evaluated, a set of criteria are applicable
- Projects may receive a Bronze, Silver, Gold, or Platinum rating for achieving 30%, 40%, 50%, and 60% or more, respectively, of the total achievable score for the relevant module
- Scoring can be done online on the INVEST website or offline by downloading fillable worksheets

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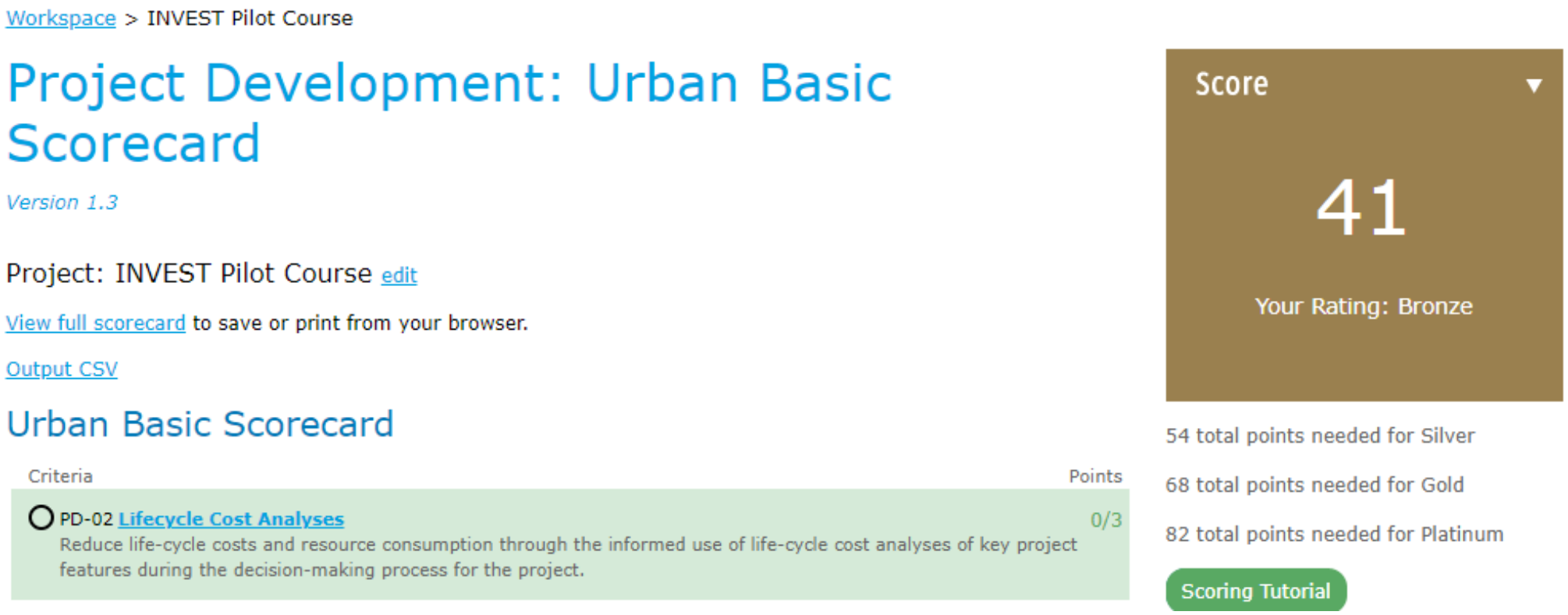
INVEST Scoring Example



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Criterion Scoring Example

Detailed background and scoring requirements are provided for each applicable criterion. Users then select responses to questions based on this guidance to determine the scores. Collaboration among stakeholders is vital to the scoring process.

Criterion Details

PD-02 Lifecycle Cost Analyses

Download as pdf

Goal

Reduce life-cycle costs and resource consumption through the informed use of life-cycle cost analyses of key project features during the decision-making process for the project.

Sustainability Linkage

Conducting a life-cycle cost analysis supports the environmental and economic principles by promoting efficient use of materials and resources.

Affected Triple Bottom Line Principles

Background & Scoring Requirements

Background

Per FHWA's *Life-Cycle Cost Analysis Primer*[1], "Life-cycle cost analysis (LCCA) is an evaluation technique applicable for the consideration of certain transportation investment decisions. Specifically, when it has been decided that a project will be implemented, LCCA will assist in determining the best— the lowest-cost—way to accomplish the project. The LCCA approach enables the total cost comparison of competing design (or preservation) alternatives, each of which is appropriate for implementation of a transportation project. All of the relevant costs that occur throughout the life of an alternative, not simply the original expenditures, are included. Also, the effects of the agency's construction and maintenance activities on users, as well as the direct costs to the agency, are accounted

Criterion Scoring Example
(Continued)

Detailed background and scoring requirements are provided for each applicable criterion. Users then select responses to questions based on this guidance to determine the scores. Collaboration among stakeholders is vital to the scoring process.

PD-02.1a Was an LCCA performed for all pavement structure alternatives in accordance with the method described in the FHWA's Technical Bulletin for Life-Cycle Cost Analysis?

- ○ Yes (1 point)
- ◉ No

PD-02.1b Was an LCCA performed for all stormwater infrastructure alternatives considered?

- ○ Yes (1 point)
- ◉ No

PD-02.1c Was an LCCA performed for the project's major feature (bridges, tunnels, retaining walls, or other items not listed in the preceding options) for each of the alternatives considered?

- ○ Yes (1 point)
- ◉ No

CASE STUDY — **Planning**

metroplan orlando
A REGIONAL TRANSPORTATION PARTNERSHIP

- MetroPlan Orlando, the MPO for central Florida, applied INVEST to help address health and sustainability in regional planning
- Evaluation of the Metropolitan Transportation Plan was conducted using INVEST's Systems Planning for Regions Module
- Received a Gold rating
  (129 out of 255 possible points)

Source: https://www.sustainablehighways.org/779/97/metroplan-orlando-integrating-health-and-sustainability-principles-into-transportation-planning.html

Case Study — Planning (continued)

Key Outcomes

- Identification of areas of success and for improvement
- Helped develop a multi-year health and sustainability approach
- New relationships and enhanced relationships with non-traditional transportation partners
- Increased support from elected and senior officials
- Development of white papers
- Identification of research topics

Source: INVEST. Case Studies. https://www.sustainablehighways.org/779/97/metroplan-orlando-integrating-health-and-sustainability-principles-into-transportation-planning.html

CASE STUDY — **Project Development and Construction**

OHIO DEPARTMENT OF TRANSPORTATION

- Ohio DOT included sustainability (measured by INVEST) as one of the criteria for scoring contractor proposals for a design-build contract for the second phase of the George V. Voinovich Bridge
  - Winning bid committed to INVEST Platinum rating (95 INVEST points out of a total possible of 126)

Source: INVEST. Case Studies. https://www.sustainablehighways.org/779/94/ohio-dot-george-v-voinovich-bridgecleveland-innerbelt-corridor.html

CASE STUDY — **Project Development and Construction** (continued)

- Collaborative workshop (eco-charette) was used to identify areas for improvement
- Selected outcomes
  - Reuse of materials
  - Earthwork balance to eliminate excess fill
  - Diversion of most of the construction waste

Source: https://www.sustainablehighways.org/779/94/ohio-dot-george-v-voinovich-bridgecleveland-innerbelt-corridor.html

CASE STUDY — **Operations and Maintenance**

ADOT

- ADOT conducted an evaluation of internal operations and infrastructure operations and maintenance areas using INVEST
- ADOT achieved a platinum rating, based on the self-evaluation

Source: https://www.sustainablehighways.org/779/78/arizona-dot-using-invest-to-benefit-planning-programming-and-maintenance-in-arizona.html

CASE STUDY — **Operations and Maintenance** (Continued)

High-Scoring Areas	Areas for Improvement
• Vehicle fuel efficiency and use • Pavement management system • Transportation management and operations • Work zone traffic control	• Sustainability plan • Electrical energy efficiency and use • Tracking environmental commitments • Bridge management system • Road weather management program

Source: https://www.sustainablehighways.org/779/78/arizona-dot-using-invest-to-benefit-planning-programming-and-maintenance-in-arizona.html

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LECTURE 12

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