



INVEST

ECONOMIC • SOCIAL • ENVIRONMENTAL

Version 1.3

Sustainable Highways Self-Evaluation Tool

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INVEST Version 1.3

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Introduction to the Compendium

INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) was developed by FHWA as a practical, web-based, collection of voluntary best practices, called criteria, designed to help transportation agencies integrate sustainability into their programs (policies, processes, procedures, and practices) and projects. This compendium includes user selected criteria from INVEST 1.2 as of September 2015. It includes System Planning for States (SPS), System Planning for Regions (SPR), Project Development (PD), and Operations and Maintenance (OM) criteria. It is not intended to be an instructional manual or guidebook; the website, located at www.sustainablehighways.org, provides thorough information and instruction on how to use INVEST.

Short excerpts from the website are featured in this compendium. For more information, visit the INVEST website.

INVEST Version 1.0

INVEST Version 1.0 (v1.0) was the first full release of the INVEST tool and criteria in October 2012. It was developed through research and analysis of sustainability best practices in the transportation field. The original Beta Version criteria, released in the fall of 2010, were written by subject matter experts, and then were reviewed, modified, and vetted through valuable stakeholder feedback. After revising based on this feedback, the Pilot Test Version was released in the spring of 2011 for testing and evaluation across a broad spectrum of agencies, projects, programs, and geographies. INVEST 1.0 reflects substantial revisions made to the criteria and web-based tool based on the pilot testing.

INVEST Versions 1.1, 1.2, and 1.3

Development of Version 1.1

After the release of INVEST v1.0, the Federal Highway Administration (FHWA) launched an implementation program that provided grants to teams from DOTs, MPOs, and a Tollway desiring to implement INVEST v1.0. These teams used INVEST to evaluate a project or program, and in some cases, their entire portfolio of projects. Each provided a final report to FHWA that included comments and suggestions for the online tool and the criteria. These comments were combined with comments received during the development of version 1.0 that were deferred for consideration in future versions of INVEST. After reviewing the comments, it was decided to make two updates to INVEST, Version 1.1 and 1.2.

The release of Version 1.1 in January 2015 introduced minor edits, formatting changes, and tool enhancements that did not affect scoring of projects or programs. That is, in terms of scoring projects and programs, Version 1.0 = Version 1.1 and no translation was required.

Modifications Included in Version 1.2

With the release of Version 1.2 in September 2015, FHWA completed the responses to comments that required more substantial changes than Version 1.1. Version 1.2 included significant changes to criteria, scorecards, modules, and scoring in INVEST and did significantly affect the scoring of all existing projects and programs. The changes introduced include the following:

Changes to Criteria

- Adding an Innovative Criterion to all modules that users can define to take credit for sustainable innovations and emerging technologies not already included in INVEST.

- Adding five new criteria to the Project Development module, including: Low-Impact Development (separated from Stormwater), Infrastructure Resiliency in Planning and Design, Permeable Pavement, Light Pollution, and Noise Abatement.
- Removing the Contractor Warranty criterion and adding similar concepts to the Long-Life Pavement criterion.
- Modifying existing criteria to clarify scoring, adding new methods of achieving credit, and adding more opportunities to earn partial credit.

Other Changes

- Separating the System Planning module into two modules: System Planning for States (or infrastructure owners), and System Planning for Regions (and MPOs). This allows modifications to the criteria to make each module more applicable to the types of activities that the respective types of organizations perform.
- Adding a Recreational/Scenic scorecard to better represent criteria applicable to projects such as those designed by Federal Lands.
- Linking Case Studies to online criteria write-ups, making the case-studies searchable and adding the ability to share user examples of Innovative Criteria.
- Introducing a new guide to applying INVEST in the real world called *Using INVEST to Accomplish Your Goals*.
- Reorganizing the website and renaming tabs to aid in navigation.
- Launching scoring tool enhancements that include streamlined Program/ Project Registration Fields, new sortable fields in My Workspace, consolidation of actions in My Workspace into graphical icons, display of status and rating of evaluations in My Workspace, improved tools to manage collaborators, scoring status icons and the ability to lock criteria already scored, and an improved process to customize a scorecard.

The website includes a page under ABOUT called Version 1.2 that describes changes made to INVEST in Version 1.2.

Modifications Included in Version 1.3

After 2-1/2 years of continued testing and use of Version 1.2, FHWA launched another set of updates to INVEST including Version 1.3 (this version) and an upcoming update, Version 2.0 (expected early 2019). Version 1.3 includes minor edits, criteria clarifications, and fixes to broken resource hyperlinks. Version 1.3 **does not affect scoring**, and therefore replaces Version 1.2.

Project and Program Scoring in Version 1.3

New Projects and Programs

All new project and program evaluations started will be in Version 1.3 and it is no longer possible to start a new project or program evaluation using Version 1.1 of INVEST.

Existing Projects and Programs

Existing evaluations (prior to the launch of Versions 1.2 and 1.3) remain in Version 1.1 until the user makes the decision to translate them to Version 1.3, which can be done when scoring the project by selecting the option and confirming the user's intent.

Users choosing to leave their existing scorecards in Version 1.1 will be able to continue scoring and will have access to the Version 1.1 scoring tool by selecting to continue scoring the existing project or program. It is anticipated that this

access will be available for several years. Users will be notified when this option is phased out before changes are made.

Translating a Project or Program to Version 1.3

When choosing to translate a project or program to Version 1.3, all relevant scores will be maintained (that is, response to questions that have not changed will remain unchanged). In addition, all notes, collaborators, and uploads will remain. The user will need to rescore items in many of the existing criteria to reflect changes included in Version 1.3 and will need to score new criteria; a matrix describing the changes to each of the criteria and necessary scoring updates is available for download at http://www.sustainablehighways.com/1811/version-12.html.

INVEST Background

Transportation and Sustainability

Transportation projects and programs serve many different, and sometimes competing, objectives. "Sustainability" is a concept that enables decision-makers to make balanced choices around these objectives. The three principles of the "triple bottom line" upon which sustainability is based—social, economic, and environmental—capture the broad range of transportation goals and objectives. Highway project development (including project planning, design, and construction) should seek to apply these principles. These principles are useful because they begin to define specific results that can be achieved by improving highway sustainability. They begin to provide distinct reasons for highway project development to incorporate such diverse concepts as climate change, environmental protection, judicious use of funds, regional air quality improvement, construction quality incentives, recycling promotion, social equity, and environmental management system use. If done effectively, the result should be more sustainable highways. Using sustainable approaches in transportation infrastructure will help us to continue to enhance quality of life and serve the transportation needs of the present without compromising the ability of future generations to meet their needs.

What is the Purpose and Intent of this Tool?

FHWA's INVEST is designed to provide information and techniques to help agencies integrate sustainability best practices into their projects and programs. INVEST is intended to provide guidance for practitioners to evaluate the sustainability of their transportation projects and programs and to encourage sustainability progress within the field of transportation. **It is not required** and **it is not intended to encourage comparisons** between transportation agencies. INVEST was developed with input from state and local transportation agency officials and staff and professional organizations such as AASHTO and ASCE. FHWA will continue to update INVEST as the transportation sustainability field continues to advance. While the use of INVEST is voluntary, it can be used by transportation agencies, such as DOTs, MPOs, Council of Governments, public works departments, and their consultants and partners, to evaluate and aid the integration of sustainability into their programs and projects.

Modules and Scorecards

INVEST considers the full lifecycle of projects and has four modules to self-evaluate the entire lifecycle of transportation services, including System Planning for States or Regions (SPS or SPR), Project Development (PD), and Operations and Maintenance (OM). Each of these modules is based on a separate collection of criteria and can be evaluated separately. INVEST 1.3 includes a total of eighty-one criteria organized into these four modules.

1. **System Planning for States** (SPS) and **System Planning for Regions** (SPR) cover the first step in the lifecycle of a transportation project. This is where an agency's system-wide network is analyzed and assessed to identify projects that will improve the safety, capacity, access, operations, or other key features of the system. The SP module includes sixteen criteria and one bonus criteria that agencies are eligible for based on their scores on

the first three criteria. There is one scorecard for each of the System Planning modules that includes all of the criteria.

2. **Project Development** (PD) is the second step in the lifecycle of a transportation project. This is where specific projects conceptualized and programmed in the System Planning processes are planned, designed, and constructed. The PD module includes a total of thirty-three criteria that are generally organized from planning to design to construction. The criteria are further organized into seven scorecards for the evaluation of projects. The scorecards are designed to identify applicable criteria based on the project type and location. Six of these scorecards pre-identify criteria that are most likely to be applicable for the project type and location. The seventh scorecard is a custom scorecard option, which is a dynamic scorecard that allows the user to select criteria:

    - Paving – for projects that are devoted exclusively to pavement preservation; restoration projects that extend the service life of existing facilities and enhance safety; or pavement restoration projects that restore pavement structure, ride quality, and spot safety. Use this scorecard for paving projects in both rural and urban locations.
    - Basic Rural – for small, rural reconstruction or rural bridge replacement projects that do not expand capacity of the roadway.
    - Basic Urban – for small urban reconstruction or urban bridge replacement projects that do not expand capacity of the roadway.
    - Extended Rural – for rural projects for a new roadway facility; structure projects where nothing of its type currently exists; and major reconstruction projects that add travel lanes to an existing roadway or bridge.
    - Extended Urban – for urban projects for a new roadway facility; structure projects where nothing of its type currently exists; and major reconstruction projects that add travel lanes to an existing roadway or bridge.
    - Scenic and Recreational – for typically rural scenic and recreational projects, such as those developed by Federal Lands.
    - Custom - for projects that do not fit any of the pre-defined scorecard options or that want to use the self-defined Innovative Criterion, the Custom Scorecard will allow the user to develop a unique set of criteria that is most appropriate for the project being evaluated. The Custom Scorecard starts with a core set of 11 criteria that must be included as part of the score. There are not achievement levels associated with the custom scorecard.

    Table 1 on the next page shows the criteria included in each of the PD scorecards. Each PD scorecard includes a different combination of the thirty-three PD criteria based on the type project. The custom scorecard includes eleven core criteria plus user-selected criteria to make a custom self-evaluation for projects that don't fit well into the six defined scorecards.

Table 1 - Project Development Criteria by Scorecard

Project Development by Criteria Scorecard	Paving	Urban Basic	Urban Extended	Rural Basic	Rural Extended	Scenic and Recreational	Custon 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.

3. **Operations & Maintenance (OM)** is the third step in the lifecycle of a transportation project. This is where infrastructure planned, designed, and constructed in prior steps is operated and maintained, data is collected, and new project needs identified are passed back to the System Planning step to complete the lifecycle of projects. The OM module includes fourteen criteria including four aimed at internal operations and ten focused on maintenance and operations of the highway system. There is one scorecard for the OM module that includes all of the criteria.

Website and Tool

Website Organization

The INVEST website, at www.sustainablehighways.org is the primary source of INVEST information and contains the self-assessment scoring tool. The site is organized into the following three primary sections, which are described in more detail below:

- **ABOUT** – Provides background information about INVEST and its goals and benefits
- **LEARN** – Provides a guided tour through the INVEST website to learn about sustainable highways and integrating sustainability best practices into projects and programs.
- **CRITERIA** – Provides an interface to browse the complete set of criteria that can be used to evaluate the sustainability of projects and programs.
- **SCORE** – Is the self-evaluation tool that allows users to evaluate the sustainability of projects and programs. One of the key pages under
- **RESOURCES** – Consolidates resources including a library, case studies and cost narratives, and other links and support documents that provide valuable information for users.

In addition to these primary sections, the website also contains a links to **My Workspace** in the header of each page.

About

The **ABOUT** section provides background information on the following topics:

- **Goals** – INVEST Goals
- **History** – Development and history of INVEST
- **Benefits** – The benefits of using INVEST
- **Version 1.1** – A summary of revisions made in Version 1.1.
- **Version 1.2** – A summary of revisions made in Version 1.2.
- **Version 1.3** – A summary of revisions made in Version 1.3.

Learn

The **LEARN** section contains more information on multiple sustainability topics as well as more information about INVEST and using it to evaluate projects and programs. The following topics are covered:

- **Sustainability and Highways** –discusses definitions of sustainability, sustainable highways, and why and how to measure sustainability
  - When Does INVEST Measure Sustainability?
  - What is Sustainability?
  - What is a Sustainable Highway?
  - Why Measure Sustainability?
  - How is Sustainability Measured?

- **Getting to Know INVEST** – defines sustainability, the triple bottom line, and the need to measure sustainability were all elements that contributed to the structure and organization of INVEST
  - What is INVEST?
  - How Does INVEST Measure Sustainability?
  - How are the Criteria Organized?
  - How are the Criteria Presented?
  - Are the Criteria Weighted?
- **System Planning –** discusses the basics of the System Planning modules.
  - About the System Planning Module
  - Why and When would I Score a System Planning Program?
  - Who Can Use the System Planning Modules?
  - How Do I Use INVEST to Score a System Planning Program?
  - What Does the System Planning Score Mean?
- **Project Development** – discusses the basics of the Project Development module.
  - About the Project Development Module– discusses the basics of the Project Development module.
  - Why and When would I Score a Project?
  - Who Can Use the Project Development Module?
  - Which Scorecard Should I Use?
  - Understanding the Context of a Project
  - How Do I Use INVEST to Score a Project?
  - What Does the Project Development Score Mean?
- **Operations and Maintenance** – discusses the basics of the Operations and Maintenance module.
  - About the Operations and Maintenance Module
  - Why and When Would I Score an Operations and Maintenance Program?
  - Who Can Use the Operations and Maintenance Module?
  - How Do I Use INVEST to Score an Operations and Maintenance Program?
  - What Does the Operations and Maintenance Score Mean?
- **Using INVEST to Accomplish Your Goals –**includes examples of how transportation agencies are using INVEST.
  - Advance Better Business Practices
  - Integrate Sustainability into Projects and Programs
  - Improve Education and Understanding of Sustainability
  - Facilitate Internal and External Communication and Outreach
  - INVESTing Time
  - Relating INVEST to other Sustainability Tools

Criteria

The **CRITERIA** section is essentially an online compendium. Users start by selecting a module to explore and can then select individual criteria to review and/or download. The Project Development criteria can be filtered to show only the criteria included in each scorecard.

Score

There are 2 operations under the **SCORE** section, including:

- **My Workspace** – this is where all scoring begins and can also be launched from the top menu bar on any page
- **Translate to Version 1.2** – this is an information page that explains the basics of the translation and how to proceed

Resources

The **RESOURCES** section provides additional information useful to INVEST users, including:

- **INVEST Library** – provides downloadable copies of compendia and printed portions of *Using INVEST to Accomplish Your Goals* from **LEARN**
- **Case Studies and Examples** – provides searchable database of case studies and Innovative Criterion examples
- **Cost Savings** – provides cost narratives that explore building a business case for implementing some practices of the INVEST tool
- **Innovative Criterion** – interface for developing and submitting an Innovative Criterion for use in the Project Development custom scorecard
- **FHWA Sustainability Highways Initiative** – link to FHWA's website
- **Webinars & Events** – provides current and past INVEST webinar and other event information
- **FAQ** – Frequently Asked Questions
- **Provide Comments** – interface tool for users to submit questions and comments to the INVEST team
- **Privacy** – FHWA's privacy notice

My Workspace

My Workspace is the primary interface to begin all project and program scoring. From this page you can launch the following services:

- **Scoring Tutorial** – this is an illustrated guide to using the scoring functions
- **Start a New Project or Program** – to create a project or program to score, you begin here to enter the basic information
- **Continue Working on an Existing Project or Program** – contains a sortable list, organized by module of all of your existing project and programs that are being scored, provides basic information about each, and allows you to quick launch the following actions:
  - Edit – editing existing project or program Information, including the scorecard being used
  - Duplicate – to duplicate a project or program
  - Print – to print a copy of the current score
  - Score – launches the scoring tool for the project or program
  - Delete – requires confirmation to delete a project or program
  - Collaborate – allows you to add or remove other users that can help score a project

Criteria

The remainder of this document contains the criteria write-ups for all eighty (80) criteria contained in the System Planning (for States and Regions), Project Development, and Operations & Maintenance modules of INVEST v1.2. However, if users download the compendium from the library, this may contain only the modules selected.

Operations and Maintenance

OM-01: Internal Sustainability Plan

1-15 points

Goal: Focus on sustainability improvements within the agency's internal operations that affect all three principles of the triple bottom line.

Affected Triple Bottom Line Principles

Sustainability Linkage

Implementation of a sustainability plan or similar document shows organizational commitment to all of the triple bottom line principles by being dedicated to the responsible use of natural resources, providing alternative commuting options, and training employees about sustainability.

Background and Scoring Requirements

Background

The purpose of this criterion is to focus on improving the sustainability of the agency itself. Also see the following, related criteria:

- OM-02: Electrical Energy Efficiency and Use
- OM-03: Vehicle Fuel Efficiency and Use
- OM-04: Reuse and Recycle

Where overlap exists with plans identified in these three related criteria, those plans should be included in the Comprehensive Internal Sustainability Plan (CISP) as an element of the plan or by reference.

For the purposes of this criterion, the following definitions apply:

- **"Internal"**– Internal refers to an agency's internal administrative and maintenance & operations functions and should address the agency's energy consumption, solid waste production, recycling rate, employee commute, water consumption, stormwater management, and procurement policies. Generally, internal operations refer to those areas over which a transportation agency has complete control. For sustainability planning related to the transportation system that the agency manages, travel demand management programs for agency employees, or professional development education programs, see System Planning and Project Development criteria.
- **"Sustainability"** – The sustainability plan should incorporate all three of the triple bottom line sustainability principles (environmental, social, and economic). A plan does not need to use the term "sustainability" to receive points, so long as the contents of the plan can clearly be demonstrated to relate back to the three sustainability principles.
- **"Plan"** – For this criterion, a plan can be a list of actions that tie back to clearly stated objectives. The plan can be in the form of a published document, website, brochure, or other format, so long as the elements under the requirement section can be clearly demonstrated.
- **"Performance Measurement"** – A fully developed internal sustainability plan should contain a performance measurement system that includes goals, performance metrics, quantifiable targets, strategies, and actions designed to help meet the overall plan objectives.

Scoring Requirements

Requirement OM-01.1

2 points. Executive Commitment

Agency sustainability commitment is endorsed by senior executives. Evidence of this could include an executive order or policy statement, organizational directive, endorsement of the Sustainability Plan, a memo to staff, or other document.

Requirement OM-01.2

4 points. Develop a Comprehensive Internal Sustainability Plan

The agency has a Comprehensive Internal Sustainability Plan that includes goals, performance metrics, quantifiable targets, strategies, and actions designed to help meet the overall plan objectives. Table OM-01.2.A shows examples of each of these components.

TABLE OM-01.2.A COMPONENTS OF A COMPREHENSIVE SUSTAINABILITY PLAN

Component	Example
A **goal** is the area that needs to be improved.	A transportation agency wants to reduce its environmental footprint.
A **performance metric** will be used to evaluate the progress being made towards the goal area.	To measure its performance, the agency will track its energy consumption.
A **target** uses the selected performance metric and identifies specific objectives to be achieved in the future.	The target is to reduce the agency's annual energy consumption 20% below current levels 2 years from now. (The baseline is how much energy the agency currently consumes per year.)
Strategies are categories of actions used to achieve the target.	The agency will use three main strategies to reach the target: (1) consume less electricity, (2) consume less gasoline and diesel fuel, and (3) consume less natural gas.
Actions are specific things that can be done to implement the strategies.	To implement the strategy of consuming less electricity the agency will: (1) replace incandescent light bulbs with compact fluorescents, (2) replace broken office equipment with energy efficient models, and (3) install occupancy sensors in the lighting system.

Common performance metrics for internal sustainability plans include:

- Annual electricity, natural gas, gasoline, and diesel fuel consumption (see OM-02 and OM-03)
- Annual renewable energy consumption (see OM-02)
- Agency fleet fuel efficiency (see OM-03)
- Agency fleet annual vehicle miles traveled (see OM-03)
- Annual tons of solid waste produced (see OM-04)
- Annual recycling rate (see OM-04)

- Annual reams of paper consumed (see OM-04)
- Annual water consumption
- Stormwater infiltrations rates at agency-owned facilities
- Percent of procured items that are sustainably produced, contain recycled materials, produced locally, etc.
- Percent of building inventory meeting green or sustainable building criteria

If an agency is growing in size, one option may be to select performance metrics that are normalized by the number of employees. This way an agency can seek to reduce the amount of materials consumed per employee, rather than the total amount consumed across the agency. However, this approach can result in an overall increase in an agency's environmental footprint, even though it appears to be meeting its sustainability goals.

Requirement OM-01.3

1-3 points. Components of a Comprehensive Internal Sustainability Plan

Scoring is based on the following, cumulative elements:

- **Requirement OM-01.3.a**

  1 point. Coordination

  The CISP is integrated with national, state, and/or regional sustainability goals.

- **Requirement OM-01.3.b**

  1 point. Implementation

  The CISP has an implementation section that includes responsible parties, timelines, and potential funding sources.

- **Requirement OM-01.3.c**

  1 point. Monitoring and Tracking

  The CISP includes a performance measurement system, a plan for monitoring the plan's progress, and a schedule for updating the plan as needed.

Requirement OM-01.4

1-2 points. Employee Engagement and Training

Scoring is based on the following, cumulative elements.

- **Requirement OM-01.4a**

  1 point. Sustainability Training

  Training on sustainability is provided for staff, including an introduction to the Comprehensive Internal Sustainability Plan.

- **Requirement OM-01.4b**

  1 point. Employee Sustainability Committee

  The agency has an employee committee that promotes sustainability. Sometimes called a green team, this committee is focused on implementing more sustainable measures throughout the agency.

Requirement OM-01.5

1-2 points. Commuting Options

Scoring is based on the following, cumulative elements.

- **Requirement OM-01.5a**

  1 point. Implement Travel Demand Management Options

  The agency implements at least two Travel Demand Management options including, but not limited to, compressed work weeks, alternative working hours, carpooling/vanpooling support, virtual meetings, teleworking options, bicycle and pedestrian amenities (e.g., parking, showers, lockers, etc.), and subsidized transit.

- **Requirement OM-01.5b**

  1 point. Provide Support for Alternative Fuel Vehicles

  The agency provides support for alternative fuel vehicles used for commuting. This could include providing electric vehicle plug in stations, providing alternative fuel vanpools, or other options.

Requirement OM-01.6

2 points. Demonstrate Sustainable Outcomes

To earn credit for this scoring requirement, the agency must have a Comprehensive Internal Sustainability Plan as described in scoring requirement OM-01.2. Monitor progress towards goals for at least one year after goal establishment and show measurable advancement towards stated goals.

Resources

Above-Referenced Resources

The following resources are referenced in this criterion and consolidated here:

1. ICLEI - Local Governments for Sustainability, Sustainability Planning Toolkit, http://portal.hud.gov/hudportal/documents/huddoc?id=20399_iclei_sustainabil.pdf
2. ICLEI - Local Governments for Sustainability, Tools website, http://www.iclei.org/activities/resources/tools.html
3. US DOT, Our Sustainability Efforts website, http://www.dot.gov/mission/sustainability/our-sustainability-efforts-0

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Comprehensive Internal Sustainability Plan, or similar document.
2. An attachment to the plan that clearly describes how the plan includes measurements of performance.
3. Plan progress report (likely produced independently of this application) that provides evidence that the agency has been monitoring and tracking its performance towards meeting the plan's goals. The report should include quantifiable metrics (such as water or energy reduced per employee) that demonstrates the agency's commitment to tracking its progress.

OM-02: Electrical Energy Efficiency and Use

1-15 points

Goal: Reduce the consumption of fossil fuels during operation and maintenance of agency owned and/or operated facilities through improvements in efficiency and the use and/or generation of renewable energy sources.

Affected Triple Bottom Line Principles

Sustainability Linkage

Reducing energy consumption and converting to renewable energy sources contributes to the environmental and economic principles by reducing fossil fuel usage and associated emissions and reducing long-term energy costs.

Background and Scoring Requirements

Background

Renewable energy is generated from natural processes that are continuously replenished as opposed to fossil fuels which are depleting resources. Some sources of renewable electrical energy include sunlight, geothermal heat, wind, tides, and flowing water.

Renewable Energy Certificates (RECs)

The *Green Power Partnership website*[1] by the Environmental Protection Agency (EPA) explains that "REC represents the property rights to the environmental, social, and other non-power qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source and offers buyers flexibility:

- In procuring green power across a diverse geographical area.
- In applying the renewable attributes to the electricity use at a facility of choice.

This flexibility allows organizations to support renewable energy development and protect the environment when green power products are not locally available."

Note that purchasing RECs is typically more expensive than purchasing unsourced electricity.

How to Buy Renewable Electrical Power

The EPA's *Green Power Partnership website*[1] further explains that "all grid-tied renewable-based electricity generators produce two distinct products, physical electricity and RECs. At the point of generation, both product components can be sold together or separately, as a bundled or unbundled product. In either case, the renewable generator feeds the physical electricity onto the electricity grid, where it mixes with electricity from other generation sources. Since electrons from all generation sources are indistinguishable, it is impossible to track the physical electrons from a specific point of generation to a specific point of use.

As renewable generators produce electricity, they create one REC for every 1000 kilowatt-hours (or 1 megawatt-hour) of electricity placed on the grid. If the physical electricity and the associated RECs are sold to separate buyers, the electricity is no longer considered "renewable" or "green." The REC product is what conveys the attributes and benefits of the renewable electricity, not the electricity itself.

RECs serve the role of laying claim to and accounting for the associated attributes of renewable-based generation. The REC and the associated underlying physical electricity take separate pathways to the point of end use (see diagram). As renewable generators produce electricity, they have a positive impact, reducing the need for fossil fuel-based generation sources to meet consumer demand. RECs embody these positive environmental impacts and convey these benefits to the REC owner. "

Certifying and Tracking RECs

Renewable resources shall be as defined by the *Green-e Energy National Standard*[2] or an equivalent source and shall be tracked per one of the certificate tracking systems, such as WREGIS, ERCOT, NARR, PJM GATS, M-RETS, NEPOOLGIS, MIRECS, or NC-RETS. The EPA has more information on tracking systems on their *Green Power Partnership website*[1].

Scoring Requirements

Requirement OM-02.1

2 or 4 points. Set Energy Reduction and Renewable Energy Usage Goals

Scoring is based on the following, cumulative requirements:

Requirement OM-02.1a

2 points. Set Energy Reduction Goal

Set an energy reduction goal to be obtained (usually a percentage reduction as compared to current usage).

Requirement OM-02.1.b

2 points. Set Goal for Buying RECs

Set a goal for buying RECs (in addition to energy reduction goals) that is at least equivalent to one of the following options:

- Your current state's Renewable Portfolio Standard (RPS). Currently 24 states and the District of Columbia have RPSs in place representing more than half of the energy consumed in the United States.
- Your state's non-binding renewable energy goal. Five other states (as of July 2011) have non-binding goals for renewable energy.
- If your state does not have a RPS or a non-binding goal, 20 percent of operational energy use should be used as the goal.

Requirement OM-02.2

2 or 4 points. Develop a Plan

Develop a documented plan that outlines how the energy reduction and renewable energy goals set above will be accomplished. The plan (could be multiple documents) should state what energy-efficiency measures are planned and how renewable energy will be procured for operations and maintenance of facilities, including roadway lighting, traffic control, rest areas, maintenance & operations facilities, and other agency-operated administration facilities. This should include current energy usage and projected energy usage for the next two years as a minimum. Owned renewable energy sources may be factored into these calculations.

One of the following scores applies:

- **0 points.** No plan is created.
- **2 points.** A plan is developed to meet either the energy reduction or renewable energy usage goals.
- **4 points.** A plan is developed to meet both the energy reduction and renewable energy usage goals.

Requirement OM-02.3

2 points. Measure Progress and Monitor Performance

Develop and maintain an electricity monitoring system for operations and maintenance that tracks electricity usage for all highway facilities that require electricity including, but not limited to: lighting, ITS, signals, signage, maintenance and operations sites and buildings, and rest area building and sites. This database should help to monitor any issues or inefficiencies that may exist or develop over time.

Requirement OM-02.4

1-2 points. Employee Awareness Program

Scoring is based on the following, cumulative requirements:

- **Requirement OM-02.4a**

  1 point. Employee Awareness Program

  Develop and implement an employee awareness program that educates employees about the sources and costs of energy usage in agency-owned/operated facilities and what they could do to reduce energy usage and how that links to sustainability.

- **Requirement OM-02.4b**

  1 point. Employee Energy Reduction Representative or Committee

  Employ a representative or create and maintain an employee committee focused on the reduction of energy consumption. This committee could have a larger focus but must have reduction of energy usage as one of their goals.

Requirement OM-02.5
2-3 points. Demonstrate Sustainable Outcomes

Scoring is based on the following, cumulative requirements:

- **Requirement OM-02.5a**

  2 points. Execute Renewable Energy Contract

  Execute a contract for a minimum of two years of renewable energy or create and operate renewable energy facilities within the agency-owned properties to meet the selected goal.

- **Requirement OM-02.5b**

  Additional 1 point. Monitor Performance and Demonstrate Sustainable Outcomes

  Monitor performance and demonstrate attainment of the agency's energy reduction goal over at least a one-year period.

Resources

Above-Referenced Resources

The following resources are referenced in this criterion and consolidated here:

1. EPA's Green Power Partnership website, http://www.epa.gov/greenpower/index.htm
2. Green-e, Green-e Energy National Standard, http://www.green-e.org/getcert_re_stan.shtml#standard

Additional Resources

The following resources provide information on this criterion topic in addition to the sources directly referenced:

3. EPA's *Guide to Purchasing Green Power* (2010), https://www.epa.gov/sites/production/files/2016-01/documents/purchasing_guide_for_web.pdf
4. US Department of Energy's website, https://www.energy.gov/

5. U.S. Department of Energy Office of Energy Efficiency & Renewable Energy's website, http://energy.gov/eere/office-energy-efficiency-renewable-energy.
6. EPAs Green Power Partnership's *Renewable Energy Certificates (RECs)*, https://www.epa.gov/greenpower/renewable-energy-certificates-recs

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Energy efficiency and renewable energy plan(s) with current energy usage and projected energy usage for the next two years.
2. Copy of the electricity monitoring system.
3. Documentation of employee awareness program and/or employee committee focused on reduction of energy usage.
4. Statement of renewable energy goal and documentation of Green-e contract or equivalent meeting that goal, according to energy projections, for two years. If a Green-e equivalent source is used, documentation to show that the source is indeed equivalent.
5. Documentation showing reduction in energy consumption over the prior year meets goals set.

OM-03: Vehicle Fuel Efficiency and Use

1-15 points

Goal: Reduce fossil fuel use and emissions in vehicles used for operations and maintenance.

Affected Triple Bottom Line Principles

Sustainability Linkage

Reducing fossil fuel usage contributes to all of the triple bottom line principles by improving public health, reducing energy usage and costs, and reducing the impacts from associated emissions.

Background and Scoring Requirements

Background

Reducing fossil fuel consumptions is the overall goal of this criteria, whether that is achieved through the use of electric vehicles, alternative fuels, reduced idling, etc. The performance measurement tool should be used to report actual percentage reduction of fossil fuels used. If an increase or decrease in overall fleet size is required during the program, it could be used as an opportunity for improvement. For more information on alternative fuel and efficiency best practices, visit AASHTO's Equipment Management Technical Service website[1].

Scoring Requirements

Requirement OM-03.1

2 or 4 points. Set Fuel Reduction Goals

Set goals for fuel use reduction (primarily fossil fuels) and set a time frame in which these goals should be achieved. Some agencies manage their light-duty fleet vehicles separately from their heavy-duty fleet and off-road equipment—in these cases, goals may be included in multiple documents.

One of the following scores applies:

- **0 points.** No goals are set.
- **2 points.** Goals are set by the agency for either light-duty fleet or for heavy-duty and off-road equipment. Or, goals are set for light-duty and/or heavy-duty fleet for the agency by an executive board or other governing entity and no additional goals are developed by the agency.
- **4 points.** Goals are set by the agency for both light-duty fleet and for heavy-duty and off-road equipment.

Requirement OM-03.2

2 or 4 points. Develop a Fleet Management Plan

Have a documented fleet management plan that, at a minimum, describes the agency's planned actions to reduce fossil fuel usage, transition to alternative fuels or energy sources, increase overall fuel efficiency, and reduce vehicle miles travelled (VMT). The plan may be comprised of multiple documents or a consolidated single document. Some examples of reduction actions include:

- **Higher efficiency and Alternate energy vehicles**. The purchase of vehicles powered by such alternative fuels as electricity, propane, natural gas, E-85, or biodiesel can result in lower greenhouse gas emissions. Hybrid electric and other high efficiency vehicles can reduce fossil fuel use and greenhouse gas emissions.

- **Anti-idling policy**. Anti-idling policies can be implemented that reduce the amount of fuel used unnecessarily when the vehicle is not in motion. These policies often specify a time limit for any vehicle idling or an amount of idling allowed during a certain time frame. There are idling reduction technologies that can be installed on heavy vehicles to help reduce idling. See the EPA website[2] for types of idling reduction technologies and strategies.
- **Maintenance and operation.** Proper maintenance and operation can improve fuel efficiency. Training employees to properly inspect vehicles before use, drive efficiently, and identify maintenance issues can help prevent fuel waste.
- **Right-sizing vehicles.** Agencies may want to examine what each vehicle in their fleet is used for and ensure that vehicles are sized appropriately. For example, using light-duty trucks instead of heavy-duty trucks can often meet the needs of the user while reducing the amount of fuel consumed.
- **Vehicle technologies.** Tow plows and wing plows are two examples of modifications of snow plow equipment that can contribute to overall fuel efficiency by using a single vehicle to do more work without requiring significantly more fuel. Installing GPS in vehicles has also been shown to reduce the miles actually travelled by vehicle operators.
- **Employee training**. Appropriate training of staff that operate equipment and vehicles can significantly improve adherence with planned reduction actions and the commitment to help achieve the set goals.

One of the following scores applies:

- **0 points.** No plan is created.
- **2 points.** A plan is developed for either light-duty fleet or for heavy-duty and off-road equipment.
- **4 points.** A plan is developed for both light-duty fleet and for heavy-duty and off-road equipment.

Requirement OM-03.3

3 points. Test Alternative Fuels and Reduction Methods

The agency is actively testing the use of alternative fuels or reduction methods in order to analyze the feasibility for incorporation in the agency's light-duty fleet or heavy-duty or off-road equipment use.

Requirement OM-03.4

2 points. Measure Progress and Monitor Performance

Have a fleet tracking program, spreadsheet, or other document that monitors vehicle use and fuel consumption. This could likely be integrated into an existing vehicle usage or maintenance database. Use this tool to identify where the greatest improvements can be made and to monitor progress once improvements are implemented. This applied to Fuel Reduction Plans described above and/or Testing of Alternative Fuels and Reduction Methods as noted above.

In addition to measuring fuel consumption, other measures may help the organization analyze where fuel consumption is reduced. Examples include measuring vehicle miles traveled or carbon footprint reduction (which would measure emissions reductions as well as fuel reductions).

Requirement OM-03.5

2 points. Demonstrate Sustainable Outcomes

To earn credit for this scoring requirement, the agency must have a fleet tracking program, spreadsheet, or other document that monitors vehicle use and fuel consumption as described in scoring requirement OM-03.4. Use the

fleet tracking system that was set up to measure performance and track progress toward these goals for at least one year. Show that progress has been made toward the stated goals.

Resources

The following resources are referenced in this criterion and consolidated here:

1. AASHTO, Equipment Management Technical Service website, http://www.emtsp.org/
2. EPA, *Learn About Idling Reduction Technologies (IRTs) for Trucks and School Buses*, https://www.epa.gov/verified-diesel-tech/learn-about-idling-reduction-technologies-irts-trucks-and-school-buses

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Fleet management plan to reduce fossil fuel usage.
2. Copy of fleet performance tracking tool with list of current fleet vehicles and fuel usage.
3. Goal statement and documentation of progress toward goals for at least the first year.

OM-04: Reduce, Reuse and Recycle

1-15 points

Goal: Create and pursue a formal recycling and reuse plan for agency operated facilities and maintenance activities.

Affected Triple Bottom Line Principles

Sustainability Linkage

Reducing, reusing, and recycling materials supports the environmental and economic principles of the triple bottom line by reducing the consumption of raw materials, reducing landfill waste, and encouraging cost savings.

Background and Scoring Requirements

Background

For the purposes of this criterion, the key terms are defined as follows:

- **"Office waste material"** includes, but is not limited to, paper products (e.g., packaging materials, copier paper, paper products, cardboard, and pallets), glass, trash, or compostables (including recyclable materials generated from office facilities).
- **"Operations and Maintenance Waste Material"** is waste from roadway maintenance and operations activities. Depending on the organization and how goals are set and implemented, this may include office waste materials generated as part of operations and maintenance activities. Construction and maintenance waste includes, but is not limited to, pavement waste from pothole/roadways repairs, metals (e.g., guiderails, pipes, luminaires, signs, aluminum, and various other metals), excess topsoil or removed vegetation, hazardous materials and liquids, or wood.
- **"Recycle"** is defined as recovering a portion of a used product or material from the waste stream for reprocessing and/or repurposing.
- **"Reduce"** refers to the process of intentionally implementing actions that reduce the amount of materials that are needed to perform a function or activity. For example, many companies have campaigns to reduce the amount of printing and/or increase double-sided printing to reduce their paper consumption.
- **"Reuse"** is defined as a continued use or repurposing of existing materials without reprocessing. Materials do not need to be reused or repurposed within the same project limits.

The Construction & Demolition Recycling Association's *Find a C & D Recycler website*[1] provides links to a variety of localities that offer construction and demolition waste recycling services.

Scoring Requirements

The scoring requirements below may be included in the Comprehensive Internal Sustainability Plan discussed in OM-01. If so, additional credit may be taken here for the specific elements of Reduce, Recycle and Reuse.

Requirement OM-04.1

2 or 4 points. Set Reduce, Recycle, and Reuse Goals

Set goals for operation and maintenance waste material reduction, reuse, and recycling. These goals do not need to be included in a formal Reduce, Recycle and Reuse (3R) plan; they could be part of a Comprehensive Internal Sustainability Plan (see OM-01) or Environmental Management Plan.

One of the following scores applies:

- **0 points.** No goals are set.
- **2 points.** Goals are set for either office waste materials or operations and maintenance waste materials.
- **4 points.** Goals are set for both office waste materials and operations and maintenance waste materials.

Requirement OM-04.2

2 or 4 points. Develop a Reduce, Reuse, and Recycle Plan

Develop a documented plan (could be multiple documents) that outlines how the 3R goals set in Requirement OM-04.1 will be accomplished. The plan should describe the agency's proposed 3R measures at agency-owned and operated facilities, including rest areas, maintenance & operations facilities, and other agency operated administration facilities. The documented plan could be part of a Comprehensive Internal Sustainability Plan (see OM-01) or Environmental Management Plan.

Some potential 3R measures include, but are not limited to:

- Management organization and roles and responsibilities related to management of waste streams.
- Keeping accurate records and retaining all waste handling invoices and receipts.
- Locating recycling receptacles in all facilities and offices to encourage waste reduction of basic materials and small items.
- Clearly labeling receptacles and recycling locations. Large color photos of what is recyclable and what is not are often very helpful, especially, for multi-lingual work environments.
- Providing waste receptacles that are smaller than the recycling receptacles to provide a visual or behavioral cue indicating that the trash is supposed to be limited and there are ample recycling alternatives.
- Providing training to workers to educate them on 3R and the specifics of the efforts being made to reduce waste.
- Creating an incentive or recognition plan for workers to engage actively in recycling efforts of personal trash that rewards positive and successful behavior.
- Hiring an experienced waste transport company to manage site waste and monitor waste streams for unacceptable materials.
- Providing handling and storage areas for construction and operations materials to be recycled and reused to provide a visual and behavioral cue indicating that trash is supposed to be limited and there are ample recycling alternatives.
- Identifying local facilities that accept recyclables or salvaged materials. This is important in designating types of waste to separate and in making arrangements for drop-off or delivery of materials.
- Proper handling of waste to minimize negative environmental impacts. This could include management of waste including engine oil, asphalt, concrete, and other industrial waste to avoid soil and water contamination.

One of the following scores applies:

- **0 points.** No plan is developed, or the plan is not linked to the goals set in Requirement OM-04.1.
- **2 points.** A plan is developed for either office waste materials or operations and maintenance waste materials.
- **4 points.** A plan is developed for both office waste materials and operations and maintenance waste materials.

Requirement OM-04.3

2 or 4 points. Measure Progress and Monitor Performance

Track the agency waste streams and report the amount of waste produced and the amount of material reused and recycled.

One of the following scores applies:

- **0 points.** Progress is not measured, or it is measured and not compared to performance goals set in Requirement OM-04.1.
- **2 points.** Waste streams are tracked for either office waste materials or operations and maintenance waste materials.
- **4 points.** Waste streams are tracked for both office waste materials and operations and maintenance waste materials.

Requirement OM-04.4

3 points. Demonstrate Sustainable Outcomes

To earn credit for this scoring requirement, the agency must have a 3R Plan as described in Requirement OM-04.2. Track the progress toward these goals with the performance measurement system for at least one year. Monitor the percentages of materials that are reduced or go to waste, reuse, or recycling and show that progress has been made toward the stated goals.

Resources

Above-Referenced Resources

The following resources are referenced in this criterion and consolidated here:

1. Construction & Demolition Recycling Association, Find a C & D Recycler, https://cdrecycling.org/directory/

Additional Resources

The following resources provide information on this criterion topic in addition to the sources directly referenced:

2. EPA, *Reduce, Reuse, Recycle website,* http://www2.epa.gov/recycle
3. EPA, *Resources for Businesses, States, and Local Governments,* http://www2.epa.gov/recycle/resources-businesses-states-and-local-governments
4. Green Highways Partnership, *Home page of website*, http://www.greenhighwayspartnership.org/index.php
5. Industrial Resources Council, *Home page of website*, http://www.industrialresourcescouncil.org/

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Recycling and Reuse Plan with description of strategies to be used to reduce waste.
2. Recycling and Reuse goals.
3. Agency waste stream report and goal tracking for at least the first year.

OM-05: Safety Management

1-15 points

c

Goal: Maximize the safety of the existing roadway network through a systematic and comprehensive review of safety data and the allocation of resources in planning and programming to support safety in operations and maintenance.

Affected Triple Bottom Line Principles

Sustainability Linkage

Reducing fatal and serious injuries contributes to the social and economic principles by reducing the impacts associated with personal and public property damage, injury, and loss of life.

Background and Scoring Requirements

Scoring Requirements

Requirement OM-05.1

2 or 4 points. Assess Current Safety Performance

Assess the current safety performance of the state or region, identify prevailing trends in fatal and serious injuries based on a variety of metrics, and identify safety performance metrics most appropriate to assess progress in improvement of the safety performance of the state or region.

Prevailing trends reflect the characteristics of the safety performance of the state or region that would most benefit from improvement, that measure performance of the system for vulnerable user groups, and that reflect the reliability of the system (for example, as it relates to incidents and crashes on major through routes). Once the agency identified a set of safety performance metrics that define safety performance for the region (measures that reflect areas associated with the largest amount of fatal and serious injuries and those associated with vulnerable users and system reliability), the agency quantifies the current or base safety performance of the system.

Safety performance metrics typically account for fatal and serious injuries related to, for example, collision types, user groups involved, behavioral characteristics, vehicle types involved, or other crash-related circumstances. Safety performance metrics may also account for, for example, particular fatal and serious crash characteristics showing increasing trends.

Scoring for this requirement is based on the following, cumulative requirements:

- **Requirement OM-05.1a**

  2 points. Evaluate Safety Performance

  For state agencies (for metropolitan or regional agencies see below):

  One of the following scores applies:

  - **0 points.** Quantify the safety performance of the state in terms of a rate or solely with the use of one metric: the overall number of fatalities or fatal and serious injuries in the state or region.
  - **2 points.** Identify safety performance measures for the state and evaluate the safety performance of the state through a quantitative evaluation of the safety performance of the state in terms of:

- The number of fatal and serious injuries across collision types, and user groups; and where particular user behaviors are present that would increase the risk of fatal and serious injury crashes (for example, unbelted vehicle occupants), and
- Fatal and serious crash characteristics that reflect the status of safety culture among road users (for example, drinking and driving).

  In most cases, such quantitative assessments are included as part of the development of the SHSP (refer to the FHWA's *Strategic Highway Safety Plans: A Champion's Guide to Saving Lives*[1] and other SHSP-related resources) and those reflecting safety culture.

For metropolitan or regional agencies (for state agencies see above):

One of the following scores applies:

- **0 points.** Quantify the safety performance of the region in terms of a rate or solely with the use of the overall number of fatalities or fatal and serious injuries in the region.
- **2 points.** Conduct a safety performance evaluation that includes:
  - Evaluation of the safety performance of the region across the emphasis areas in the SHSP or agency if this is regional.
  - Evaluation of regional safety performance related databases (crash, roadway, and other databases mentioned in the FHWA's *Strategic Highway Safety Plans: A Champion's Guide to Saving Lives*[1]) to identify any additional emphasis areas that may be unique to the region or different from state priorities. These additional emphasis areas reflect regional differences in the nature of these crashes, road network characteristics, and community priorities.

The product of this activity is a list of emphasis areas along with the number of fatal and serious injuries associated with each emphasis area where feasible. The list of emphasis areas would also include those for which the number of associated fatal and serious injuries would be difficult to quantify; for example, EMS, data and analysis, and workforce development.

Metropolitan or regional agencies safety performance evaluations can be conducted as part of metropolitan or regional agency participation in the development of the state SHSP (refer to the FHWA's *Strategic Highway Safety Plans: A Champion's Guide to Saving Lives*[1] and other SHSP-related resources).

- **Requirement OM-05.1b**

  2 points. Identify Safety Performance Metrics

  Identify safety performance metrics for the reduction of fatal and serious injuries in the state or region.

  One of the following scores applies:

  - **0 points.** Use the rate or total number of fatal and serious injuries as the sole safety performance metric for the state or region.
  - **2 points.** Identify safety performance metrics for each of the emphasis areas identified during the evaluation of the safety performance of the state or region:
    - For emphasis areas related to particular collision types or users, each of the metrics measures the change in the number of fatal and serious injuries for the particular collision type or user group.
    - For user behavior-related metrics the associated metrics reflect the change in the number of fatal and serious injuries in crashes where these behaviors are present; and the change in the portion of overall fatal and serious injuries where the behavior is reported. For example, if an emphasis area is identified

as: *Reduce the fatal and serious injuries involving drinking and driving*, then the metrics include at least the following: (a) the number of fatal and serious injuries sustained in crashes where one or more drivers were drinking and driving; and (b) the portion of drivers that were drinking and driving in fatal and serious injury crashes.

- For emphasis areas that cannot be readily measured in terms of fatal and serious injuries, metrics would identify improvement in these areas based on other criteria. For example, for EMS, the metrics may include the number of drivers that die on the scene and the number of drivers that die on their way to a hospital or trauma center.

NOTE: Metropolitan or regional agencies. Evaluate the incidence of fatal and serious injury crashes in the jurisdiction and identify emphasis areas based on the evaluation. For a metropolitan area, not all the emphasis areas in the SHSP may be applicable due to the urban nature of the area, and for rural counties, some of the more urban emphasis areas may not be relevant.

Requirement OM-05.2

3 points. Set Goals and Targets

Set goals and targets for each of the safety performance metrics identified for the reduction in fatal and serious injuries.

For state agencies (for metropolitan or regional agencies see below):

Set safety performance metrics that are consistent with the emphasis areas in the state

SHSP. For metropolitan or regional agencies (for state agencies see above):

Set safety performance metrics for each of the emphasis areas identified during the evaluation process described earlier. Where applicable, these should be consistent with the metrics in the SHSP that also reflects prevailing trends in the region.

Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-05.2a**

  1-2 points. Set Safety Goals and Targets

  One of the following scores applies:

  - **0 points.** Set no safety performance goals, or performance goals are expressed solely as a rate (for example, crash rate, and fatal and serious injury crash rate).
  - **1 point.** Set safety performance goals that can be readily achieved under current program and agency activity priorities.
  - **2 points.** Set long-term goals and intermediate targets for improvements in the safety performance metrics in addition to the State's fatality reduction goal (which is set under an agreement reached between NHTSA and GHSA). Goals and targets set by the agency should reflect meaningful reductions on an ongoing basis; acceleration in reductions that would require a concerted effort to achieve. These goals should measure the numeric change in fatalities and serious injuries across emphasis areas, and the incidence of behaviors that increases the risk of fatal and serious injury crashes.

  For example, for the emphasis area "Reduce drinking and driving," the safety performance metrics would include: (a) change in the outcome of crashes where one or more drivers were drinking (change in the number of fatal and serious injuries sustained in crashes where one or more drivers were drinking); and b) change in the portion of fatal and serious injury crashes where one or more drivers were drinking. In other words, the

metrics should direct, for example, changes in user behavior in addition to overall reductions within an emphasis area.

- **Requirement OM-05.2b**

  Two points must be earned on OM-05.2a to accomplish this requirement.

  1 additional point. Integrate Safety Goals with Maintenance & Operations

  Integrate these goals to make resource decisions for maintenance, repair, and operations activity.

Requirement OM-05.3

1-2 points. Develop a Plan

Develop a plan to support the reduction in fatal and serious injuries in the state or region. Depending on the structure and needs of the agency, this could be one plan or a set of consolidated plans from differing geographies or levels of governance (headquarters, district, etc.); however to achieve points for this scoring requirement, all geographies of the agency must be included.

Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-05.3a**

  1 point. Develop Statewide or Regional Safety Plan

  One of the following scores applies:

  - **0 points.** No plan exists, or the plan does not (a) incorporate all the emphasis areas; (b) identify strategies and lead agencies; and (c) present a system-wide approach to identify expenditure on programs, projects, and activities targeting a reduction in fatal and serious injuries in the region.
  - **1 point.** Develop a statewide or regional safety plan as part of a collaborative effort across all levels of government (federal, state, and local level). The plan:
    - Presents a system-wide approach to reduce the risk of fatal and serious injuries that rely on systematic and scientific methods and approaches that (i) are aimed at reducing the overall severity of crashes rather than the frequency of crashes; and (ii) incorporate performance thresholds (base performance).
    - Includes specific strategies and lead agencies for each the emphasis areas in the plan.
    - Supports integrated and multidisciplinary approaches to reduce the number of fatal and serious injuries on the entire public highway system.
    - Demonstrates a commitment to prioritize safety improvements through their programming decisions for safety projects and the use of safety funding.

  The plan could be a single statewide plan or a combination of SOPs at headquarters and district/regional levels; or a plan for a county, metropolitan area, or regional council area.

- **Requirement OM-05.3b**

  At least one point must be earned on OM-05.2a to accomplish this requirement.

  1 additional point. Include Strategies and Activities to Support Improvement of Data and Analysis

  Include, as part of the plan, specific strategies and activities to support improvement of data and analysis capabilities across the public highway system. For example, improvement of the quality and accuracy of crash location information within a geographic framework (GIS), improved traffic record systems, improved analysis

tools, linkage across databases (for example, medical, asset management, incident management). These activities should be part of the larger state traffic records program coordinated and supported by the state Traffic Records Coordinating Committee (TRCC). The benefits of such a process include, but are not limited to: improved data quality, improved safety performance metrics, improved reliability of analysis results, improved the ability to identify appropriate emphasis area needs, improved implementation by targeting funding where it is needed most, improved reliability of economic evaluations, and improved ability to evaluate and monitor the safety performance of the public highway system.

Requirement OM-05.4

1 or 3 points. Implement the Plan

For state agencies (for metropolitan or regional agencies see below):

One of the following scores applies:

- **0 points**. No plan exists, or implementation of projects, activities, and programs occur within agencies without integration or collaboration across state and regional agencies in support of the common goal to reduce fatal and serious injuries on the public highway system.
- **3 points.** Implement the plan in an integrated and multidisciplinary manner. Implementation needs to incorporate proactive and reactive approaches to fatal and serious injury reduction:
  - Programming and implementation of projects, activities, and programs reflects priorities of the plan.
  - Implementation of strategies within the plan occurs in an integrated, coordinated, and multidisciplinary way, involving different technical areas (planning and engineering), other disciplines such as EMS and public health.
  - Specified implementation actions require the involvement of different state, federal, and local agencies across multiple disciplines.
  - Implementation includes strategies that are proactive as well as reactive.
  - Implementation reflects an approach that incorporates consideration of the reduction of the risk that a crash occurs, reduction of the risk of fatal and serious injury during the crash, and reduction of the crash outcome. For example, drinking and driving increases the risk of a crash occurring; installation of cable median barrier reduces the risk of fatal and serious injury during a crash; and short response times by qualified and skilled EMS improves the likelihood that injured victims will survive the crash.
  - Consider implementation of systemic approaches to reduce fatal and serious injury risk on the public highway system.

For metropolitan or regional agencies (for state agencies see above):

One of the following scores applies:

- **0 points**. No plan exists, or implementation of projects, activities, and programs occur within agencies without integration or collaboration across state and regional agencies in support of the common goal to reduce fatal and serious injuries on the public highway system.
- **1 point.** Implement the plan in close cooperation with local agencies. Facilitate and support allocation of funding that reflects the priorities of the plan to the extent possible.
- **3 points.** Adopt PlanSafe or a similar program as an integral part of the agency's technical process for conducting transportation planning.

PlanSafe is an advanced quantitative tool that uses macro-level predictive models to assess the impact of long-range planning (20-year horizon) on safety performance. The results provide a quantitative and statistically reliable forecast of crashes for a given future travel demand (using output from travel demand models) and socio-demographics if no particular improvements in safety culture, infrastructure, EMS, and other areas occur other than what exists at the base year of the analysis. Future forecast assists in identifying actual improvements in safety performance needed over longer period (20 years) to meet long-term safety performance goals. See the TRB's Report on PlanSafe[2].

Requirement OM-05.5

1-3 points. Measure Progress and Monitor Performance

Advanced methods set a baseline for performance without change brought about by the plan, accounts for the unique nature of crash data, and account for volume and socio-demographic changes. Agencies can use tools such as PlanSafe to estimate anticipated performance of the system without intervention and compare results with actual performance with implementation.

Statistically sound approaches account for crash data as count data that are heavily skewed. Agencies can use the advanced evaluation methods in Chapter 9 of the *Highway Safety Manual*[3] (HSM) for project and program evaluation (these advanced methods account for regression to the mean (RTM) effects that are common to safety studies and applications). While treatments at sites require monitoring over the first year to identify any unintended effects, it is necessary to extend the evaluation period to a three to five year before and after period to support statistically valid evaluation.

One of the following scores applies:

- **0 points.** Measure progress and change in the system safety performance solely based on the overall crash rate, crash rates for typical facilities, the rate of fatal and serious injuries, or the total number of fatal and serious injuries.
- **1 point.** Measure progress using some of the safety performance metrics previously identified. The evaluation is limited to an overall summary of the number of fatal and serious injuries across the state or region.
- **2 points.** Measure the performance of the public highway system in the region using advanced and statistically sound methods to perform evaluations of the safety performance of the system.
- **3 points.** Measure the performance of the public highway system in the region using advanced and statistically sound methods to perform evaluations of the safety performance of the system AND incorporate project and program evaluations into the monitoring process. Use statistically sound evaluation approaches.

Resources

The following resources are referenced in this criterion and consolidated here:

1. FHWA, *Strategic Highway Safety Plans: A Champion's Guide to Saving Lives,* http://safety.fhwa.dot.gov/safetealu/guides/guideshsp040506/guideshsp040506.pdf
2. TRB, Report on PlanSafe, http://www.trb.org/Main/Blurbs/163790.aspx
3. AASHTO, Highway Safety Manual, https://bookstore.transportation.org/collection_detail.aspx?ID=135

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. The agency's plan for safety improvements.

2. The state SHSP, Highway Safety Plans, and Annual Report submitted annually for the Highway Safety Program for NHTSA.
3. Annual review of safety performance of the system, data, trends, and 3- or 5-year averages.
4. Annually collected documentation that measures safety performance of the road network, including fatalities and serious injuries for all facilities within their jurisdiction. The report would outline changes in aggregate safety performance across the safety performance metrics, identify the actions taken through projects, activities and programs to reduce the fatal and serious injury crashes, and results from evaluations of the safety performance of implemented projects, activities, and programs.
5. Maintenance project reports, technical memos, or other supporting documentation that demonstrate application of evaluation methods such as those described in the HSM; and report on the existing system safety performance (frequency, crash type, severity) and comparisons with appropriate benchmarks.
6. Memoranda or calculations documenting the effectiveness over the life of the solution, treatment, or countermeasure in reducing crashes. Using processes outlined in the AASHTO HSM determine the benefit-cost ratio (reduction in total crash cost anticipated for the project investment), or net present value (difference between the anticipated reduction in total crash cost and the project investment) for the project.
7. Research report that documents a post-implementation effectiveness evaluation of projects. Such a report shall include collection of actual crash data before and after implementation, and shall follow the Empirical Bayes process or advanced methods that account for RTM where feasible. Feasible refers to the availability to perform the evaluation using predictive methods; for example, availability of calibrated HSM SPFs or state-specific SPFs available for appropriate application of the EB method.
8. A report that documents system safety performance evaluation and performance across various performance measures identified as part of the state or regional safety plan.
9. A capital improvement program description that documents how the agency specifically prioritizes ongoing safety improvements through allocation of funds to safety-based programs. For example, documentation of the projects funded in safety-based programs and their relative anticipated impact on fatal and serious injury crashes.

OM-06: Environmental Commitments Tracking System

1-15 points

Goal: Ensure that environmental commitments made during project development related to operations and maintenance are documented, tracked, and fulfilled.

Sustainability Linkage

Tracking commitments supports the environmental and social principles by ensuring that adherence to commitments made to stakeholders and the environment are consistently met throughout project development.

Background and Scoring Requirements

Background

Scoring Requirements OM-06.2 through OM-06.5 are intended to allow for scalability in the type and detail-level of Environmental Compliance Tracking System (ECTS), from processes to disseminate information, to forms that are passed through part or all of a project's lifecycle, to a formal database driven ECTS.

For the purposes of this criterion, the following definitions apply:

- **"Commitments"** – Any agreed-upon obligations to avoid, minimize, or compensate for a social, economic, or environmental impacts resulting from planning activities, an environmental review process such as NEPA, design efforts, or permitting.
- **"Compliance"** – Conforming to environmental laws, regulations, standards, and other requirements such as permits to operate and/or maintain a project or facility.
- **"Environmental Mitigation"** – Environmental Mitigation activities means strategies, policies, programs, actions, and activities that, over time, will serve to avoid, minimize, or compensate for (by replacing or providing substitute resources) the impacts to, or disruption of, elements of the human and natural environment associated with the implementation of a transportation project, plan, or system. Examples of the human and natural environment include neighborhoods and communities, homes and businesses, cultural resources, parks and recreation areas, wetlands and water sources, forested and other natural areas, agricultural areas, endangered and threatened species, and the ambient air.

Scoring Requirements

Requirement OM-06.1

2 points. Develop a Comprehensive Environmental Compliance Tracking System

Develop and use a comprehensive ECTS that ensures that commitments made during project development are tracked, fulfilled, and verified throughout operations & maintenance activities. In this case, a system could include a wide range of solutions from project worksheets to detailed databases. Points are achieved by incorporating all regulatory and non-regulatory commitments that apply to the development work and additional properties, which may include items such as the following:

- Stormwater management facilities
- Wetland restoration areas

- Stream restoration areas
- Reforestation areas
- Sound walls
- Wildlife crossing structures
- Surveys
- Borings
- Batch plants
- Staging
- Equipment storage
- Employee parking, and field offices; and land that is purchased, leased, occupied, or used for the work.

Requirement OM-06.2

1-5 points. Integrate Key Functions of an ECTS

At a minimum, the ECTS should identify commitments in a single list, identify environmental compliance manager(s), and be updated and maintained as projects are constructed and throughout any monitoring period.

Scoring is based on the following, cumulative requirements:

- **Requirement OM-06.2a**

  1 point. Communicate from Planning through Operations & Maintenance

  Ensure that environmental commitments are communicated from project development (including project planning, design, and construction) to operations & maintenance.
- **Requirement OM-06.2b**

  1 point. Leverage Tracking Mechanisms

  Leverage tracking mechanisms (such as databases, forms, or lists).
- **Requirement OM-06.2c**

  1 point. Identify Training Needs

  Identify periodic training needed for necessary maintenance and operations staff.
- **Requirement OM-06.2d**

  1 point. Provide Reports

  Provide periodic reports verifying the commitments have been fulfilled.
- **Requirement OM-06.2e**

  1 point. Establish Quantifiable Performance Metrics

  Establish quantifiable performance metrics for the environmental commitment tracking system. These can either be assigned to individual roadways and bridges or the aggregated network.

Requirement OM-06.3

2 points. Require Use of ECTS

The agency has official policies and procedures in place that require use of the ECTS by project development, construction, and maintenance and operations staff.

Requirement OM-06.4

2 points. GIS-based ECTS

The agency has an ECTS that is GIS-based and on a platform consistent with the agency's planning, asset management, and maintenance systems, if applicable.

Requirement OM-06.5

2 or 4 points. Measure Progress and Monitor Performance

To earn credit for this scoring requirement, the agency must have a CISP as described in scoring requirement OM-06.1. Use established quantifiable performance metrics for the environmental commitment tracking system (assigned to individual roadways and bridges or the aggregated network) to evaluate the overall performance of the environmental commitment tracking program.

Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-06.5a**

  2 points. Set Goals

  Set goals for compliance with environmental commitments and set a time frame in which these goals should be achieved.

- **Requirement OM-06.5b**

  2 additional points. Measure Performance and Demonstrate Sustainable Outcomes

  Use the environmental commitment tracking system that was set up to measure performance and track progress toward these goals for at least one year. Show that progress has been made toward the stated goals.

Resources

None referenced.

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Copies of the databases, forms, lists, and hold points used for environmental commitment tracking.
2. If performance is measured, a chart, table, or spreadsheet that summarizes system performance.
3. If progress is monitored, a chart, table, or spreadsheet progression towards the above goal over time.

OM-07: Pavement Management System

1-15 points

Goal: Leverage a pavement management system to balance activities that extend the life and function of pavements with impacts to the human and natural environment.

Affected Triple Bottom Line Principles

Sustainability Linkage

Maintaining and using a pavement management system supports the environmental and economic principles by optimizing the management of pavements, including preservation, restoration, and replacement, to maximize their lifetime. This reduces costs, the environmental impacts of construction, and raw material usage.

Background and Scoring Requirements

Background

The intent of this criterion is to leverage an agency's Pavement Management System (PMS) to incorporate sustainability considerations into decision-making, rather than to require that using the PMS will always result in the selection of a sustainable pavement solution.

Scoring Requirements

Requirement OM-07.1

1 point. Develop a Pavement Management System and Collect Data

The agency has a PMS. An effective PMS is a systematic process that provides information for use in implementing cost-effective pavement reconstruction, rehabilitation, and preventative maintenance programs, and results in pavements designed to accommodate current and forecasted traffic in a safe, durable, and cost-effective manner. There is no requirement that the PMS be a singular, computerized system; however, the PMS shall be a system of coordinated processes and tools that accomplish the functions of this criterion. The PMS should be based on the AASHTO *Pavement Management Guide, 2nd Edition*[1] and should include:

1. an up-to-date inventory;
2. a condition assessment;
3. yearly estimate of the annual budget needed to maintain and preserve the eligible infrastructure assets at the condition level established and disclosed by the government.
4. prioritization of projects needing maintenance and rehabilitation;
5. a method to determine the impact of funding decisions; and
6. a feedback process.

Note, the first three functions are requirements of Statement 34 of the Governmental Accounting Standards Board (GASB 34)[2]. This information must be stored in a retrievable format and made available to the agency's PMS user.

One of the following scores applies:

0 points. The agency does not have a PMS that includes all six functions shown above.

1 point. The agency has a PMS that includes at all six of the functions noted above and collects system-wide data.

Requirement OM-07.2

1-3 points. Track Pavement Network Performance

Points are assigned for tracking pavement network performance. Scoring is based on the following, cumulative requirements:

- **Requirement OM-07.2a**

  1 point. Track Using Common Metrics

  Track overall network condition using common metrics that supports GASB 34 requirements. At least one of the following common metrics should be used as a minimum: roughness (any commonly accepted measure is acceptable), cracking (or structural condition), rutting and faulting (for concrete pavements). The network condition should also state or show the fraction of the overall network the agency categorizes as "acceptable" and "deficient." The specific definitions of these terms are left to the agency but they must be clearly identified in the PMS documentation.

- **Requirement OM-07.2b**

  2 points. Measure Project Timeliness

  Have measures related to project timeliness of rehabilitation, preservation, and maintenance activities. For example, an agency may identify projects and activities to be completed within 3 years that they can later assess to evaluate the timeliness of their actual implementation.

Requirement OM-07.3

2 points. Set Goals and Monitor Progress

Set pavement system performance goals and monitor progress toward goals.

One of the following scores applies:

0 points. Do not set quantifiable goals relating to both condition and timeliness as noted above; or set quantifiable goals relating to both condition and timeliness but do not monitor, or have not monitored progress towards goals for at least one year after goal establishment.

2 points: Set quantifiable goals relating to both condition and project timeliness as noted above, including when these goals are to be achieved, and monitor progress towards goals for at least one year after goal establishment.

Requirement OM-07.4

1-7 points. Leverage Data to Demonstrate Sustainable Outcomes

To earn credit for this scoring requirement, the agency must have a Pavement Management System as described in scoring requirement OM-07.1. Scoring is based on the following, cumulative requirements:

- **Requirement OM-07.4a**
  2 points. Leverage PMS Data to Prioritize Projects

  Prioritize projects based on system modeling, scenario analyses, trade-off analyses, and system optimization rather than a "worst-first" approach.

- **Requirement OM-07.4b**
  2 points. Leverage LCCA to Predict Costs

  Leverage life-cycle cost analysis (LCCA) techniques to predict costs and to perform short- and long-term budget forecasting.

- **Requirement OM-07.4c**
  1 point. Include Pavement Preservation in Annual Plan

  Include routine pavement preservation needs in the annual UPWP or STIP/TIP that are based on the condition and timeliness goals set above.

- **Requirement OM-07.4d**
  2 points. Link Pavement Repair, Preservation and Maintenance to Projects

  Leverage a PMS to link pavement repair, preservation, and maintenance projects to adjacent capital projects.

Requirement OM-07.5

1 or 2 points. Sustainable Specifications

To earn credit for this scoring requirement, the agency must have a Pavement Management System as described in scoring requirement OM-07.1. In addition to having and using a PMS, consider sustainable pavement solutions, including warm mix asphalt, long life pavement, recycled asphalt pavement, and others.

One of the following scores applies:

0 points. The agency is testing sustainable pavement solutions.

1 point. The agency has special provisions specific to at least one sustainable pavement solution that allow the use of this solution.

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.

Resources

The following resources are referenced in this criterion and consolidated here:

1. AASHTO, *Pavement Management Guide, 2nd Edition (2012)* https://bookstore.transportation.org/Item_details.aspx?id=2024
2. Governmental Accounting Standard Series, *Statement 34 of the Governmental Accounting Standards Board* (June 1999), http://www.gasb.org/cs/
3. FHWA, *Towards Sustainable Pavement Systems: A Reference Document* (January 2015), https://www.fhwa.dot.gov/pavement/sustainability/hif15002/hif15002.pdf

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Existence and use of a PMS.
2. If performance is measured, a chart, table, or spreadsheet that summarizes system performance.
3. Documentation of PMS goals including quantifiable objectives and timeframes.
4. If progress is monitored, a chart, table, or spreadsheet progression towards the above goal over time.
5. Standard specifications or special provisions.

OM-08: Bridge Management System

1-15 points

Goal: Leverage a bridge management system (BMS) to balance activities that extend the life and function of bridges with impacts to the human and natural environment.

Affected Triple Bottom Line Principles

Sustainability Linkage

Maintaining and using a bridge management system supports the environmental and economic principles by optimizing the management of bridge structures, including preservation, restoration, and replacement, to maximize their lifetimes. This reduces costs, the environmental impacts of construction, and raw material usage.

Background and Scoring Requirements

Background

Bridge preservation is defined as actions or strategies that prevent, delay, or reduce deterioration of bridges or bridge elements, restore the function of existing bridges, keep bridges in good condition, and extend their life. Preservation actions may be preventive or condition-driven.

Scoring Requirements

Requirement OM-08.1

1 or 2 points. Develop a Bridge Management System and Collect Data

An effective BMS for bridges on and off Federal-aid highways that should be based on the *AASHTO Guidelines for Bridge Management Systems*[1]. It supplies analyses and summaries of data, uses mathematical models to make forecasts and recommendations, and provides the means by which alternative policies and programs may be efficiently considered. An effective BMS should include, as a minimum, formal procedures for:

1. Collecting, processing, and updating data;
2. Predicting deterioration;
3. Identifying alternative actions;
4. Predicting costs;
5. Determining optimal policies;
6. Performing short- and long-term budget forecasting; and
7. Recommending programs and schedules for implementation within policy and budget constraints.

One of the following scores applies:

- **0 points.** The agency does not have a BMS or has a BMS but does not collect data.
- **1 point.** The agency has a BMS that includes at least five of the seven procedures noted above and collects system-wide data.
- **2 points.** The agency has a BMS that includes at all seven of the procedures noted above and collects system-wide data.

Requirement OM-08.2

1-4 points. Track Bridge Network Performance

Points are assigned for tracking bridge network performance. Scoring is based on the following, cumulative requirements.

- **Requirement OM-08.2a**

  1 point. Track Overall Bridge Network Condition Using Common Metrics

  Track overall bridge network condition using common metrics. Create a database of structural health for each bridge managed by the agency. Rate the superstructure, substructure, and deck of each bridge on the ten-point scale defined for reporting to the National Bridge Inventory, or gather more quantified data using an element level inspection approach.

- **Requirement OM-08.2b**

  1 point. Report Operational Limits

  Report any bridges that are in service with posted weight limits or have functional limitations. This also applies in situations where bridge service loading has been reviewed and no posted limits or functional limitations apply.

- **Requirement OM-08.2c**

  2 points. Project Timeliness

  Have measures related to project timeliness of rehabilitation, preservation, and maintenance activities. For example, an agency may identify projects and activities to be completed within 3 years that they can later assess to evaluate the timeliness of their actual implementation.

Requirement OM-08.3

1 or 2 points. Set Goals and Monitor Progress

Set bridge system performance goals and monitor progress toward goals.

One of the following scores applies:

- **0 points.** Set quantifiable goals relating to less than two of the three metrics listed above (OM-08.2a, OM-08.2b, and 0M-08-2c) for agency bridges; or set quantifiable goals relating to at least two of the three metrics listed above for agency bridges but do not monitor or have not monitored progress towards goals for at least one year after goal establishment.
- **1 point:** Set quantifiable goals relating to at least two of the three metrics listed above for agency bridges, including when these goals are to be achieved, and monitor progress towards goals for at least one year after goal establishment.
- **2 points**. Set quantifiable goals relating to all three of the metrics listed above for agency bridges, including when these goals are to be achieved, and monitor progress towards goals for at least one year after goal establishment.

Requirement OM-08.4

1-7 points. Leverage Data to Demonstrate Sustainable Outcomes

To earn credit for this scoring requirement, the agency must have a Bridge Management System as described in scoring requirement OM-08.1. Scoring is based on the following, cumulative requirements:

- **Requirement OM-08.4a**

  2 points. Use BMS to Perform Sophisticated Modeling

  Use BMS to perform sophisticated modeling, including forecasting, scenario analyses, trade-off analyses, and system optimization.

- **Requirement OM-08.4b**

  2 points. Leverage LCCA to Predict Costs

  Leverage life-cycle cost analysis (LCCA) techniques to predict costs and to perform short- and long-term budget forecasting.

- **Requirement OM-08.4c**

  1 point. Include Preservation in Annual Plan

  Include routine bridge preservation needs in the annual UPWP or STIP/TIP that are based on the condition and timeliness goals set above.

- **Requirement OM-08.4d**

  2 points. Link Repair, Preservation and Maintenance to Projects

  Leverage BMS to link bridge repair, preservation, and maintenance projects to adjacent capital projects.

Resources

Above-Referenced Resources

The following resources are referenced in this criterion and consolidated here:

1. AASHTO, *Guidelines for Bridge Management Systems*, https://bookstore.transportation.org/item_details.aspx?id=343

Additional Resources

The following resources provide information on this criterion topic in addition to the sources directly referenced:

2. FHWA, Asset Management website, http://www.fhwa.dot.gov/asset/

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Existence and use of a BMS.
2. If performance is measured, a chart, table, or spreadsheet that summarizes system performance.
3. Documentation of BMS goals including quantifiable objectives and timeframes.
4. If progress is monitored, a chart, table, or spreadsheet progression towards the above goal over time.
5. Standard specifications or special provisions.

OM-09: Maintenance Management System

1-15 points

Goal: Leverage a Maintenance Management System (MMS) to inventory, assess, analyze, plan, program, implement, and monitor maintenance activities to effectively and efficiently extend the life of the system, improve the service, and reduce the impacts to the human and natural environment.

Affected Triple Bottom Line Principles

Sustainability Linkage

Utilizing an MMS supports all of the triple bottom line principles by facilitating efficient and cost-effective decision-making, better leveraging funds, improving system quality and customer satisfaction, and more effectively maintaining assets, which reduces cost and the environmental impacts of construction and raw material use.

Background and Scoring Requirements

Background

An MMS is a computerized database that is designed to integrate an agency's asset management and maintenance management systems to optimize the management of maintenance. The MMS provides managers with processes, tools, and data necessary to make decisions to help maintenance staff do their jobs more effectively and to help management make informed decisions.

This criterion is largely based on AASHTO's *Guidelines for Maintenance Management Systems*[1] (GMMS). The following definitions from the GMMS apply:

- **"Maintenance Management"** – refers to all the actions that managers undertake in their daily responsibilities of overseeing the maintenance program.
- **"Maintenance Management System"** – the set of tools, technologies, and processes that help the manager make better decisions and manage more effectively.

Scoring Requirements

Requirement OM-09.1

1 or 2 points. Incorporate Key Elements of MMS

The agency has an MMS that includes, at a minimum, modules for:

- **Planning**, including asset inventory, maintenance activity guidelines, customer input, performance targets, and condition assessment.
- **Programming and Budgeting**, including performance-based budget analysis, annual work program, and annual budget.
- **Resource Management**, including resource needs analysis, staffing allocations, equipment management, and private contracting.
- **Scheduling**, including work needs identification, customer service program, and short-term work scheduling.
- **Monitoring and Evaluation**, including performance measures, work reporting, and management analysis.

- **Maintenance Support and Administration**, including permit processing and tracking, Adopt-a-Highway program, risk management, and stockpile management.

One of the following scores applies:

- **0 points.** The agency does not have an MMS or has an MMS that has less than three of the modules listed above.
- **1 point.** The agency has an MMS that has three or four of the modules listed above.
- **2 points.** The agency has an MMS that has five or six of the modules listed above.

Requirement OM-09.2

2 points. Integrate Vehicle-Based Technology

Leverage automated vehicle and connected vehicle technologies, such as GPS, weather information systems, surface temperature measuring devices, on-board freezing point and ice-presence detection systems, salinity measuring devices, visual and multi-spectral sensors, traffic speed, crash reporting, etc. to provide input information to the MMS and leverage MMS outputs to maintenance vehicles to optimize operations and maintenance activities.

Requirement OM-09.3

1-5 points. Integrated Maintenance Management System

The agency has an MMS that integrates, at a minimum, a Pavement Management System (PMS, see OM-07), a Bridge Management System (BMS, see OM-08), Road Maintenance Plan (RMP, see OM-10), and a Traffic Control Maintenance Plan (TCMP, see OM-11). Points will be assigned for the integration of additional, specific features listed below (see GMMS for more definition). Scoring is based on the following, cumulative requirements:

- **Requirement OM-09.3a**

  1 point. Roadway Inventory Systems
- **Requirement OM-09.3b**

  1 point. Financial Management Systems
- **Requirement OM-09.3c**

  1 point. Construction/Project Management Systems
- **Requirement OM-09.3d**

  1 point. Equipment Management Systems
- **Requirement OM-09.3e**

  1 point. Environmental Commitment Tracking System (see OM-02)
- **Requirement OM-09.4**

3 points. Leverage MMS to Define Projects

The MMS ties into the agency's PMS and BMS and exchanges information. That information is used to link pavement/bridge repair, preservation, and maintenance projects to adjacent maintenance needs (e.g., updating traffic safety devices and signage within the same project limits).

Requirement OM-09.5

2-3 points. Maintenance Quality Assurance

Maintenance Quality Assurance (MQA) is a process that uses quantitative quality indicators to assess the performance of maintenance programs. These programs are outcome-based and provide statistically valid, reliable, and repeatable measures of asset conditions.

Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-09.5a**

  2 points. MQA Relates Maintenance to Performance

  The agency has a MQA program that relates highway maintenance to highway performance.

- **Requirement OM-09.5a**

  1 additional point. MQA Used to Understand Relationship between Costs and Outcomes

  The MQA program is being used to help managers to understand maintenance conditions, set priorities, and document the relationship between costs and outcomes.

Resources

The following resources are referenced in this criterion and consolidated here:

1. AASHTO, *Guidelines for Maintenance Management Systems,* https://bookstore.transportation.org/item_details.aspx?id=413

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Existence and use of a MMS.
2. Documentation of features and elements of the MMS.
3. Documentation of MQA processes and procedures.

OM-10: Highway Infrastructure Preservation and Maintenance

1-15 points

Goal: Make highway infrastructure (paved roadway surfaces, bridges, tunnels, roadsides, and their appurtenance facilities) last longer and perform better by undertaking preservation and maintenance on them.

Affected Triple Bottom Line Principles

Sustainability Linkage

Infrastructure preservation and maintenance activities support all of the triple bottom line principles by better leveraging funds, improving system quality and customer satisfaction, and more effectively maintaining assets, which reduces cost and the environmental footprint.

Background and Scoring Requirements

Background

Preservation and maintenance activities for pavements, bridges, and their appurtenant facilities should be generated from a Pavement Management System (PMS, see OM-07) and a Bridge Management System (BMS, see OM-08), in conjunction with a Maintenance Management System (MMS, OM-09). These Management Systems feed into an Asset Management Plan that assists in applying the right treatment to the right infrastructure element at the right time to optimize performance.

The organization and operation of preservation and maintenance functions within different agencies are unique. As a result, for example, the Road Maintenance Plan (RMP) discussed in this criterion or the Traffic Control Maintenance Plan (TCMP) discussed in OM-11 may be multiple documents that cover different assets, functions, or geographies. For the purposes of this tool, the user should score the RMP, including all relevant documents necessary to cover the assets and functions discussed in each criterion and scoring requirement.

Scoring Requirements

Requirement OM-10.1

1-4 points. Develop a Road Maintenance Plan

Develop and implement an RMP that covers highway infrastructure systems and includes the four core assets listed below and their appurtenant facilities. The RMP refers to document(s) that address, at a minimum, strategies, responsible parties/organizations, inventory of assets, standards, schedule, methods/standard operating procedure (SOP) to be used, and funding sources. The RMP should include preservation and maintenance (including repair, cleaning, and litter control) activities for the following infrastructure systems.

Core assets that must be included:

- Pavements
- Bridges and Tunnels
- Stormwater system, including LID features
- Other infrastructure facility elements

Additional assets that may be included:

- Shoulders and sidewalks
- Slopes, rock-fall, and slope protection
- Vegetation
- Accessory facilities to the assets listed above

One of the following scores applies:

0 points. The agency does not have an RMP that covers the four core systems listed above.

1 point. The agency has an RMP consisting of multiple documents that covers the core assets only.

2 points. The agency has an RMP consisting of multiple documents that covers the core assets and at least two additional assets noted above, or the agency has a consolidated RMP that covers the core assets only.

3 points. The agency has an RMP consisting of multiple documents that covers the core assets and all of the additional assets noted above, or the agency has a consolidated RMP that covers the core assets and at least two of the additional assets noted above.

4 points. The agency has a consolidated RMP that covers the core assets and all of the additional assets noted above.

Requirement OM-10.2

2-7 points. Sustainable Maintenance and Operations

Scoring is based on the following, cumulative requirements.

- **Requirement OM-10.2a**
  3 points. Fund RMP Activities
  For the fiscal year evaluated, appropriate funding is allocated to accomplish all preventative maintenance, routine maintenance and repair activities included in the RMP and annual work plan.
- **Requirement OM-10.2b**
  2 points. RMP Highlights Activities that Contribute to Sustainability during Maintenance & Operations
  The RMP specifically addresses sustainability and highlights procedures, specifications, and activities that contribute to sustainability during preservation and maintenance activities. For example, non-idling procedures could be included in standard operating procedures for maintenance crews.
- **Requirement OM-10.2c**
  2 points. RMP Includes Activities that Contribute to Sustainability of Infrastructure Assets
  The RMP specifically addresses sustainability and includes procedures, specifications, or measures that contribute to the sustainability of infrastructure assets. For example, a standard operating procedure could require that drainage grates within pedestrian/bicycling limits and with existing openings parallel to the traveled way be replaced with reticuline grates that will not catch wheelchair or bicycle tires.

Requirement OM-10.3

2 or 4 points. Include Performance Measures, Monitor, and Demonstrate Progress

To earn credit for this scoring requirement, the agency must have a Road Maintenance Plan as described in scoring requirement OM-10.1. Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-10.3a**

  2 points. Include Performance Measures

  Plan includes performance measures that can be used to monitor the effects of plan implementation on highway preservation and maintenance. Metrics should focus on preventative maintenance, routine maintenance, and repairs and should be aligned with the agency's sustainability goals. These can be assigned to individual roadways or the aggregated network. Measures could be based on condition of infrastructure, functionality of drainage systems, effluent water quality, presence of noxious weeds or obstructive vegetation, and other relevant parameters. Measures could be qualitative and/or quantitative.

- **Requirement OM-10.3b**

  2 additional points. Monitor Progress and Demonstrate Sustainable Outcomes

  Monitor progress towards goals for at least one year after performance metrics in OM-10.3a are established and how measurable advancement towards stated goals.

Resources

None referenced.

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. A list of each item that addresses responsible parties, schedule, methods, standard operating procedure (SOP), and funding sources.
2. If performance is measured, a chart, table, or spreadsheet that summarizes system performance.
3. Document goals for the maintenance plan, including quantifiable objectives and timeframes. If progress is monitored, a chart, table, or spreadsheet progression towards the above goal over time.

OM-11: Traffic Control Infrastructure Maintenance

1-15 points

Goal: Increase safety and operational efficiency by maintaining roadway traffic controls.

Affected Triple Bottom Line Principles

Sustainability Linkage

Infrastructure preservation and maintenance activities supports all of the triple bottom line principles by better leveraging funds, improving system quality and customer satisfaction, and more effectively maintaining assets, which reduces cost and the environmental impacts of construction and raw material use.

Background and Scoring Requirements

Background

This criterion covers the preservation and maintenance of permanent traffic control, Intelligent Transportation System (ITS), and safety devices. Two related criteria include OM-14: Work Zone Traffic Control, which includes temporary traffic control, ITS, and safety devices, and OM-13: Transportation Management and Operations, which covers the operation of permanent traffic control and ITS systems.

Preservation and maintenance activities for traffic control infrastructure should be generated in conjunction with a Maintenance Management System (OM-09), if one exists within an organization.

Scoring Requirements

The organization and operation of preservation and maintenance functions within different agencies are unique. As a result, the Traffic Control Maintenance Plan (TCMP) may actually be multiple documents that cover different assets, functions, or geographies. For the purposes of this tool, the user should score the TCMP including all relevant documents necessary to cover the assets and functions discussed in each criterion.

If an agency is evaluating only a specific geography then that entire geography must be covered in order to take credit for the following scoring requirements. If evaluating agency-wide, all geographies must be covered by a combination of plans in order to take credit.

Requirement OM-11.1

1 or 2 points. Develop a Traffic Control Maintenance Plan

The agency shall have and implement a comprehensive TCMP. This plan must address, at a minimum, responsible parties/organizations, standards, schedule, methods to be used, and funding sources for the following items:

- Pavement marking maintenance and repair: Restriping activities;
- Sign maintenance and repair: Reflectivity assessment, sign replacement, signpost repair;
- Safety device (e.g., guardrail, traffic attenuators, delineators, etc.) maintenance and repair;
- Traffic signal maintenance and repair;
- Roadway lighting maintenance and repair: Electrical service, bulb replacement; and
- Intelligent transportation system (ITS) maintenance and repair.

One of the following scores applies:

- **0 points.** The agency does not have a TCMP that covers the items listed above.
- **1 point.** The agency has a TCMP consisting of multiple documents that covers all of the relevant items listed above or the agency has a consolidated TCMP that covers at least four of the six items listed above.
- **2 points.** The agency a consolidated TCMP that covers the all of the relevant items listed above.

Requirement OM-11.2

2 or 4 points. Establish Metrics and Measure Performance

To earn credit for this scoring requirement, the agency must have a Road Weather Management Plan as described in scoring requirement OM-12.1. Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-11.2a**

  2 points. Establish Quantifiable Metrics

  Establish quantifiable performance metrics for the TCMP. These can be based on evaluation of individual roadways or the aggregated network, and should be based on level-of-service, readability of signage, adequacy of lighting, presence of deficient traffic control devices, timeliness of maintenance activities, and other relevant parameters.

- **Requirement OM-11.2b**

  2 additional points. Use Metrics to Evaluate Performance

  Use these to evaluate the overall performance of the TCMP.

Requirement OM-11.3

1 or 3 points. Set Goals and Monitor Progress

To earn credit for this scoring requirement, the agency must have a Traffic Control Maintenance Plan as described in scoring requirement OM-11.1. Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-11.3a**

  1 point. Set Quantifiable Goals

  Set quantifiable goals relating to the metrics above for agency traffic control devices, including when these goals are to be achieved. For example, an agency might set a goal that all painted centerline stripes are to be repainted bi-annually.

- **Requirement OM-11.3b**

  2 additional points. **Monitor Progress and Demonstrate Sustainable Outcomes**

  Monitor progress towards goals for at least one year after goal establishment and show measurable advancement towards stated goals.

Requirement OM-11.4
3 or 6 points. Sustainable Maintenance and Operations

Scoring is based on the following, cumulative requirements:

- **Requirement OM-11.4a**

  3 points. TCMP Highlights Activities that Contribute to Sustainability during Maintenance & Operations

  The TCMP specifically addresses sustainability and highlights procedures, specifications, and activities that contribute to sustainability during preservation and maintenance activities. For example, standard operating procedures for maintenance crews could include non-idling procedures for noise and air quality control, sustainable waste management, sustainable materials procurement and use, or pollution prevention procedures.

- **Requirement OM-11.4b**

  3 points. TCMP Includes Activities that Contribute to Sustainability of Infrastructure Assets

  The TCMP specifically addresses sustainability and includes procedures, specifications, or measures that contribute to the sustainability of infrastructure assets. For example, a standard operating procedure could require that HPS luminaires to be replaced shall be upgraded to more efficient lamps (e.g., LED).

Resources

None referenced.

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. A list of each item that addresses responsible parties, schedule, methods, and funding sources.
2. If performance is measured, a chart, table, or spreadsheet that summarizes system performance.
3. Documentation of the goals of the maintenance plan, including quantifiable objectives and timeframes.
4. If progress is monitored, a chart, table, or spreadsheet progression towards the above goal over time.

OM-12: Road Weather Management Program

1-15 points

Goal: Plan, implement, and monitor a road weather management program (including snow and ice control) to reduce environmental impacts with continued or better level of service.

Affected Triple Bottom Line Principles

Sustainability Linkage

Implementing an effective and efficient road weather management program supports all of the triple bottom line principles by improving safety, increasing mobility, reducing delay and traffic interruptions, increasing productivity of the labor force, and reducing impacts of materials used for management on the human and natural environments.

Background and Scoring Requirements

Intelligent Transportation Systems (ITS) solutions are included in OM-13: Transportation Management and Operation, including techniques for information dissemination and traffic control strategies, and are not duplicated in this criterion. Technologies related to infrastructure surveillance, monitoring and prediction; and response and treatment strategies are included in this criterion.

Background

FHWA's Road Weather Management Website[1] explains that "adverse weather conditions have a major impact on the safety and operation of our Nation's roads, from signalized arterials to Interstate highways. Weather affects driver behavior, vehicle performance, pavement friction, and roadway infrastructure. Weather events and their impacts on roads can be viewed as predictable, non-recurring incidents that affect safety, mobility and productivity. Weather affects roadway safety through increased crash risk, as well as exposure to weather-related hazards. Weather impacts roadway mobility by increasing travel time delay, reducing traffic volumes and speeds, increasing speed variance (i.e., a measure of speed uniformity), and decreasing roadway capacity (i.e., maximum rate at which vehicles can travel). Weather events influence productivity by disrupting access to road networks, and increasing road operating and maintenance costs."

Determining the most sustainable approaches to Road Weather Management requires a balance of best practices with impacts. For instance, providing an improved level-of- service (LOS) for the roadway during weather events must be balanced with the environmental impacts associated with the resulting increase in materials applied. Materials used to treat snow and ice can harm adjacent flora and fauna and leach into nearby bodies of water and negatively impact plant and animal habitats. The use of these materials to improve LOS during weather events must be weighed against potential impacts. The development of plans and best practices included in this criterion requires a balance of these trade-offs based on the goals of the individual agency.

Scoring Requirements

Requirement OM-12.1

2-4 points. Road Weather Management Program

- **Requirement OM-12.1a**

  2 points. Develop a Road Weather Management Program

  A Road Weather Management Program (RWMP) includes strategies that can be used to mitigate the impacts of rain, snow, ice, fog, high winds, flooding, tornadoes, hurricanes, avalanches, and other inclement weather impacts on traffic. The RWMP will vary in size and scope depending on the needs of the agency. It could be a combination of multiple documents that cover management of different conditions or different regions, or could be a single, consolidated document. For the purposes of evaluating this criterion, the agency should consider all applicable materials and respond according per the majority of their practices. One of the following scores applies:

  0 points. The agency does not have an RWMP.

  1 point. The agency has multiple RWMP documents that cover all geographies and weather types within the agency (may be separated by geography, weather type, etc.)

  2 points. The agency has single, consolidated RWMP document that covers all geographies and weather types within the agency.

- **Requirement OM-12.1b**

  2 additional points. Address Long-term Weather Changes in RWMP

  The RWMP developed in requirement OM-12.1a addresses weather events based on long-term predictions and trends, rather than historical weather data only. Anticipated impacts to operations and maintenance based on long-term weather/climate changes should be developed consistently with the approaches discussed in SP-16: Infrastructure Resiliency, including Hazard Identification, Vulnerability Assessment and Risk Assessment and should be updated on an established evaluation and update cycle.

Requirement OM-12.2

2-3 points. Set Goals and Monitor Progress

To earn points for this scoring requirement, the agency must have a Road Weather Management Plan as described in scoring requirement OM-12.1. If the RWMP contains multiple documents, each document must include the following requirements. Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-12.2a**

  2 points. Establish Quantifiable Metrics

  Establish quantifiable performance metrics for the RWMP program. Measures could be based on level of service, amount of materials used per event, and other relevant parameters. Measures could be qualitative and/or quantitative.

- **Requirement OM-12.2b**

  1 additional point. Monitor Progress and Demonstrate Sustainable Outcomes

  Monitor progress towards the goals set in requirement OM-12.2a for at least one year after goal establishment and show measurable advancement towards stated goals.

Requirement OM-12.3

1-2 points. Implement a Road Weather Information System

Road Weather Information Systems (RWIS) are a way to monitor pavement and weather conditions in real-time using sensors to measure atmospheric, pavement, and/or water level conditions. Atmospheric data include air temperature and humidity, visibility distance, wind speed and direction, precipitation type and rate, tornado or waterspout occurrence, lightning, storm cell location and track, as well as air quality. Pavement data include pavement temperature, pavement freezing point, pavement condition (e.g., wet, icy, flooded), pavement chemical concentration, and subsurface conditions (e.g., soil temperature). Water level data include tide levels (e.g., hurricane storm surge) as well as stream, river, and lake levels near roads. This data are used to maintain awareness of current conditions and to feed into roadway models, and they allow the operator to make the best decisions about which actions to take. For example, it enables a maintenance manager to decide when to apply chemicals, how much to apply, and what type of chemical to apply, thereby reducing the amount of salt and chemical applied and increasing its effectiveness.

The agency implements a RWIS which measures the weather and road conditions using sensors on the side of the road to track weather and road conditions to plan and implement the appropriate treatment actions. The RWIS should provide timely information on prevailing and predicted conditions to both transportation managers and motorists (e.g., posting fog warnings on Dynamic Message Signs (DMS) or listing flooded routes on web sites). One of the following scores applies:

0 points. The agency does not have an RWIS.

1 point. The agency implements a RWIS in select areas identified, but has not implemented a system agency-wide.

2 points. The agency implements a RWIS agency-wide in most or all areas identified vulnerable to weather conditions (e.g., mountain passes, high wind areas, bridges, etc.) and shares the data with the NWS.

Requirement OM-12.4

1-2 points. Implement the Standards of Practice or Standard Operating Procedure (SOP) For Weather-Related Issues

Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-12.4a**

  1 point. Include Snow and Ice Control in RWMP

  Have an RWMP that includes, at a minimum, the following elements specific to snow and ice control:

  - Reducing salt use in environmentally sensitive areas
  - Existence of an anti-icing program
  - Conducting periodical training program for proper use of salt and chemicals
  - Best Management Practice (BMP) for chemical storage facilities
  - Proper storage of chemical and chemical-abrasive stockpiles
  - Proper calibration of equipment
  - Reducing cost and improving fuel efficiency by planning and optimizing routes

- **Requirement OM-12.4b**

  1 additional point. Include Performance Standards to Demonstrate Sustainability

  The agency's program includes performance standards that take into account sustainability and demonstrate a reduction in treatment materials and truck fuel usage.

Requirement OM-12.5

2 points. Implement Materials Management Plan

Successful implementation of a Materials Management Plan to monitor quantities of salt applied and level of service (e.g., interstates bare and dry 1 hour after event) during and after an event; includes salt, chemicals (de-icing agents), sand, etc.

Requirement OM-12.6

1-2 points. Implement a Maintenance Decision Support System

Deploy a Maintenance Decision Support System (MDSS) to improve the effectiveness and efficiency of roadway weather treatments and implement best practices. The MDSS can be based RWIS installed roadside or mounted on maintenance vehicles to measure and monitor the road conditions.

One of the following scores applies:

- **0 points.** The agency does not have an MDSS.
- **1 point.** The agency's MDSS is based on roadside RWIS.
- **2 points.** The agency has MDSS processes that are based on both roadside RWIS and vehicle mounted sensing technologies.

Resources

Above-Referenced Resources

The following resources are referenced in this criterion and consolidated here:

1. FHWA, Road Weather Management Website, http://www.ops.fhwa.dot.gov/weather/index.asp

Additional Resources

The following resources provide information on this criterion topic in addition to the sources directly referenced:

2. FHWA, *An Introduction to Standards for Road Weather Information Systems (RWIS): Siting Standards, Calibration Standards, Communications Standards* (2002), http://www.standards.its.dot.gov/Content/documents/rwis-standards.htm
3. FHWA, *Best Practices for Road Weather Management* (2012), http://ops.fhwa.dot.gov/publications/fhwahop12046/fhwahop12046.pdf
4. FHWA – RITA, *Road Weather Management Performance Measures – 2017 Update*, https://ops.fhwa.dot.gov/publications/fhwahop17048/ch2.htm
5. WSDOT, *Road Weather Information Systems: Enabling Proactive Maintenance Practices in Washington State* (2002), http://www.wsdot.wa.gov/research/reports/fullreports/529.1.pdf
6. NCHRP, Benefit/Cost Study of RWIS and Anti-icing Technologies (2001), http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=1459
7. NCHRP, Test Methods for Evaluating Field Performance of RWIS Sensors (2006), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w87.pdf
8. Prepared by Montana DOT for FHWA, *Recommendations for Winter Traction Materials Management on Roadways Adjacent to Bodies of Water* (2004), https://www.mdt.mt.gov/other/webdata/external/research/docs/research_proj/traction/final_report.pdf
9. NCHRP, *Report 526: Snow and Ice Control: Guidelines for Materials and Methods* (2004), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_526.pdf

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Road Weather Management Program, and related plans and programs.
2. Materials Management Plan, MDSS, and documentation of RWIS for the jurisdiction (state, county, city). A qualified plan should include quantitative goals for reductions in chloride and other chemical applications, reduction of plow truck mileage, and a description of the tools and hardware used to monitor and operate the snow and ice control activities. A qualifying plan shall outline specific strategies to be implemented by specific agencies or stakeholders to achieve the plan.
3. Annual reports of plan progress, including data supporting goal performance and actions taken during the previous period. Minutes of monthly or quarterly meetings of interagency stakeholders to demonstrate active efforts to implement the plan.

OM-13: Transportation Management and Operations

1-15 points

Goal: Maximize the utility of the existing roadway network through use of technology and management of operations strategies.

Affected Triple Bottom Line Principles

Sustainability Linkage

Transportation management and operations support all of the triple bottom line principles. More efficient operations of the roadway network will result in a reduction of fossil fuel usage and related emissions; a reduction in the number and severity of crashes and therefore congestion and private and public property loss, injury, and loss of life; and a reduction in the resources and related costs needed to expand capacity of the network.

Background and Scoring Requirements

This criterion, OM-13: Transportation Management and Operations, covers the management and operations (M&O) of existing infrastructure through the use of Intelligent Transportation Systems (ITS). Other related criteria that also include ITS strategies include:

- OM-03 Vehicle Fuel Efficiency and Use – includes ITS strategies to reduce fuel usage of fleet vehicles;
- OM-07: Pavement Management System – includes ITS strategies to inventory and manage pavement assets;
- OM-08: Bridge Management System – includes ITS strategies to inventory and manage bridge assets;
- OM-11: Traffic Control Infrastructure Maintenance – includes the preservation and maintenance of permanent traffic control, ITS, and safety devices;
- OM-12: Road Weather Management Program – includes ITS strategies to monitor weather, manage events, and efficiently operate and maintain the transportation system during weather events; and
- OM-14: Work Zone Traffic Control – includes ITS strategies related to M&O related temporary traffic control

For the purposes of INVEST, ITS strategies are included in specific topical criteria first, and more general solutions are included in OM-13.

Background

The intent of this criterion is to encourage the use of available technologies to actively manage and operate the existing roadway infrastructure, alleviating the major causes of congestion, including insufficient capacity (bottlenecks), substandard transportation operations systems (such as traffic signal systems with poor signal timing), incidents (crashes, disabled vehicles), and non-recurring events (special events, work zones, weather-related events, etc.).

For the purpose of this criterion, the key terms are defined as follows:

- **"Intelligent Transportation Systems (ITS)"** are advanced applications that provide innovative services relating to different modes of transport and traffic management and enable system users to be better informed and make safer, more coordinated, and 'smarter' use of technology-based transportation networks.

- **"ITS Architecture"** defines how systems functionally operate and the interconnection of information exchanges that must take place between these systems to accomplish transportation services. An architecture is functionally oriented and not technology-specific which allows the architecture to remain effective over time. It defines "what must be done," not "how it will be done."
- **"ITS Standards"** define an architecture of interrelated systems that work together to deliver transportation services.
- **"National ITS Architecture"** provides a common framework for planning, defining, and integrating ITS. It defines the functions that must be performed by subsystems, where these functions reside (e.g., field, traffic management center, in vehicle), the interfaces and architecture flows to/from the subsystems, and the communications requirements for the architecture flows. It is a mature product that reflects the contributions of a broad cross-section of the ITS community (e.g., transportation practitioners, systems engineers, system developers, technology specialists).

Scoring Requirements

The strategies included in the following scoring requirements will vary in size and scope depending on the needs of the agency. The strategies could be comprised of a combination of various documents that cover M&O of different conditions or regions, or could be a single, consolidated document. For the purposes of evaluating this criterion, the agency should consider all applicable documents in aggregate and respond according to the majority of their practices.

Requirement OM-13.1

2 points. Conduct Enhanced or Expedited Compliance

The agency takes steps or measures beyond (enhanced) or faster than (expedited) what is required under existing operations regulations and certifications to improve mobility and user level of service. Existing regulations and certifications include Congestion Management Process, Real Time Traveler Information, and the Manual on Uniform Traffic Control Devices. Examples of measures that enhance compliance include adopting demand management strategies, such as congestion pricing strategies and high-occupancy toll (HOT) lanes, which are encouraged but not required under the Congestion Management Process. Enhancements might also include programs that encourage transit use and ridesharing.

Requirement OM-13.2

1-6 points. Include Operation-Based Strategies and Programs

The agency has in place system-wide strategies, for enhancing the mobility and safety of the existing roadway network. These strategies increase user level of service and roadway capacity, and decrease collisions and their effects on mobility. Strategies include ITS functions and the programs in place to implement and support their use. Information about ITS functions that can be used to support these strategies can be reviewed at the FHWA Office of the Assistant Secretary for Research and Innovative Technology (OST-R) Intelligent Transportation Systems Joint Program Office's Application Area Website[1]. Table OM-13.2.A shows the ITS application areas and ITS functions available for this criterion.

Utilize one or more ITS functions, as listed in Table OM-13.2.A, in support of the application areas listed. Points are awarded based on how many application areas are supported system-wide (or in a majority of areas identified as relevant). Multiple ITS functions in one application area do not achieve additional points. Points for supporting application areas are cumulative; however, this criterion **shall not exceed a total of six points**.

To determine points, it is important to review the definition of the application areas, the function, and the technology. The application areas are defined on the aforementioned ITS Application Area Website[1]. To better understand the function and technologies, select the application area name, then, on the ITS Taxonomy page for that application area, select the desired function or technology. At the top of each page that describes a particular function or technology, there is a "What is this?" description. This defines the function or technology being scored. For example, the technology labeled "HOV Facilities" within the Lane Management function, is described as "Sensors detecting the traffic conditions support the use of dynamic message signs and moveable barriers (e.g., gates) to control the operation of HOV facilities." Therefore, points are not provided for merely having HOV facilities, but utilizing ITS to monitor and control the facilities. In addition, the implementation of ITS functions included in Table OM-13.2.A will vary in size and scope depending on the needs of the agency; while a particular function or technology itself may be utilized, it may not be used fully in all possible ITS application areas; ensure this is reflected correctly in determining points.

The implementation of technologies to support M&O strategies may vary from test projects, to regional improvements, to statewide implementation both as applicable/relevant and as the agency is rolling-out or testing specific technologies. Some technologies may have greater relevance to urban areas or rural areas and vice versa. For the purposes of evaluating this criterion, the agency should consider whether the technologies are ***implemented in a majority of the relevant areas***.

TABLE OM-13.2.A ITS TECHNOLOGIES (CONTINUED ON NEXT PAGE)

Requirement	Points	Application Area	Functions (If Itemized, Shown Technologies ONLY)
OM-13.2a	1	Arterial Management	**Information Dissemination** (In-Vehicle Systems) **Lane Management** **Surveillance** (Infrastructure) **Traffic Control** (Adaptive Signal Control*, Bicycle and Pedestrian**, Special Events, Variable Speed Limits)
OM-13.2b	1	Freeway Management	**Information Dissemination** (In-Vehicle Systems) **Lane Management** **Ramp Control** (Ramp Closures) **Special Event Trans. Management** **Surveillance** (Infrastructure)
OM-13.2c	1	Crash Prevention & Safety	**Animal Warning*** **Bicycle Warning** **Highway-Rail Crossing Warning*** **Pedestrian Safety****
OM-13.2d	1	Road Weather Management	**Information Dissemination** (Dynamic Message Signs) **Traffic Control Strategies**
OM-13.2e	1	Roadway Operations & Maintenance	**Asset Management** (Infrastructure Management) **Information Dissemination** (Internet/ Wireless/Phone)
OM-13.2f	1	Transit Management	**Information Dissemination**
OM-13.2g	1	Traffic Incident Management	**Surveillance & Detection** (Detectors, Imaging/Video)
OM-13.2h	1	Electronic Payment and Pricing	**Pricing** **Toll Collection**

Requirement	Points	Application Area	Functions (If Itemized, Shown Technologies ONLY)
OM-13.2i	1	Traveler Information	**En-Route Information** **Information Dissemination** **Pre-Trip Information** (511, Internet/ Wireless/Phone, Kiosks)
OM-13.2j	1	Information Management	**Data Archiving**
OM-13.2k	1	Commercial Vehicle Operations	**Safety Assurance** **Security Operations**
OM-13.2l	1	Intermodal Freight	**Freight-Highway Connector System**

* Earns points in rural applications only. Not considered "above and beyond" in an urban setting.
** Points are not earned for "Countdown" WALK/DON'T WALK signals; as they are not considered "above and beyond."

Requirement OM-13.3

2 points. Compliance with National ITS Architecture
Tailor the National ITS Architecture to create a "regional" ITS Architecture based on agency- specific needs. The regional ITS Architecture should consist of functions within ITS elements and architecture flows that interconnect each of the ITS elements in the region (and with ITS elements outside the region). For more information, visit FHWA's OST-R ITS Joint Program Office's ITS Standards Program website[2].

Requirement OM-13.4

2 points. Integrate M&O Strategies into Design
Integrate a system (such as design policies, procedures, and strategies) to ensure the needs of M&O strategies are fully considered in roadway infrastructure design. Consider M&O strategies during systems planning, project selection, and project design to maximize their potential and limit the need to retrofit roadways to meet M&O strategies. Retrofitting roadways is usually less cost effective and more likely to force the need for design exceptions than meeting the needs of M&O strategies during the design phase. For more information, visit the FHWA's Office of Operations' Designing for Transportation Management and Operations: A Primer website[3].

Requirement OM-13.5

2-3 points. Set Goals and Monitor Progress

Scoring is based on the following, cumulative requirements. The first requirements must be accomplished to earn the second.

- **Requirement OM-13.5a**

  2 points. Establish Safety and Mobility Performance Metrics

  Establish performance metrics specific to the operational system that is relevant to the implementation of ITS, including at least one metric related to safety, one related to mobility, and one related to integration of M&O strategies into design. Examples include travel times, incident response times, and incident frequency.

- **Requirement OM-13.5b**

  1 additional point. Monitor Progress and Demonstrate Sustainable Outcomes

  Monitor progress towards goals for at least one year after goal establishment using the performance measures established in OM-13.5a and show measurable advancement towards stated goals.

Resources

The following resources are referenced in this criterion and consolidated here:

1. FHWA Office of the Assistant Secretary for Research and Innovative Technology (OST-R) Intelligent Transportation Systems Joint Program Office Application Area Website, https://www.standards.its.dot.gov/LearnAboutStandards/ApplicationAreas
2. FHWA Office of the Assistant Secretary for Research and Innovative Technology (OST-R) Intelligent Transportation Systems Joint Program Office, ITS Standards Program Website, http://www.standards.its.dot.gov/LearnAboutStandards/NationalITSArchitecture
3. FHWA Office of Operations, *Designing for Transportation Management and Operations: A Primer*, http://ops.fhwa.dot.gov/publications/fhwahop13013/ch1.htm#s11

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Improvement plan with list of implementable strategies and technologies that are applicable to the system.
2. Well developed (mature) programs in place for signal timing and coordination, work zone coordination, and incident management.
3. Performance metric and report of where the greatest improvements can be made.
4. Plan and project selection documents showing early consideration of operation strategies and projects.
5. List of goals to be achieved and proof of progress toward these goals for the first year, as defined by the performance metric.

OM-14: Work Zone Traffic Control

1-15 points

Goal: Plan, implement, and monitor Work Zone Traffic Control (WZTC) methods that maximize safety of workers and system users with continued or better level of service.

Affected Triple Bottom Line Principles

Sustainability Linkage

Work zone traffic control supports all of the triple bottom line principles by improving safety for construction workers and, for system users, reducing crash-related and construction-related congestion, user costs, and incident-related costs.

Background and Scoring Requirements

Background

This criterion covers WZTC related to preservation and maintenance activities undertaken by an agency's staff (or contracted staff) and programmatic WZTC activities. It does not include project-specific WZTC. Two related criteria include OM-11: Traffic Control Infrastructure Maintenance, which covers the preservation and maintenance of permanent traffic control, ITS, and safety devices, and OM-13: Transportation Management and Operations, which covers the operation of permanent traffic control and ITS systems.

The agency must have a program, committee, or task force that reviews and establishes policies regarding WZTC. In addition to ensuring compliance of the FHWA Work Zone Safety and Mobility Rule as required to receive federal funding on projects, the task force agenda includes training, standards, new products, innovative practices, and legislation.

Scoring Requirements

Requirement OM-14.1

1-3 points. Develop a Program

Develop a WZTC program that includes the following elements:

- Have a policy in place to conduct an annual Work Zone Process Review using FHWA's Work Zone Process Review Toolbox website[1] to review how an agency's work zone management is performing on a system-wide basis.
- Examine current work zone trends and issues in work zone safety, and identify current contributing factors that cause injury and fatal work zone crashes.
- Update and adopt new policies and procedures as needed to correct shortcomings in work zone safety policies and to improve level of service in work zones.
- Work with law enforcement to ensure work zone accident reports are accurately reported.
- Organize and provide training both for workers and for use in drivers' education classes.
- Review new technologies and innovations for use in work zones.
- Consider FHWA's WZTC Self-Assessment website[2].

One of the following scores applies:

- **0 points.** The agency does not have a WZTC program that covers two or more of the elements listed above.
- **1 point.** The agency has a WZTC program that covers two or three of the elements listed above.
- **2 points.** The agency has a WZTC program that covers four or five of the elements listed above.
- **3 points.** The agency has a WZTC program that covers six or seven of the elements listed above.

Requirement OM-14.2

2 or 4 points. Set Goals and Monitor Progress

To earn credit for this scoring requirement, the agency must have a Work Zone Traffic Control program as described in scoring requirement OM-14.1. Scoring is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement OM-14.2a**

  2 points. Establish Performance Metrics for Work Zone Traffic Control

  Establish quantifiable performance metrics for the WZTC program. Measures could be based on level of service, number and severity of accidents, and other relevant parameters. Measures could be qualitative and/or quantitative.

- **Requirement OM-14.2b**

  2 additional points. Monitor Progress and Demonstrate Sustainable Outcomes

  Monitor progress towards goals for at least one year after goal establishment and show measurable advancement towards stated goals.

Requirement OM-14.3

1-2 points. Use Intelligent Transportation Systems (ITS) to Anticipate and Reduce Congestion

In order to obtain credit for this criterion, the agency must routinely maintain signal systems and ITS during construction. Use ITS to anticipate and reduce congestion caused by highway work zones and to warn drivers of an upcoming work zone. This could include the use of portable camera systems, highway advisory radios, variable speed limits, ramp metering, traveler information, merge guidance, queue detection information, and traffic analysis tools (e.g., Quick Zone), and is aimed at increasing safety for both workers and road users.

One of the following scores applies:

- **0 points.** The agency does not use ITS to anticipate and reduce congestion.
- **1 point.** The agency allows and has a few projects using ITS to anticipate and reduce congestion.
- **2 points.** The agency routinely uses ITS to anticipate and reduce congestion.

Requirement OM-14.4

1 point. Apply and Review ITS Technologies and Innovations

Apply and review new ITS technologies and applications for use in work zones, such as:

- Use of safety intrusion alarms in work zones
- Use of CB Wizard to broadcast alert messages to truck drivers
- Drone radar and radar speed advisory devices

Requirement OM-14.5

1-3 points. Leverage Contracting Innovations

Contracting incentives or dis-incentives can encourage contractors to reduce and optimize construction time lines and therefore reduce impact to the travelling public and exposure of workers to traffic. Strategies such as Lane Rental, A+B bidding, Interim completion dates, and flexible start dates can be effective strategies for reducing impact to the public.

One of the following scores applies:

- **0 points.** The agency does not use innovative contracting to encourage contractors to reduce and optimize construction time lines.
- **1 point.** The agency has test cases that use innovative contracting to encourage contractors to reduce and optimize construction time lines.
- **2 points.** The agency routinely includes the use of innovative contracting to encourage contractors to reduce and optimize construction timelines in design-build contracts only.
- **3 points.** The agency routinely includes the use of innovative contracting to encourage contractors to reduce and optimize construction timelines in both design-bid-build and design-build contracts.

Requirement OM-14.6

1 point. Coordinate with the Public

Agency uses a public involvement or WZTC representative to communicate regularly with property owners and businesses affected by work. Consideration is given to reduce impacts to businesses through effective and clear WZTC (e.g., driveway open or business open signage).

Requirement OM-14.7

1 point. Promote Public Awareness

Participate in National Work Zone Awareness Week and develop a campaign to promote work zone safety awareness.

Resources

The following resources are referenced in this criterion and consolidated here:

1. FHWA, Work Zone Process Review Toolbox website, http://ops.fhwa.dot.gov/wz/prtoolbox/pr_toolbox.htm
2. FHWA, WZTC Self-Assessment website, https://ops.fhwa.dot.gov/wz/decision_support/self-assess.htm

Scoring Sources

The program is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one or more of the following documentation sources (or equal where not available):

1. Documentation of the Work Zone Traffic Control program, committee, or task force including its members, goals, actions, and scope.
2. Documentation of policies, procedures, and guidance for the use of ITS in work zone traffic control.
3. Summary of Contracting Innovations and when they are appropriate to use.
4. Documentation of the activities to promote public awareness of work zone safety.

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