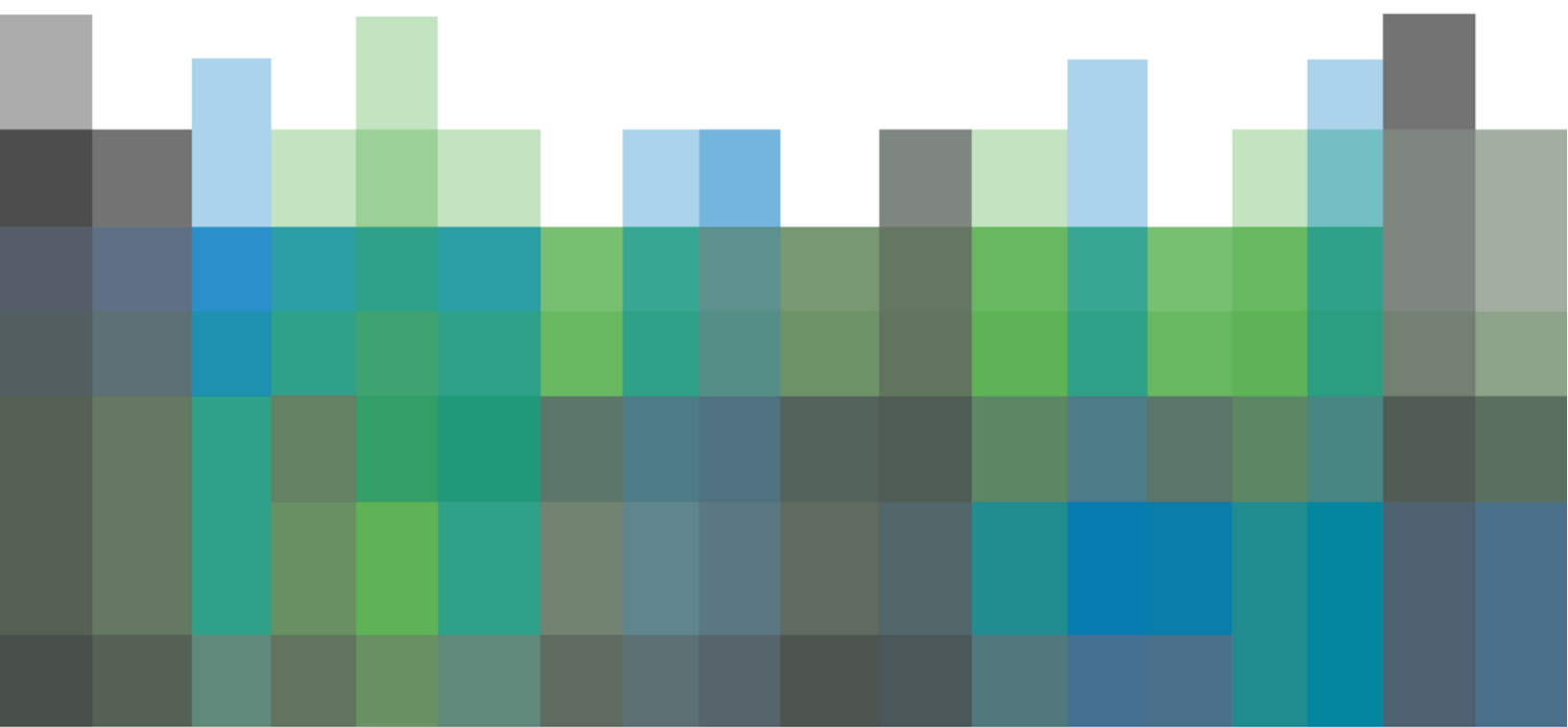


March 2021

INVEST Project Development Manual Version 1.2

ILLINOIS STATE TOLL HIGHWAY AUTHORITY



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This Illinois Tollway INVEST Project Development Manual dated March 2021 is the eighth publication of this Manual and replaces the version issued March 2020.

This Manual complements and amends the Federal Highway Administration's (FHWA) INVEST Version 1.2 (referred to herein as INVEST v1.2), released September 2015.

Article 1.4 Revised and updated various definitions.

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SECTION 1.0 INTRODUCTION

1.1 Purpose and Use

This Manual complements and amends the Federal Highway Administration’s (FHWA) Infrastructure Voluntary Evaluation Sustainability Tool Version 1.2 (referred to herein as INVEST v1.2), released September 2015. The purpose of the Illinois Tollway INVEST Manual is to prescribe the Illinois Tollway’s method of implementing INVEST throughout the project development process in order to produce more sustainable projects and to measure sustainable results and progress on projects. Appendix 1 contains a diagram that shows an overview of the Illinois Tollway’s process.

This Manual provides the technical and project requirements of the Illinois Tollway’s INVEST Program for project teams and Illinois Tollway management. It discusses required project activities and milestone submittals, as well as guidance for completing these requirements. The Manual also features technical information, tools, and resources to help project teams successfully accomplish the process required by the Illinois Tollway’s INVEST Program.

In addition to guidance related to the FHWA INVEST program, this Manual also contains Illinois Tollway-Specific Supplements and Criteria to the FHWA’s INVEST v1.2. The Illinois Tollway-Specific Supplements and Criteria in this Manual are generally to accommodate projects and agencies that are not led by State (such as regional or local agencies), as well as projects that are not typically funded with federal monies. However, this Manual is still applicable to projects that have federal monies, with a few exceptions. Specifically, projects with federal funding cannot give preference to local materials or regional labor and, therefore, should not use the “Consider Local Materials” scoring element in PD-53T: Reduce, Reuse and Recycle Materials (Design) or PD-55T: Regional Employment.

This Manual will be updated as needed, and as new versions of the FHWA’s INVEST Program are released or the Illinois Tollway identifies the need for Illinois Tollway-Specific Supplements or Criteria. All project teams at the Illinois Tollway are required to use this Manual to implement INVEST on projects the Illinois Tollway has selected to participate in its INVEST Program.

1.2 Abbreviations and Acronyms

Most of the acronyms shown below are defined the first time they are used in this Manual. Exceptions are designated with a single asterisk (*) and include INVEST terminology referenced in this Manual without definition except in this Section.

| | |
|---------|--|
| AASHTO* | American Association of State Highway and Transportation Officials |
| ACEC | American Council of Engineering Companies |
| BCA* | Benefit-Cost Analysis |
| BMP | Best Management Practice |
| CADD* | Computer-Aided Design and Drafting |
| CCM | Corridor Construction Manager |
| CM | Construction Manager |

| | |
|------------------|---|
| CSS* | Context Sensitive Solutions |
| DCM | Design Corridor Manager |
| DOT | Department of Transportation |
| DSE | Design Section Engineer |
| EIA* | Economic Impact Analysis |
| Env. Planner | Environmental Planner |
| FHWA | Federal Highway Administration, Department of Transportation |
| GEC | General Engineering Consultant |
| GIS* | Geographic Information System |
| HMA* | Hot Mix Asphalt |
| HOV* | High-Occupancy Vehicle |
| IDOT | Illinois Department of Transportation |
| I-LAST v2.02 | Illinois - Livable and Sustainable Transportation Rating System and Guide, Version 2.02 |
| Illinois Tollway | Illinois State Toll Highway Authority |
| INVEST v1.2 | Infrastructure Voluntary Evaluation Sustainability Tool, Version 1.2 |
| INVEST TM | INVEST Technical Manager |
| IRTBA | Illinois Road and Transportation Builders Association |
| ITS* | Intelligent Transportation System |
| LCCA* | Life-Cycle Cost Analyses |
| LED* | Light Emitting Diode |
| OM | Operations and Maintenance |
| PCC* | Portland Cement Concrete |
| PD | Project Development |
| PE | Project Engineer |
| PINS | Project INVEST Scorecard |
| PM | Project Manager |
| PMO | Program Management Office |
| QA | Quality Assurance |
| QC | Quality Control |
| RFI | Request for Information |
| SP | System Planning |
| URL | Uniform Resource Locator |
| WBPM | Web-Based Project Management system |

1.3 INVEST Specific Abbreviations

The following abbreviations are used when submitting INVEST documents at the various milestones. These abbreviations shall be used in the file names. They are shown in the order used rather than alphabetical order.

| | |
|-----|---|
| PLN | Designates Pre-Conceptual Planning submittals |
| 30D | Designates Conceptual Design submittals (30%) |
| 60D | Designates Preliminary Design submittals (60%) |
| 95D | Designates Pre-Final Design submittals (95%) |
| CSC | Designates Construction Substantial Completion submittals |

1.4 Definitions

This Section contains definitions of frequently used terms, as well as definitions with special or specific meanings as it applies to Illinois Tollway work. Other Sections define infrequently used or technical terms particular to that Section. Whenever in this Manual the following proper terms are used, their intent and meaning, both the singular and plural thereof, shall be as follows:

Agreement: The legal written instrument or negotiated Contract defining the obligations and considerations of the signatory parties including, but not limited to the performance of the Services, furnishing of labor and materials, and basis of payment. The term “Agreement” includes all Supplemental Agreements.

Conceptual Design: An initial stage of design work which develops the nature of the required improvement(s), demonstrates the intent of the proposed design, and verifies compliance with established parameters and design criteria. The Conceptual Design shall include a description of alternatives considered in reaching the reported conclusions.

Consolidated Compendium of INVEST Criteria: A single document containing a collated collection of FHWA’s INVEST v1.2 Criteria and Illinois Tollway-Specific Supplements and Criteria.

Construction Manager (CM): The Engineer or firm of Engineers and their duly authorized employees, agents, and representatives retained by the Illinois Tollway to observe the Work to determine whether or not it is being performed and constructed in compliance with the Contract.

Construction Section: Any one of the numerous divisions into which construction of the roadway, facilities and appurtenances of the Illinois Tollway may be divided for the purpose of awarding Contracts. **Contract:** The written agreement executed between the Illinois Tollway and the successful Bidder and any supplemental agreements duly executed, establishing the terms and conditions for the performance and construction of the Work, and the furnishing of labor, materials, and equipment by which the Contractor is bound to perform the Work and to furnish labor, equipment, and materials, and by which the Illinois Tollway is obligated to compensate the Contractor therefore at the established rate or price. The Contract includes the Advertisement to Bidders, Instructions to Bidders, the Proposal, Bonds, the Standard Specifications, the Tollway Supplemental Specifications, the Contract Plans, the Special Provisions and all Addenda and any Extra Work Order, Change Order, or supplemental Agreements after execution of the Agreement.

Contract Documents: All the documents mentioned under the definition of “Contract”.

Contract Plans: The term commonly used to designate the “drawings” incorporated into the Contract Documents. They are the design drawings, Special Provisions, and contract requirements which have had all addendum items incorporated.

Contractor: The individual, partnership, firm and corporation, or any combination thereof, who has entered into the Construction Contract.

Corridor: A geographic location between identified termini or limits for which the planning efforts are developed, but are subsequently broken into smaller sections for further detailed design to be performed by Design Section Engineers (DSE).

Corridor Construction Manager (CCM): The Engineer or the firm of Engineers contracted by the Illinois Tollway to act as the duly authorized agent of the Chief Engineering Officer to manage other Construction Managers (CMs), in accordance with the scope of the particular duties delegated to them by the terms of their Agreement.

Criteria: See INVEST Criteria.

Design Corridor Manager (DCM): The Engineer or the firm of Engineers contracted by the Illinois Tollway to act as the duly authorized agent of the Chief Engineering Officer to manage other DSEs, in accordance with the scope of the particular duties delegated to them by the terms of their Agreement.

Design Section: Any one of the numerous divisions into which design of the roadway, facilities and appurtenances of the Illinois Tollway may be divided for the purposes of design.

Design Section Engineer (DSE): The Engineer or firm of Engineers and their duly authorized employees, agents, and representatives retained by the Illinois Tollway to prepare the Contract Plans and Special Provisions for a Design Section.

DSE Project Manager: A member of the DSE's staff responsible for all activities of all design disciplines, and who serves as the interface with the Illinois Tollway Project Manager.

e-Builder: See Web-Based Program Management (WBPM). e-Builder is the Illinois Tollway's WBPM system. Accessed at <https://app.e-builder.net> with Illinois Tollway login credentials.

Environmental Planner (Env. Planner): The person on the staff of the Illinois Tollway responsible for coordinating environmental issues and permits for Illinois Tollway projects. This person is also responsible for ensuring that the DSE performs the proper studies to determine whether a project meets Illinois Tollway, State, and Federal environmental policies.

Greenroads™: A sustainability rating system for roadway design and construction that is applicable to all roadway projects including new, reconstruction and rehabilitation, bridges, etc. It is a collection of sustainability best practices, called "credits," that relate to roadway design and construction. Achieving these credits can earn points toward a total score for the project, and in general, the score can be used as an indicator of sustainability for the roadway.

Illinois Tollway: The Illinois State Toll Highway Authority.

Illinois Tollway INVEST Staff: The Illinois Tollway Materials Engineer and the Environmental Policy and Program Manager, who provide scoring support and approval of the PINS-95D and PINS-CSC.

Illinois Tollway-Specific Criteria: A set of four Criteria written by the Illinois Tollway to supplement FHWA's INVEST v1.2 and add relevant sustainable practices from I-LAST™ Version 2.2 (v2.02) to the Illinois Tollway's INVEST Program.

Illinois Tollway-Specific Supplements: A set of five Supplements that amend FHWA's INVEST v1.2 and add relevant sustainable practices from I-LAST™ v2.02 to the Illinois Tollway's INVEST Program.

Illinois Tollway Supplemental Specifications: The Illinois Tollway Supplemental Specifications to the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction adopted April 1, 2016.

INVEST Criteria: INVEST is a sustainability self-evaluation tool that covers all aspects of major highway investment and maintenance. INVEST considers the full life-cycle of projects with Criteria for system planning, project development, and operations and maintenance. It is based on a collection of sustainability best practices called Criteria. Each Criterion describes a best practice and assigns it a point value based on its sustainability impact and the duration of that impact.

INVEST Implementation: Implementation is the process the Illinois Tollway will undertake to establish and roll-out the Illinois Tollway's INVEST Program.

INVEST Program: Processes and tools adopted by the Illinois Tollway to incorporate sustainability into project design and construction, as well as system-wide planning and operations and maintenance activities. The program is based upon implementation of FHWA's INVEST Tool.

INVEST Technical Manager(s): The person(s) on the staff of the Illinois Tollway's General Engineering Consultant (GEC) responsible for coordinating and implementing the Illinois Tollway's INVEST Program.

Pre-Final Design: A complete set of checked plans, accompanied with Special Provisions and calculations, which includes all anticipated drawings and contains complete design computations and pay item quantity documentation. This design submittal shall be a biddable set of Construction documents.

Preliminary Design: Drawings, sketches, and work sheets prepared by the DSE which demonstrate the general intended content of the Contract Plans. The Preliminary Design submittal includes draft Special Provisions; structural, mechanical, and electrical calculations; preliminary quantity calculations; an updated budget; and schedule.

Project: The proposed development that is the subject of the Services stipulated in the Agreement. It may be comprised of one or more Design or Construction Sections.

Project Engineer (PE): A member of the DSE's staff responsible for the design of a singular discipline identified within the Contract Documents.

Scorecard: A set of Criteria based on project type (paving, basic, or extended) and location (urban or rural) that are combined to evaluate a specific project.

Special Provisions: Special clauses, directions, and requirements supplemental to the Standard Specifications, setting forth requirements specific to the Work included in the Construction Contract.

Standard Specifications: The most recent edition of IDOT's "Standard Specifications for Road and Bridge Construction".

Substantial Completion: The point in the progress when a portion of the Work, or in the case of beneficial occupancy, a designated portion thereof, has been completely performed in accordance with the Contract Documents so the Illinois Tollway can occupy or utilize that portion of the Work for its intended purpose.

Sustainability: For the purposes of this Manual, the goal of Sustainability can be described with the "triple bottom line", which includes giving consideration to three principles: Social (also known as equity or people), Environmental (also known as ecology or planet), and Economic (also known as money or profit). The goal of Sustainability is the satisfaction of basic social and economic needs, both present and future, and the responsible use of natural resources, all while maintaining or improving the well-being of the environment on which life depends.

Sustainable Practices: A sustainable practice is a specific project activity, feature, or process that accomplishes the goal of promoting sustainability.

Web-Based Program Management (WBPM) system: Software database tool used to reduce coordination errors and improve productivity through automation of previously paper-based processes. The database is administered via a website on the Internet, allowing controlled access to the documentation processes. The WBPM system is utilized as a communication, collaboration, and coordination tool, as well as a document management solution, for various project activities during planning, design, and construction phases. The WBPM system allows Illinois Tollway authorized users with various roles to collaborate on various types of projects. The WBPM system is the official repository of the Project records.

Work: Work shall mean the furnishing of all labor, material, tools, equipment, and other incidentals necessary or convenient to the successful completion of the project and carrying out of all duties and obligations imposed by the contract. Work may also be used in context to describe, in whole or in part, the completed facilities to be constructed, altered or removed, as detailed in the Contract. The engineer will have exclusive authority to determine the intent and meaning of the usage of this term whenever it appears in the Contract.

Note:

This manual follows the traditional definitions for **shall**, **should**, and **may**. **Shall** is used to mean something that is required or mandatory, while **should** is used to mean something that is recommended, but not mandatory and **may** is used to mean that it is optional and carries no requirement or recommendation.

1.5 Illinois Tollway INVEST Project Development Manual Organization

This Section describes the organization of information contained in this Manual. Guidance provided for projects in planning, design, and construction is contained in Section 6A for projects that are part of a larger Corridor planning effort or Section 6B for stand-alone projects.

Section 1 Introduction

This Section provides basic Manual information, including purpose and use, definitions, abbreviations, acronyms, and organization.

Section 2 Illinois Tollway INVEST Program

Section 2 describes the Illinois Tollway's Sustainable Goals, the FHWA's INVEST Program, which projects require INVEST Implementation, and the activities and processes key to the Illinois Tollway's INVEST Implementation.

Section 3 Technical Information

Section 3 provides technical terminology, considerations for Illinois Tollway projects, and information related to Illinois Tollway-Specific Supplements and Criteria, relevancy of Criteria for use at the Illinois Tollway, and Illinois Tollway Scorecards. Appendix 2 contains the Compendium of Criteria that includes FHWA Criteria, Illinois Tollway-Specific Supplements, and Illinois Tollway-Specific Criteria.

Section 4 INVEST Tools

Section 4 introduces FHWA and Illinois Tollway-specific tools that are required and available for users implementing INVEST.

Section 5 INVEST Program Implementation

Section 5 describes the implementation process, including activities, submittals, and requirements of each project team throughout the life-cycle of a project. It describes the sustainable opportunities at each phase, defines who should evaluate which Criteria, and explains how submittals shall be made.

Section 6 Guidance for Projects

Section 6 is presented in two different Subsections, 6A for projects that are included as part of a larger Corridor planning effort, and 6B for stand-alone projects. The user shall follow the subsection relevant to the project being considered.

Section 6A Guidance for Projects Included in a Corridor Plan

Section 6A provides guidance for completing the required activities and submittals presented in Section 5. Section 6A is specific to projects that are part of a larger Corridor planning effort. Section 6A shall not be used for stand-alone projects.

OR

Section 6B Guidance for Stand-Alone Projects

Section 6B provides guidance for completing the required activities and submittals presented in Section 5. Section 6B is specific to stand-alone projects that are NOT part of a larger Corridor planning effort. Section 6B shall not be used for projects that are part of a larger Corridor planning effort.

Section 7 Support from the Illinois Tollway

Section 7 describes the support available from the Illinois Tollway to implement INVEST on projects, including the INVEST Team, scheduling and tracking, training, and Quality Assurance/Quality Control (QA/QC) evaluations that will be performed.

SECTION 2.0 ILLINOIS TOLLWAY INVEST PROGRAM

The Illinois Tollway utilizes FHWA's INVEST v1.2 to further incorporate sustainable practices into the design and construction of *Move Illinois* projects through the Illinois Tollway's INVEST Program. Other agencies may opt to use this Manual as well; Section 1.1 discusses applicability to other agencies and projects in more detail.

2.1 Illinois Tollway's Sustainability Goals

Two of the Illinois Tollway's goals for the *Move Illinois* Program are for it to be the "Cleanest and Greenest Transportation Program" in the history of the Illinois Tollway and to "Minimize the environmental impact of new roadway construction by reducing, recycling, and reusing materials". It is the Illinois Tollway's plan to meet these goals and improve the sustainability of projects and processes by programmatically implementing INVEST throughout the Illinois Tollway's 15-year, \$14 billion Capital Program, *Move Illinois: The Illinois Tollway Driving the Future*.

The tools and deliverables required in this Manual should not overshadow the Illinois Tollway's primary goal, i.e., to increase the sustainability of Illinois Tollway projects. The goal is not merely to get a high score using INVEST, rather it is important to the Illinois Tollway to consistently improve the sustainability of its projects and processes. Although INVEST is a self-evaluation tool, care shall be made to use it correctly and fairly. Overstating points earned in a project does not help future projects improve their design, design processes, and/or construction practices. An honest evaluation of each project helps to direct the Illinois Tollway on methods, processes, manuals, and guidance that can be changed to facilitate sustainability improvement on all Illinois Tollway projects.

2.2 FHWA's INVEST Program

The Illinois Tollway chose the FHWA's INVEST as a foundation for its own sustainability implementation program based on thorough research and evaluation of existing sustainability rating tools. INVEST was found to meet the needs of the Illinois Tollway and be advantageous to use as it is fully developed, covers the complete project life-cycle, is industry tested, provides an objective standard with which to measure the Illinois Tollway's sustainability accomplishments, and is a self-evaluation tool that does not require third-party auditing.

FHWA's INVEST is a web-based self-evaluation tool comprised of Criteria that identify outcomes and results that contribute to sustainability. It enables transportation practitioners to assess the sustainability of their projects and programs using one of three modules that evaluate the following:

- **Project Development.** The Project Development (PD) module of INVEST focuses on project-specific planning, design, and construction activities.

- **System Planning.** The System Planning (SP) module of INVEST focuses on system-wide, long-range transportation planning and comprehensive planning activities.
- **Operations and Maintenance.** The Operations and Maintenance (OM) module of INVEST focuses on administrative, internal operations, maintenance, and operations activities.

All three modules of FHWA's INVEST v1.2 are being implemented at the Illinois Tollway. This Manual provides information relevant only to the Project Development module of the Illinois Tollway's INVEST Program.

In April 2018 the FHWA released INVEST Version 1.3 (v1.3) which included minor edits, clarifications, and fixed broken hyperlinks in the criteria, but did not impact scoring. At that time, FHWA announced INVEST Version 2.0 (v2.0) would be released in early 2019. Due to the lack of substantive changes in v1.3 and imminent release of v2.0, the Illinois Tollway continued to use v1.2 through 2019. As of this manual's publication date, v2.0 has not yet been released by FHWA. It should be noted that the version of INVEST used for scoring a project is established at the project planning stage (for projects in a corridor) or in early design (for stand-alone projects), and that version is carried through to final scoring. The INVEST Technical Managers (INVEST TM(s)) track the version of INVEST used on every project and will provide the appropriate documentation for DSEs and CMs.

The FHWA's INVEST v1.2 Project Development module includes 33 Criteria that address project-level planning, design, and construction, as well as three opportunities that allow points for innovative sustainability measures that have been incorporated into a project. Each Criterion covers a specific topic area and is generally more focused on sustainable outcomes and results rather than the specific activities (sustainable practices, see Section 3.1.2) used to achieve the outcomes and results. Further, FHWA's INVEST v1.2 focuses on sustainable outcomes and results that can be achieved by implementing sustainable practices that are above-and-beyond standard practice and regulatory or agency requirements.

Section 4.0 provides information on how to use FHWA's INVEST tool to evaluate Illinois Tollway projects.

2.3 Projects Requiring INVEST Implementation

The Illinois Tollway has established that evaluating projects with INVEST is mandatory for most non-facility *Move Illinois* projects with a construction cost greater than \$10 million. Typically, projects in the Illinois Tollway's Systemwide Program are not included due to this threshold; there may be case-by-case exceptions, however. In addition, selected projects prior to the *Move Illinois* Program were evaluated as a baseline for performance comparisons over time.

The INVEST TM(s) are the owners of the project list that indicates which projects are required to use INVEST. The assigned INVEST TM will coordinate with the appropriate Illinois Tollway staff to make case-by-case determinations on projects that require implementation of INVEST.

It is the responsibility of the Design Section Engineer (DSE) to contact the assigned INVEST TM to determine if individual projects require the use of INVEST.

2.4 Illinois Tollway INVEST Activities and Process

This Section describes the three primary types of activities performed during INVEST implementation and presents an overview of the process.

2.4.1 INVEST Activities

There are three types of activities required to implement the Illinois Tollway's INVEST Program. These include brainstorming sustainable practices, incorporating sustainable practices and evaluating the INVEST score. Each is discussed in more detail below.

2.4.1.1 Brainstorming Sustainable Practices

The purpose of brainstorming is to develop an exhaustive list of sustainable practices that could be incorporated into the project. Below are four approaches that can be combined to brainstorm sustainable practices:

- Review the INVEST Criteria one-by-one and brainstorm specific activities, features, or processes that would accomplish the results and outcomes described in each Criterion.

For example, looking at PD-30: Low Impact Development and its requirements would prompt a list of drainage Best Management Practices (BMPs) that could be used to accomplish the water quality treatment scoring requirement. These might include infiltration BMPs such as bioswales and/or detention ponds.

- Review the project one discipline at a time and determine what sustainable practices could be incorporated.

For example, looking at PD-18: Site Vegetation, Maintenance and Irrigation would result in a list of solutions related to native species, eradication of noxious species, water reduction, recycling and reduction of emissions-producing mechanical maintenance activities.

- Consider the project as a whole and the resources and materials existing within the project boundaries. Discuss how these available resources can be used or reconditioned onsite to reduce or eliminate the need for new virgin materials.

For example, discussing earthwork balance and materials to be recycled would help define these opportunities. Possible outcomes may be salvaging pavements to be removed and reusing recycled pavements into new fill and pipe or structural backfill.

- Search available sustainability documentation for emerging sustainable practices that could be incorporated into the project.

For example, renewable energy solutions or newer recycling practices may be available for application to the project.

It is important during this step not to evaluate and eliminate potential solutions, but rather to create an exhaustive list of sustainable practices that fit the context and opportunities presented in the project. Selection of appropriate sustainable practices would be incorporated or eliminated as the design evolves.

Each of the brainstormed sustainable practices should be added to the Project INVEST tracking sheet of the Project INVEST Scorecard (PINS) (see Appendix 3 for a sample of the PINS). This sheet can be used to prioritize which sustainable practices will be incorporated on the project; those that will not be used should be logged as such on the Project INVEST tracking sheet rather than deleted from the sheet.

2.4.1.2 Incorporating Sustainable Solutions

The second activity is the incorporation of selected sustainable practices into the project. This generally includes completing processes during the planning and design phases (e.g., completing economic analyses or life-cycle cost analyses) and incorporating sustainable practices into the Contract Plans and Special Provisions.

Some best practices to ensure incorporation of sustainable practices include:

- Assigning a Sustainability Lead responsible for tracking and reviewing the incorporation of sustainable practices.
- Performing sustainability QA/QC reviews at each project development phase (leverage the PINS form to do this).
- Adding a sustainability agenda item to cross-discipline coordination meetings.
- Tracking each sustainable practice throughout project development using the PINS. Ensuring that all the brainstormed sustainable practices stay on the form by noting the ones that were not selected, and the reasons not

selected, will keep the team from second-guess “missing ideas” along the way.

2.4.1.3 Evaluating the INVEST Score

The third activity is the scoring of a project by evaluating the sustainable practices that were incorporated. This is accomplished by:

- Conducting an INVEST evaluation consisting of reviewing the project Criterion-by-Criterion and evaluating how many points the project could or has earned. The PINS is used at Conceptual Design (30%) to set a Target INVEST score. See Appendix 3 for a sample Scorecard.
- Revisiting the Conceptual Design (30%) INVEST score at the Preliminary (60%) and Pre-Final Design Phase (95%) stages to see what sustainable practices were incorporated. The Pre-Final Design Phase (95%) will provide the As-Designed INVEST score.
- Revisiting the As-Designed score again at Construction Substantial Completion to determine an As-Constructed INVEST score.

Evaluations are done using the PINS form, not FHWA’s web-based tool. Each subsequent evaluation is completed by updating the prior PINS while reviewing the Project INVEST tracking sheet of the PINS. These two sheets inform the evaluator of potential changes in scoring and make updating straightforward and easy to follow.

2.4.2 INVEST Process

Figure 1 shows the general steps used to implement the Illinois Tollway’s INVEST Program throughout the project development process, including planning, design, and construction. These steps are implemented differently for projects that are part of a larger Corridor planning effort versus projects that are stand-alone projects (as described in Sections 6A and 6B, respectively). For stand-alone projects, the steps are as described in Figure 1. For projects that are part of a larger Corridor planning effort the first three steps shown are completed at the Corridor-level and then the second and third steps are re-evaluated for each project within the Corridor. The subsequent steps are performed at the project-level. Even though many sustainability practices are determined at the corridor level and prescribed to the individual sections, every project in a Corridor plan will have a unique INVEST score relative to its distinctive context and resulting sustainable potential.

The following Sections should be referenced for information and guidance on the specific project requirements and submittals for each project Phase:

- Section 6A Guidance for Projects Included in a Corridor Plan

- Section 6B Guidance for Stand-Alone Projects



FIGURE 1 - INVEST IMPLEMENTATION PROCESS

2.5 Expected Outcomes

INVEST evaluations assign points to projects for the incorporation of practices based on the magnitude and duration of their sustainable impact relative to the three principles of sustainability: Environmental, Economic and Social. Therefore, achieving a higher INVEST score on a project substantiates that the project has been completed in a more sustainable manner than had it achieved a lower score.

This Manual requires the use and submittal of an Excel-based tool at multiple milestones throughout the design and construction phases of projects. The Project INVEST Scorecard is to be used to evaluate projects in lieu of the FHWA's INVEST v1.2 online tool in order to incorporate the Illinois Tollway-Specific Supplements and Criteria included in this Manual. This Scorecard is also designed to facilitate the tracking and incorporation of specific sustainable practices (activities, features or processes that promote sustainability) into projects throughout the planning, design and construction phases.



FIGURE 2 - THREE PRINCIPLES OF THE SUSTAINABLE TRIPLE BOTTOM LINE

Every project has its own distinctive context and characteristics that contribute to a unique, project-specific sustainable opportunity. As such, project scores cannot be compared to determine which project is more sustainable. This is true even for adjacent projects on a Corridor using the same design parameters and studied under the same Corridor plan.

Benefits

Implementation of INVEST, as described in this Manual, contributes to increasing the sustainability of projects and facilitates measurement of the Illinois Tollway's progress toward the *Move Illinois* Program being the "Greenest and Cleanest" Program in Illinois Tollway history. It will also aid the Illinois Tollway with:

- Evaluating past and present sustainability performance,
- Setting a baseline against which future improvements can be measured,
- Measuring progress in sustainability performance,
- Identifying and integrating sustainable practices,
- Identifying institutional or other barriers that may be preventing implementation of sustainable practices, and
- Reporting sustainability performance consistently to stakeholders.

Sustainable Focus

The use of the tools, methods, and deliverables required in this Manual should not overshadow the Illinois Tollway's primary goal:

To increase the sustainability of Illinois Tollway projects.

FIGURE 3 - ILLINOIS TOLLWAY'S SUSTAINABILITY FOCUS

The Illinois Tollway evaluates project scores annually on a macro level to look for opportunities to incorporate more sustainable practices and remove barriers to incorporating sustainable practices that may exist. The Illinois Tollway does not compare project scores for purposes of determining consultant performance; rather, consultant teams are evaluated based on their compliance with INVEST implementation as it relates to their projects.

SECTION 3.0 TECHNICAL INFORMATION

The Illinois Tollway's INVEST Program is based on FHWA's INVEST v1.2 and modifications included in this Manual. These modifications were made to incorporate sustainable practices not included in FHWA's INVEST v1.2, but included in I-LAST™ v2.02, or Greenroads v1.5, and that are relevant and significant to sustainability at the Illinois Tollway. This Manual will be updated as needed, and as new versions of the FHWA's INVEST Program are released.

3.1 Technical Terminology

3.1.1 Criteria

Each INVEST Criterion describes a sustainable best practice and assigns it a point value based on its sustainability impact and the duration of that impact. Criteria are results and outcomes focused rather than activity or checklist focused and typically require sustainable practices to be incorporated to meet the results.

For example, PD-30: Low Impact Development has scoring requirements for water quality based on the variety of stormwater treatment options. To accomplish these results, a project would need to incorporate one or more sustainable practices (e.g. sediment basin or bioswales).

3.1.2 Sustainable Practice

A sustainable practice is a specific project activity, feature or process that accomplishes the goal of promoting sustainability.

For example, the approach to meeting the water quality scoring requirement for Criterion PD-30: Low Impact Development on a project may include using sustainable practices such as bioswales and infiltration trenches (versus non-sustainable practices like closed pipe conveyance systems and detention vaults).

3.2 Additional Considerations for Illinois Tollway Projects

During the initial review of INVEST for applicability at the Illinois Tollway, two considerations resulted in modifications to the FHWA INVEST Criteria for the Illinois Tollway version. This Section describes compatibility and applicability of sustainable practices from I-LAST™ v2.02, as well as Criteria influenced by federal funding requirements.

3.2.1 I-LAST™

Illinois – Living and Sustainable Transportation Rating System and Guide (I-LAST) is a sustainability performance metric system developed by the Joint Sustainability Group of the Illinois Department of Transportation (IDOT), the American Council of Engineering Companies (ACEC) and the Illinois Road and Transportation Builders Association (IRTBA). The intent is that this rating system and guide will be revised as the state of the art evolves – utilizing the input of industry users.

The Illinois Tollway prepared a line-by-line comparison of INVEST v1.0 and I-LAST™ v2.02 and confirmed that much of the material currently included in I-LAST™ v2.02 was also included in INVEST v1.0. Section 3.3 describes Illinois Tollway-Specific Supplements and Criteria which were used to incorporate relevant I-LAST™ v2.02 information that is not covered in the FHWA's INVEST, to ensure inclusion into the Illinois Tollway's INVEST Program.

3.2.2 Federal Funding and INVEST

INVEST was developed for FHWA in consideration of its projects and those of its primary stakeholders, the State DOTs. As such, the FHWA INVEST tool has criteria and scoring that are tailored to federally funded projects. This included not granting points for following the National Environmental Policy Act because this is required for federally funded projects. In addition, Regional Employment and Regional Materials considerations are not used in FHWA's INVEST v1.2 because these are not allowed for federally funded projects. Because the Illinois Tollway does not use federal funding, criteria related to local employment and materials can be included in Illinois Tollway's version of INVEST. Section 3.3 describes Illinois Tollway-Specific Supplements and Criteria which are used to incorporate some of these sustainable practices into the Illinois Tollway's INVEST Program.

3.3 Illinois Tollway-Specific Supplements and Criteria

In addition to incorporating elements of I-LAST and accounting for the absence of federal funding in most Illinois Tollway projects, the Illinois Tollway also identified several Criteria and/or sustainable practices within Criteria that were relevant to the Illinois Tollway but were not addressed in INVEST v1.0. This section describes the two approaches that were taken to amend INVEST to best fit the Illinois Tollway's intent and goals: (1) adding additional sustainable practices to existing INVEST Criteria, in the form of Illinois Tollway Supplements, and (2) adding entirely new Criteria, in the form of Illinois Tollway-Specific Criteria. These approaches are described below.

3.3.1 Illinois Tollway-Specific Supplements to INVEST Criteria

In the first approach, if achieving an I-LAST™ v2.02 sustainable practice and/or other relevant sustainable practice is consistent with and would help achieve an existing INVEST Criterion, it was added as a Supplement that amends the FHWA's INVEST v1.2 Criterion. In other instances, Supplements were added to provide clarification of FHWA's INVEST Criteria, or clarify FHWA's INVEST Criteria in relationship to Illinois Tollway practices.

The intent of these Supplements is to provide additional sustainable practices or clarifications that can help a project team achieve points within an INVEST Criterion; however, these Supplements are not an exhaustive list of best practices or solutions. Project teams should not feel constrained to use only the solutions mentioned; ingenuity and innovation are highly encouraged.

Table 1 lists the Illinois Tollway-Specific Supplements and the INVEST Criterion each one modifies. Appendix 2 contains a Compendium of the FHWA’s INVEST Criteria, as well as Illinois Tollway-Specific Supplements to FHWA’s INVEST v1.2 Criteria. This compendium can also be downloaded from the WBPM system as described in Section 4.4.

TABLE 1 - CONSIDERING AND EVALUATING ILLINOIS TOLLWAY-SPECIFIC SUPPLEMENTS

| Illinois Tollway-Specific Supplement | Summary of Supplement |
|--|---|
| PD-07: Habitat Restoration | Provides additional examples of restorative features from I-LAST™ v2.02. |
| PD-08: Stormwater Quality and Flow Control | Replaces FHWA PD-08; provides scoring elements for runoff rate control and runoff volume control. |
| PD-18: Site Vegetation, Maintenance and Irrigation | Provides additional scoring elements related to vegetation and irrigation from I-LAST™ v2.02. |
| PD-20: Recycle Materials | Adds scoring elements from I-LAST™ v2.02. |
| PD-30: Low Impact Development | Replaces FHWA PD-30; provides methods for incorporating BMPs that work well within Illinois Tollway property. |

3.3.2 Illinois Tollway-Specific INVEST Criteria

The second approach considers groups of I-LAST™ v2.02 sustainable practices and/or other relevant information not represented within FHWA INVEST Criteria. These best practices are grouped into Illinois Tollway-Specific Criteria and written similarly, in both format and content, to the FHWA INVEST Criteria. For the most part, these custom Criteria are pertinent to the Illinois Tollway, and may also be important to other local agencies.

Table 2 lists and summarizes the Illinois Tollway-Specific INVEST Criteria that have been developed. Appendix 2 contains a Compendium of the FHWA’s INVEST v1.2 Criteria as well as Illinois Tollway-Specific Criteria. This compendium can also be downloaded from the WBPM system as described in Section 4.4.

TABLE 2 - CONSIDERING AND EVALUATING ILLINOIS TOLLWAY-SPECIFIC CRITERIA

| INVEST Criterion | Summary of Criterion and Comments |
|--|--|
| PD-50T: Alignment Selection | Modeled after I-LAST™ v2.02. Provides credit for minimizing or avoiding impacts, or enhancing features of forested tracts, prime farmland, and socioeconomic resources. Provides credit for minimizing right-of-way takes and utilizing brownfields. |
| PD-53T: Reduce, Reuse and Recycle Materials (Design) | Modeled after I-LAST™ v2.02 approach of giving credit for allowing sustainable practices to reduce, reuse, and recycle pavements in design as well as selecting the sustainable practices in construction. |
| PD-55T: Regional Employment | Regional Employment cannot be used on federally funded projects and therefore was not included in INVEST. Modeled after Greenroads v1.5. This Criterion provides credit for incentivizing and using regional labor for projects. |
| PD-57T: Innovations | Provides 6 credit points for integrating innovative materials and methods. Shall be approved by INVEST TM(s). |

As a result of these modifications, the Illinois Tollway cannot use the FHWA INVEST online tool to evaluate projects. Therefore, project evaluations are to be performed using the tools described in this Manual and provided by the Illinois Tollway.

3.4 Scorecards

Not all Criteria will apply to every project. To address this and simplify the scoring so that the evaluation contains only the relevant Criteria, Scorecards have been developed that include only the most relevant Criteria for a project.

3.4.1 FHWA INVEST Scorecards

FHWA developed a total of seven Scorecards based on a combination of four project types (Paving, Recreational and Scenic, Basic, or Extended) and two project locations (Urban or Rural). In addition, a Custom Scorecard was developed to use when one of these categories does not fit, or if a project will get credit for Criteria not included in its “best-fit” Scorecard. The seven Scorecards are Urban Basic, Urban Extended, Rural Basic, Rural Extended, Paving (same Scorecard for Urban and Rural), Recreational and Scenic (same Scorecard for Urban and Rural) and Custom.

3.4.2 Illinois Tollway Scorecards

The Illinois Tollway’s INVEST Program includes the 33 FHWA’s INVEST v1.2 Criteria (five are amended by Illinois Tollway-Specific Supplements) plus another four Illinois Tollway-Specific Criteria, totaling 37 Criteria that can be used to evaluate projects. The same organization of FHWA Scorecards is used, however, the Illinois Tollway included the modified Criteria in each applicable Scorecard to incorporate the new Illinois Tollway-Specific Criteria, and to allow for the consideration of other Illinois Tollway project specific contexts and concerns.

The following paragraphs describe each of the six Illinois Tollway INVEST Scorecards. The Illinois Tollway does not use the Recreational and Scenic Scorecard because no recreation or scenic roads exist within the Illinois Tollway system. Most projects will use the Illinois Tollway’s version of the Urban Extended Scorecard; however, selection of the actual Scorecard to be used on an Illinois Tollway project will be made by the INVEST TM(s). If a Scorecard change is desired, the project DSE shall coordinate with the INVEST TM.

1. **Illinois Tollway Urban Basic** - For urban roadway reconstruction or urban bridge replacement projects that do not expand capacity of the roadway.
2. **Illinois Tollway Urban Extended** - For urban construction of a new roadway facility, for a structure where nothing of its type currently exists, and for major reconstruction projects that add travel lanes to an existing roadway or bridge.

3. **Illinois Tollway Rural Basic** - For rural roadway reconstruction or rural bridge replacement projects that do not expand capacity of the roadway.
4. **Illinois Tollway Rural Extended** - For rural construction of a new roadway facility, for a structure where nothing of its type currently exists, and for major reconstruction projects that add travel lanes to an existing roadway or bridge.
5. **Illinois Tollway Paving** - For projects that are devoted exclusively to pavement preservation or restoration projects that extend the service life of existing facilities and enhance safety, and for pavement restoration projects that restore pavement structure, ride quality, and spot safety.
6. **Illinois Tollway Custom** - For projects that do not fit any of the pre-defined Scorecard options, 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 set of 14 non-negotiable, core Criteria that shall be included as part of the score. The INVEST TM, with the DSE, may then add as many of the additional Criteria that apply to the project.

3.4.3 Criteria Included in Each Scorecard

Each of the FHWA INVEST Criteria and the Illinois Tollway-Specific Criteria were reviewed to determine in which Illinois Tollway Scorecards they should be included. This exercise considered whether it was included in the complimentary FHWA INVEST Scorecard, the Criteria content and context, and its relevancy to the Illinois Tollway.

For the most part, the Criteria included in each of the Illinois Tollway Scorecards are consistent with the complimentary FHWA Scorecard, except as noted below:

- Added the Illinois Tollway-Specific Criteria, as appropriate, to all Illinois Tollway Scorecards
- Changed the Illinois Tollway Custom Scorecard's Core Criteria to match the Illinois Tollway Paving Scorecard (instead of the Rural Basic)
- Removed PD-05: Educational Outreach from the Illinois Tollway Paving Scorecard
- Removed PD-09: Ecological Connectivity from the Illinois Tollway Rural Basic Scorecard
- Removed PD-15: Historic, Archaeological, and Cultural Preservation from both Illinois Tollway Basic Scorecards
- Removed PD-16: Scenic, Natural, or Recreational Qualities from both Illinois Tollway Basic Scorecards

- Added PD-33: Noise Abatement to the Illinois Tollway Rural Basic and Rural Extended Scorecards

Table 3 shows the Illinois Tollway Scorecards and indicates which Criteria are included in each.

TABLE 3 - CRITERIA BY ILLINOIS TOLLWAY SCORECARD

| Criteria ^{1,2} | Illinois Tollway Scorecard | | | | | |
|--|----------------------------|-------------|----------------|-------------|----------------|---------------------|
| | Paving | Urban Basic | Urban Extended | Rural Basic | Rural Extended | Custom ³ |
| 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 & 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 | • | • | • | • | • | • |

| Criteria ^{1,2} | Illinois Tollway Scorecard | | | | | |
|--|----------------------------|-------------|----------------|-------------|----------------|---------------------|
| | Paving | Urban Basic | Urban Extended | Rural Basic | Rural Extended | Custom ³ |
| 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 | | ● | ● | ● | ● | |
| PD-50T: Alignment Selection | | | ● | | ● | |
| PD-53T: Reduce, Reuse and Recycle Materials (Design) | ● | ● | ● | ● | ● | ● |
| PD-55T: Regional Employment | ● | ● | ● | ● | ● | ● |
| PD-57T: Innovations | ● | ● | ● | ● | ● | ● |
| TOTAL NUMBER OF CRITERIA IN EACH SCORECARD | 14 | 29 | 37 | 24 | 33 | 14 |

1. Criteria designated by a double asterisk (**) include an Illinois Tollway-Specific Supplement.
2. PD-50T through PD-57T are Illinois Tollway-Specific Criteria.
3. The Custom Scorecard shows only the 14 core Criteria that shall be included in the Scorecard. Any or all other Criteria may be added at the discretion of the DSE and the INVEST TM.

3.5 Relevancy of Criteria and Considerations for Use at the Illinois Tollway

This Section provides Illinois Tollway-Specific perspective to the FHWA INVEST Criteria and Illinois Tollway-Specific Supplements and Criteria to be used in the implementation of INVEST on Illinois Tollway Projects. This information is to be used as a guide and is not intended (except as noted) to prevent the project teams from being innovative and coming up with unique sustainable practices that fit their projects.

Table 4 describes how each of the Criteria are relevant to the Illinois Tollway and describes which Scorecards each Criterion is applicable to. It also provides considerations for using each Criterion on the Illinois Tollway projects based on the Illinois Tollway INVEST Program.

TABLE 4 - RELEVANCY OF CRITERIA AND CONSIDERATIONS FOR USE

| INVEST Criterion ^{1,2} | Relevant Scorecards | Considerations for Use |
|--|---------------------|---|
| PD-01: Economic Analyses | Extended | If the Illinois Tollway performs an EIA it is typically done at the Corridor-level during planning and project programming. For a BCA to get credit it shall assess Illinois Tollway and user costs. |
| PD-02: Life-Cycle Cost Analyses | All | The sustainable benefit is achieved by performing an LCCA for the major project elements during the planning and early design phases. The Illinois Tollway typically performs an LCCA on the pavement section alternatives and at times performs one on the bridge alternatives. However, most of the drainage features are prescriptive in the Drainage Design Manual and an LCCA may not add additional value. The LCCA shall be used in the decision-making process to earn credit. |
| PD-03: Context Sensitive Project Development | Basic and Extended | Most scoring elements are typically met on Illinois Tollway projects, except creating public champions, which shall be considered on a project-by-project basis. |
| PD-04: Highway and Traffic Safety | All | Based largely on the AASHTO <i>Highway Safety Manual</i> , 1 st edition, published in 2010, an evolving practice of predicting and modeling future accidents instead of looking at past statistical data. |
| PD-05: Educational Outreach | Basic and Extended | Most of the scoring elements related to public and agency involvement will be accomplished in planning and early design. Outreach shall be specifically about sustainability elements of the project to earn credit. |
| PD-06: Tracking Environmental Commitments | All | Communicating commitments is a responsibility of project teams, this formalizes the process for the Illinois Tollway design, construction, and maintenance teams; as well as the contractor. The system could be as simple as a spreadsheet plus a communication process that meets the PD-06 requirements. Tracking system shall be in place by design to obtain credit. |
| PD-07: Habitat Restoration** | Basic and Extended | Avoidance and minimization decisions made in early planning and design. Need to compare to the traditional alternative. |
| PD-08: Stormwater Quality and Flow Control** | Basic and Extended | Use Illinois Tollway Supplement to determine points based on runoff rate and volume control. |
| PD-09: Ecological Connectivity | Extended | Avoidance and minimization decisions made in early planning and design. Need to compare to the traditional alternative. |
| PD-10: Pedestrian Facilities | Urban | Access decisions made in early planning and design. Make sure improvements meet the required number of factors, including safety, comfort, connectivity, and convenience. |
| PD-11: Bicycle Facilities | Urban | Access decisions made in early planning and design. Make sure improvements meet the required number of factors, including safety, comfort, connectivity, and convenience. |
| PD-12: Transit & HOV Facilities | Urban | Access decisions made in early planning and design. |

| INVEST Criterion ^{1,2} | Relevant Scorecards | Considerations for Use |
|--|---------------------|--|
| | | Applicable to regional conformity, feasibility, and community outreach phases of each project. |
| PD-13: Freight Mobility | Extended | Includes policy and infrastructure improvements. |
| PD-14: ITS for System Operations | Urban and Extended | Refer to the Illinois Tollway's library of common use Special Provisions along with ITS Element common drawings. |
| PD-15: Historic, Archaeological, and Cultural Preservation | Extended | Illinois Tollway projects do not typically meet prerequisites. Avoidance and minimization decisions made in early planning and design. |
| PD-16: Scenic, Natural, or Recreational Qualities | Extended | Illinois Tollway projects do not meet prerequisites. Avoid and minimization decisions made in early planning and design. |
| PD-17: Energy Efficiency | Basic and Extended | Shall evaluate the energy needs of the system before and after improvements. Illinois Tollway Standard is LED. Additional point is awarded for monitoring performance after construction – this is a project-by-project decision and simply having utility bills doesn't earn this credit. |
| PD-18: Site Vegetation, Maintenance and Irrigation** | Basic and Extended | Design guidelines determined in planning and design. Includes native, non-invasive, and non-toxic species, as well as maintenance and watering issues. |
| PD-19: Reduce, Reuse and Repurpose Materials | All | This is determined during construction, see PD-53T and ensure these solutions are allowed for during design. |
| PD-20: Recycle Materials** | All | This is determined during construction, see PD-53T and ensure these solutions are allowed for during design. |
| PD-21: Earthwork Balance | Extended | Based on design volumes and allowed methods. An additional point is available for topsoil reuse. |
| PD-22: Long-Life Pavement | All | Note, criterion applies only to roads constructed with HMA or PCC. |
| PD-23: Reduced Energy and Emissions in Pavement Materials | All | Typically, this Criterion is used for warm mix asphalt. However, there is an equivalent allowed for concrete based on plant specs. |
| PD-24: Permeable Pavement | All | Shall include a maintenance plan and cannot be used where sand may be used for snow/ice control. |
| PD-25: Construction Environmental Training | Basic and Extended | Shall require in specifications. |
| PD-26: Construction Equipment Emission Reduction | All | Illinois Tollway Supplemental Specification 107.37: Construction Air Quality earns all points in the table except those related to larger hauling vehicles. |
| PD-27: Construction Noise Mitigation | Urban | Beyond having noise permits, this includes having a plan and mitigating noise during construction. |
| PD-28: Construction Quality Control Plan | All | Following the Illinois Tollway Contractor's Quality Program Manual meets the first scoring element. |
| PD-29: Construction Waste Management | All | Shall require elements in specifications and encourages communication with construction management team. |

| INVEST Criterion ^{1,2} | Relevant Scorecards | Considerations for Use |
|--|---------------------|---|
| PD-30: Low Impact Development** | Basic and Extended | Use Illinois Tollway Supplement to determine points based on BMPs incorporated into project. |
| PD-31: Infrastructure Resiliency Planning and Design | Extended | Incorporate design elements that address climate change. |
| PD-32: Light Pollution | Basic and Extended | Shall use Illinois Tollway defined fixtures which are full cut off and meet Backlight, Uplight, and Glare compliance. |
| PD-33: Noise Abatement | Basic and Extended | Illinois Tollway typically performs project- or Corridor-level paving design. Other design guidelines may be determined in Corridor planning and design. |
| PD-50T: Alignment Selection | Extended | Need to compare to the traditional proposal. Avoidance and minimization decisions made in early planning and design. |
| PD-53T: Reduce, Reuse and Recycle Materials (Design) | All | This is determined during design, see PD-19 and PD-20 for scoring during Construction. |
| PD-55T: Regional Employment | All | Do not use this Criterion if the project has federal funding. Consideration is for construction labor. |
| PD-57T: Innovations | All | Allows design team to propose solutions not covered in other Criteria. |

1. Criteria designated by a double asterisk (**) include Illinois Tollway-Specific Supplements.
2. PD-50T through PD-57T are Illinois Tollway-Specific Criteria.

SECTION 4.0 INVEST TOOLS

This Section provides information on tools available or required to be used to complete the requirements of the Illinois Tollway's INVEST Program.

4.1 FHWA's INVEST

The FHWA's INVEST Program is an on-line program designed to improve sustainability. Although the scoring feature of FHWA's INVEST is not applicable to Illinois Tollway projects, it can be helpful to use the website to learn about sustainability and access the INVEST Criteria. FHWA's INVEST can be accessed at the Uniform Resource Locator (URL) shown in Figure 4. As discussed in Section 2.2, the FHWA's INVEST website has updated to v1.3, however information on v1.2 is still available here:



FIGURE 4 - INVEST WEBSITE ADDRESS

<https://www.sustainablehighways.org/1524/invest-library.html>

Registration on the FHWA's INVEST website is not required unless the user wants to access the scoring function, which the Illinois Tollway does not currently use. However, those registered on the site receive updates on transitions in the Tool and releases of new versions of FHWA's INVEST, which is helpful for remaining updated on the program.

4.2 Illinois Tollway Project INVEST Scorecard (PINS)

Project INVEST Scorecard (PINS) is required to be submitted as part of the Illinois Tollway's INVEST Program, corresponding to the activities described in Sections 6A or 6B. The PINS is used to track scoring throughout the life span of a project.

The PINS is an Excel-based tool that facilitates the evaluation of projects using INVEST v1.2 and the Illinois Tollway-Specific Supplements and Criteria. An example of a completed PINS is included in Appendix 3 and the current electronic copy can be obtained on the Illinois Tollway's INVEST WBPM system page as described in Section 4.4.

The purpose of the PINS form is to record the scores obtained when completing an evaluation of a project using INVEST. As a project evaluation is completed, questions about each Criterion are shown; as the user responds to those questions, the scores for the project are automatically populated. The PINS shall also be used to record the sources for the scores for future reference.

The PINS has a tracking form included as a separate sheet in the Scorecard. The tracking sheet can be used to track both the incorporation of sustainable practices identified during the planning, design, or construction phases of the project, as well as sustainable practices that were

considered and dismissed. Typically, the solutions tracked in this form are identified at the Pre-Conceptual Planning Phase and then tracked through the progression of design and construction to ensure they are incorporated into the project.

Instructions for using the PINS form are included on the first tab of the spreadsheet. To evaluate a project using INVEST using this Scorecard, the evaluator needs to have a copy of the Consolidated Compendium from Appendix 2 of this document. It is easiest to use the Consolidated Compendium of INVEST Criteria described in Section 4.3 that collates the original FHWA INVEST Criteria with any Illinois Tollway-Specific Supplements and adds Illinois Tollway-Specific Criteria. Once completed, the form is to be saved per the Illinois Tollway's file naming convention. Using the File Type ID as *PINS* and the Document Title, INVESTScorecard###, where ### indicates the submittal (30% Design [Conceptual] = 30D, 95% Design [Pre-Final] = 95D, and Construction Substantial Completion = CSC).

For example, a PINS file for 30% could be named as follows:

PINS_TOLLWAY_LR_1234-INVEST30D_05022014.xlsx

The INVEST PINS shall be submitted through the WBPM system, as described in Section 4.4, along with other required submittal documents at each required phase.

4.3 Consolidated Compendium of INVEST Criteria

The Illinois Tollway maintains a Consolidated Compendium of INVEST Criteria to be used on Illinois Tollway projects. It combines the following files into an integrated Project Development Manual that is organized in numerical order by Criterion for ease of use:

- FHWA's INVEST v1.2 Criteria,
- Illinois Tollway-Specific Supplements to FHWA's INVEST v1.2, and
- Illinois Tollway-Specific Criteria added to FHWA's INVEST v1.2.

The current Consolidated Compendium of INVEST Criteria is dated the same as this Manual and can be found in Appendix 2. It can also be obtained from the WBPM system in the following folder:

0016 WBPM e-Builder Program Wide / Templates and Forms / INVEST

4.4 WBPM System

The Illinois Tollway utilizes a WBPM system that is the repository for documentation related to the Illinois Tollway's INVEST Program. Use the following information to access and save INVEST files.

1. The Consolidated Compendium of INVEST Criteria, PINS and training documents are located in the following folder:

0016 WBPM e-Builder Program Wide / Templates and Forms / INVEST

2. Completed PINS shall be saved in the relevant project folder in the following locations (*submittals shown in italics*):

☐ 02 Design

☐ 13 Submittals

☐ 01 Preconcept

☐ 01 Submittal Docs

- *PINS-PLN (if created)*

☐ 02 Concept

☐ 01 Submittal Docs

- *PINS-30D*

☐ 03 Preliminary

☐ 01 Submittal Docs

- *PINS-60D (if created)*

☐ 04 Pre-Final

☐ 01 Submittal Docs

- *PINS-95D*

☐ 03 Construction

☐ 19 Project Close-out

☐ 04 Related Correspondence

- *PINS-CSC*

SECTION 5.0 INVEST PROGRAM IMPLEMENTATION

5.1 Requirements and Submittals for all Phases

Figure 5 shows the progression of a project through the project development process and the required submittals for each phase. Sections 6A and 6B describe each phase in more depth for projects that are part of a larger Corridor plan (Section 6A) or Stand-Alone (6B).



FIGURE 5 - INVEST ACTIVITIES BY PHASES

5.2 Sustainable Opportunity by Phase

5.2.1 Planning Sustainable Opportunities

Considering sustainability early in the Corridor and project planning processes provides the greatest opportunity for incorporating sustainability into projects; this opportunity steadily diminishes as a project progresses. Early in planning there is, in general, sufficient time remaining in project development to apply new concepts and determine existing opportunities and there are fewer project constraints, as confining decisions may not have been made yet. Each decision made in the planning process affects the opportunities available. Early consideration of the sustainability opportunities in a project maximizes the potential for success.

Within planning, the activities of alignment selection and environmental documentation provide opportunities to review INVEST and determine if one alternative or another will enhance the project’s sustainability. Decisions made here can affect the ability to provide sustainable benefit in areas such as economic analyses, context sensitive project development, and educational outreach. Most significantly, alignment selection provides

the opportunity to avoid or minimize impacts to habitats; ecological connectivity; historic, archeological and culturally significant features; scenic, natural, or recreational qualities; forested tracts; prime farmland; and socioeconomic resources.

5.2.2 Incorporate Sustainable Opportunities into Design

Notable sustainable benefits realized during project design drive decision making based on life-cycle cost analyses, the incorporation of access, and features that meet the triple bottom line goals of sustainability. It is during design that the choice of materials and methods can incorporate recycling, reducing, and reusing materials; opportunities for using renewable energy can be identified; or design components can be included that minimize impacts to the environment.

5.2.3 Incorporate Sustainable Opportunities into Construction

For the most part, opportunities for sustainability in construction are limited to constructing features prescribed during the design phase within the Contract Plans and Specifications. Notable exceptions exist in the selection of material sources and construction methods. Requiring, encouraging, and enabling the contractor to make sustainable decisions is largely done during the design phase as the Special Provisions are assembled, but emphasizing performance based sustainable goals and targets throughout construction and measuring the sustainability of projects can help contractors make more sustainable choices over the lowest cost choice for any given situation.

5.3 Who Scores Which Criteria

Table 5 shows which disciplines should be involved in reviewing and scoring each Criterion. The indicated disciplines in this matrix are suggestions only, the specific disciplines and/or individuals responsible for scoring each Criterion should be determined on a project-by-project basis.

TABLE 5 - DISCIPLINES WHICH SHOULD SCORE CRITERIA

| INVEST Criterion ^{1,2} | Criteria Should be Scored by: | | | | | | | | | |
|--|-------------------------------|--------------|----|--------------|--------------|----------------|---------------|-----------------|---------------------|-------------------|
| | DSE | Env. Planner | CM | PE - Roadway | PE - Traffic | PE - Pavements | PE - Drainage | PE - Structural | Landscape Architect | PE - Illumination |
| 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 & 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 | • | | • | | | | | | | |

| INVEST Criterion ^{1,2} | Criteria Should be Scored by: | | | | | | | | | |
|--|-------------------------------|--------------|----|--------------|--------------|----------------|---------------|-----------------|---------------------|-------------------|
| | DSE | Env. Planner | CM | PE - Roadway | PE - Traffic | PE - Pavements | PE - Drainage | PE - Structural | Landscape Architect | PE - Illumination |
| 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 | | • | | | | • | | | | |
| PD-50T: Alignment Selection | • | • | | • | | | | | | |
| PD-53T: Reduce, Reuse and Recycle Materials (Design) | • | | | • | • | • | • | • | | • |
| PD-55T: Regional Employment | • | | • | | | | | | | |
| PD-57T: Innovations | • | • | • | • | • | • | • | • | • | • |

1. Criteria designated by a double asterisk (**) include Illinois Tollway-Specific Supplements.
2. PD-50T through PD-57T are Illinois Tollway-Specific Criteria.

SECTION 6A.0 GUIDANCE FOR PROJECTS INCLUDED IN A CORRIDOR PLAN

6A.1 Guidance by Phase

6A.1.1 Corridor-Level Planning Phase

For projects that are part of a larger Corridor planning effort, the planning step (PLN) is completed at the Corridor-level and not repeated for each design section that subsequently comes out of the Corridor plan for project development.

The Illinois Tollway's INVEST Program begins as the Pre-Conceptual Planning reaches the point where alternative alignments are discussed and developed. This could include public meetings to discuss alignments and what is important to stakeholders, or could be the actual layout of alignments using CADD and GIS-based information on resources.

The INVEST TM will determine and send the appropriate blank scorecard and the Compendium of Criteria to the DCM. At this point, the DCM will coordinate with the INVEST TM to set up a Pre-Conceptual Planning Sustainability Workshop. The workshop should include the DCM, Illinois Tollway PM, Illinois Tollway INVEST staff, TM and representatives from each design section. At this meeting, the DCM will lead the project team in developing the project's sustainability goals, and through a brainstorming exercise identify specific sustainable practices.

Following the workshop, the DCM creates the PINS-PLN-Corridor and emails a draft to the TM for review and approval. Once completed, the file shall be saved per the Illinois Tollway's naming convention and uploaded to the WBPM system. For example, the following file would be saved in the appropriate folder per Section 6A.3:

PINS_TOLLWAY_LR_1234-INVESTPLNCorridor_05022014.xlsx

6A.1.2 Corridor-Level Conceptual Design Phase (30%)

For projects that are part of a larger Corridor plan, the conceptual design step (30D) is completed for the Corridor AND for each design section that subsequently comes out of the Corridor plan for project development.

Several design documents are prepared at the Corridor-level that inform design sections how to consistently design elements in the Corridor; these are passed from the DCM to the DSEs of the individual projects and typically include a Corridor paving design, Corridor stormwater approach, ITS plan, Site Vegetation Plan, etc. The DCM and the Corridor team use this information, as well as the conceptual design layout, to complete a 30% PINS for the Corridor. Once these have been completed, they are provided to the DSEs and their teams for each project contained within the Corridor.

The first step at conceptual design is to update the PINS developed in the Pre-Conceptual Planning Sustainability Workshop described in Section 6A.1.1 and saved in the WBPM

system per Section 6A.3. The evaluation is typically done in a workshop led by the DCM. The DCM shall generate the PINS-30D-Corridor, and the file shall be submitted to the INVEST TM via email. Once approved, the DCM uploads the file to the WBPM system per the Illinois Tollway's naming convention. For example, the following file would be saved in the appropriate folder per Section 6A.3:

PINS_TOLLWAY_LR_1234-INVEST30DCorridor_07022014.xlsx

The second and final step for the corridor-level conceptual design includes providing the newly created PINS to the DSEs. The INVEST TM shall create and distribute PINS-30D for each design section by locking the corridor cells and unhiding the section columns on the PINS-30D-Corridor. The DCM will hold a learning workshop for the DSEs to introduce the INVEST process.

6A.1.3 Project-Level Conceptual Design Phase (30%)

The DSE shall work with the INVEST and DCM project team to update the PINS-30D to reflect the specific context and characteristics of the design section in question, and fill out the evaluation questions that could not be completed at the Corridor-level. These edits should be minor and relatively straightforward, and should be completed after a conversation with the DCM. This becomes the INVEST Scorecard for the design section.

When the PINS-30D is drafted, the DSE hosts a design workshop for their section attended by the Illinois Tollway PM, the Illinois Tollway INVEST staff, DCM, and the TM. Based on the results of the workshop, the DSE submits the PINS-30D to the TM via email. Once reviewed and approved, the DSE uploads the PINS-30D to the WBPM system. Once completed, the file shall be saved per the Illinois Tollway's naming convention. Using our sample naming, this file would become the following and would be saved in the appropriate project folder per Section 6A.3.

PINS_TOLLWAY_LR_###1-INVEST30D_09022014.xlsx

6A.1.4 Preliminary Design Phase (60%)

The focus during the development of the 60% Design shall be on incorporating the sustainable practices identified at the Pre-Conceptual Planning Sustainability Workshop into ongoing Studies, Contract Plans, and Special Provisions. There is no formal INVEST evaluation or scoring required at this phase, however the project team shall submit the PINS-60D with the 60% Design Submittal to document that sustainable practices have been reviewed and modified as necessary. At this stage of the project, the PINS tracking sheet shall be used to review ongoing studies and the 60% Contract Plans to ensure that appropriate progress is being made in incorporating sustainable practices into the project. If contracts are broken out into smaller construction contracts, a 60% Design must be submitted showing the split of construction work. Contracts broken out may not need separate PINS-60D due to lack of substantial work related to criteria and are assessed case by case. Additional best practices to consider at this stage include, but are not limited to, the following:

- Identify any Special Provisions that may be needed and discuss these early with the Illinois Tollway to ensure the ability to incorporate newer sustainable practices, and provide adequate time for Illinois Tollway review and approval;
- Add a Sustainability Lead to the project team and consider adding sustainability coordination topics to meetings for larger, multi-discipline projects;
- Consider additional sustainable practices that would be of value to the project, incorporate those deemed viable and add to PINS; and
- Leverage a QA/QC Reviewer to complete the PINS (by the Sustainability Lead, if one is assigned).

The PINS form updated in Section 6A.1.3 shall be updated again and saved per the Illinois Tollway's naming convention. Using our sample naming, this file would become the following and would be saved in the appropriate project folder per Section 6A.3.

PINS_TOLLWAY_LR_###1-INVEST60D_11022014.xlsx

6A.1.5 Pre-Final Design Phase (95%)

The focus of INVEST during the development of the 95% Contract Plans and Special Provisions shall be on incorporating the sustainable practices identified in prior phases and updated at the 60% Design, as well as developing an As-Designed INVEST score.

The Pre-Final evaluation is usually done in a mini workshop but it could also be performed by the individual project engineers. Completing the PINS update as a QA/QC step of the Contract Plans and Special Provisions provides an opportunity to “catch and fix” any items that have been overlooked during design, and to perform any necessary changes to the Contract Plans and Special Provisions prior to the 100% Design Submittal.

The DSE shall submit the PINS-95D to the TM via email. The TM shall review and approve the PINS-95D and any review comments are conveyed to the DSE via email. Once approved, the TM shall email the PINS-95D to the Illinois Tollway INVEST staff for final review and approval. Once approved by the Illinois Tollway INVEST staff, the DSE shall upload a copy to the WBPM system per the Illinois Tollway's naming convention and saved in the appropriate folders per Section 6A.3. Using our sample naming, it will become:

PINS_TOLLWAY_LR_###1-INVEST95D_01022015.xlsx.

Finally, the TM shall update the INVEST Annual Report. Projects at 95% are included in the Annual Report in the section on Corridors and Projects in Process section and in Appendix A. When all sections of a Corridor reach 95% design, a PINS-95D-Corridor is saved by the TM in the GEC INVEST files. TM incorporates the 95% Corridor score into Appendix A of the Annual Report.

6A.1.6 Pre-Construction Meeting

The DSE shall participate in the Pre-Construction Meeting with the Contractor and CCM, and/or CM, to highlight any new or unusual sustainable practices that have been incorporated into the Contract Plans and Special Provisions. This will ensure that the Contractor and CM understand the intent of the design(s) so sustainability efforts are not lost during construction. It should also be explained that a post-construction INVEST evaluation will be performed by the CM and input from the Contractor will likely be required. The TM shall provide a copy of the PINS-95D and the Compendium of Criteria to the CM.

The DSE shall coordinate with the CM to ensure that the agenda includes an INVEST item and some time for the DSE to share the relevant information.

6A.1.7 Construction Substantial Completion

For the DSE team, the focus on sustainability during construction is primarily aimed at communication, review of shop drawings and submittals, responding to requests for information (RFIs), and participation in the post-construction INVEST evaluation. The focus of the CM team is to ensure that the sustainable elements, materials, and methods are incorporated into the design without change, wherever possible, and to encourage the Contractor to select sustainable materials.

Upon substantial completion of construction, the CM shall perform a post-construction INVEST evaluation of the Project. The purpose of this evaluation is to ensure that specific sustainable practices identified throughout the design and construction phases, and corresponding INVEST evaluations, were incorporated into the project, and to determine the As-Constructed INVEST score for the project. The CM shall update the As-Designed score, PINS-95D, to establish an As-Constructed score, PINS-CSC.

The CM shall start with the PINS-95D and update it based on material selections, change orders, and field engineering that has taken place to create the draft PINS-CSC. The CM shall submit the draft PINS-CSC via email to the TM for review and approval. Any review comments are conveyed to the CM via email. Once all changes are made, the TM submits the PINS-CSC to the Illinois Tollway INVEST staff for final approval. The approved PIN is uploaded to the WBPM system by the CM.

The PINS-CSC shall be saved per the Illinois Tollway's naming convention. Using our sample naming, these files would become the following and would be saved in the appropriate project folder per Section 6A.3.

PINS_TOLLWAY_LR_###1-INVESTCSC_01022015.xlsx

Finally, the TM incorporates the score into the Annual Report and updates the Corridor score as appropriate.

6A.2 Scoring Phase, Considerations, and Basis by Criteria

Table 6 shows the following information for each Criterion:

- Final Scoring Phase – this is the point where work relevant to this Criterion shall be completed to a point where a final score can be recorded. Scores prior to this phase are estimates.
- Illinois Tollway, Corridor-Level, and Project-Level Scoring Considerations – these describe specific considerations for each Criterion relative to scoring. They include relevant Illinois Tollway guidance and typical Corridor/design section considerations.
- Score Basis – this tells the user where to get the score for a project that is part of a larger Corridor plan. In cases where the Corridor score is used, it is either applied conditionally or is added to all project scores in order to obtain a project-specific score.

TABLE 6 - SCORING PHASE, CONSIDERATIONS, AND BASIS BY CRITERIA

| INVEST Criterion ^{1,2} | Final Scoring Phase ^{3,4} | Illinois Tollway ⁴ and Corridor-Level Scoring Considerations | Project-Level Scoring Considerations | Score Basis ⁵ |
|--|------------------------------------|---|--|---|
| PD-01: Economic Analyses | Planning | If the Illinois Tollway performs an EIA it is typically done at the Corridor-level during planning and project programming. | | Corridor |
| PD-02: Life-Cycle Cost Analyses | Design | Illinois Tollway typically performs LCCA for Corridor-level paving design. | May perform project-specific LCCA. Consider at project level for structural and drainage detention/retention type selection. | Corridor as applies to Project plus Project |
| PD-03: Context Sensitive Project Development | Design | Illinois Tollway typically leverages 6-step process in Corridor planning and design. | Continue to implement in project-specific design. | Corridor plus Project |
| PD-04: Highway and Traffic Safety | Design | Best practice at Corridor-level planning and design. | Apply more specifically during project-level design. | Corridor plus Project |
| PD-05: Educational Outreach | Design | Most outreach is performed in early Corridor planning. | Outreach continues through design and construction phases. | Corridor plus Project |
| PD-06: Tracking Environmental Commitments | Construction | Tracking of commitments begins in Corridor planning but is scored as implemented on a project-by-project basis. | Independent compliance monitor is prescribed in Specifications. | Project |
| PD-07: Habitat Restoration** | Design | Avoidance and minimization decisions made in Corridor planning and design. Enhancement definition may be completed by Corridor if mitigation banking occurs. | Enhancement definition may be completed at project-level. | Corridor as applies to Project or Project |

| INVEST Criterion ^{1,2} | Final Scoring Phase ^{3,4} | Illinois Tollway ⁴ and Corridor-Level Scoring Considerations | Project-Level Scoring Considerations | Score Basis ⁵ |
|--|------------------------------------|---|--|---|
| PD-08: Stormwater Quality and Flow Control** | Design | Typically included in Corridor stormwater design. | Calculations need to be completed at the project-level using the Corridor design and project-specific information. | Corridor as applies to Project or Project |
| PD-09: Ecological Connectivity | Design | Avoidance and minimization decisions made in Corridor planning and design. | Enhancement definition likely completed at project-level. | Corridor plus Project |
| PD-10: Pedestrian Facilities | Design | Access often determined in Corridor planning and design but can be project specific. | | Project |
| PD-11: Bicycle Facilities | Design | Access often determined in Corridor planning and design but can be project specific. | | Project |
| PD-12: Transit & HOV Facilities | Design | Access determined in Corridor planning and design. | Percentage calculations are project-specific. | Corridor as applies to Project plus Project |
| PD-13: Freight Mobility | Planning | Features determined in Corridor planning. | | Corridor as applies to Project |
| PD-14: ITS for System Operations | Planning | ITS applications selected in Corridor planning. | | Corridor as applies to Project |
| PD-15: Historic, Archaeological, and Cultural Preservation | Design | Avoidance and minimization decisions made in Corridor planning and design. | Enhancement definition typically completed at project-level. | Corridor as applies to Project plus Project |
| PD-16: Scenic, Natural, or Recreational Qualities | Design | Avoidance and minimization decisions made in Corridor planning and design. Maintaining access decided at Corridor-level. | Enhancement definition typically completed at project-level. | Corridor as applies to Project plus Project |
| PD-17: Energy Efficiency | Design | Illinois Tollway standard is LED. Likely determine auditing approach at Corridor-level. | Project-level calculations determine score. | Project |
| PD-18: Site Vegetation, Maintenance and Irrigation** | Design | Design guidelines determined in Corridor planning and design. | Project-specific elements determine score. | Corridor as applies to Project plus Project |
| PD-19: Reduce, Reuse and Repurpose Materials | Construction | Design guidelines determined in Corridor planning and design. | As-constructed calculations determine score. Note that allowing materials and methods are scored in PD-53T. | Corridor plus Project |
| PD-20: Recycle Materials** | Construction | Design guidelines determined in Corridor planning and design. | As-constructed calculations determine score. | Corridor plus Project |

| INVEST Criterion ^{1,2} | Final Scoring Phase ^{3,4} | Illinois Tollway ⁴ and Corridor-Level Scoring Considerations | Project-Level Scoring Considerations | Score Basis ⁵ |
|---|------------------------------------|--|---|---|
| | | | Note that allowing materials and methods are scored in PD-53T. | |
| PD-21: Earthwork Balance | Construction | Approach or Corridor earthwork plan may be prepared as part of Corridor design. | Project-level calculations determine score. | Corridor plus Project |
| PD-22: Long-Life Pavement | Design | Illinois Tollway typically performs Corridor-level paving design. There are design parameters for HMA or PCC. | Project-level calculations determine score. | Project |
| PD-23: Reduced Energy and Emissions in Pavement Materials | Construction | Illinois Tollway typically performs Corridor-level paving design. | Project-level pavement production methods determine score. | Project |
| PD-24: Permeable Pavement | Design | Corridor or Project level | Corridor or Project level | Corridor as applies to Project plus Project |
| PD-25: Construction Environmental Training | Design | Approach may be determined in Corridor planning. | Construction environmental training requirements prescribed in Specifications. | Corridor plus Project |
| PD-26: Construction Equipment Emission Reduction | Design | Illinois Tollway Supplemental Specification 107.37 Construction Air Quality earns all points in table except those related to larger hauling vehicles. | Consider larger hauling vehicles where beneficial – will not earn additional points but will improve sustainability of project. | Illinois Tollway |
| PD-27: Construction Noise Mitigation | Design | Approach determined in Corridor planning. | Project-specific application as prescribed in Specifications. | Corridor as applies to Project |
| PD-28: Construction Quality Control Plan | Design | Illinois Tollway Contractor's Quality Program Manual earns 3 points for first scoring element. | Determine project-specific score for quality price adjustment element. | Corridor plus Project |
| PD-29: Construction Waste Management | Construction | Approach may be determined in Corridor planning. | Construction waste management requirements prescribed in Specifications. | Project |
| PD-30: Low Impact Development** | Design | Typically included in Corridor stormwater design. | BMPs to be completed at the project-level using the Corridor design and project-specific information. | Corridor as applies to Project plus Project |

| INVEST Criterion ^{1,2} | Final Scoring Phase ^{3,4} | Illinois Tollway ⁴ and Corridor-Level Scoring Considerations | Project-Level Scoring Considerations | Score Basis ⁵ |
|--|------------------------------------|---|--|---|
| PD-31: Infrastructure Resiliency Planning and Design | Design | Design guidelines determined in Corridor planning and design. | | Corridor as applies to Project plus Project |
| PD-32: Light Pollution | Design | Illinois Tollway guidelines for roadway illumination. | | Corridor plus Project |
| PD-33: Noise Abatement | Design | Illinois Tollway typically performs Corridor-level paving design (quiet pavements). Other design guidelines may be determined in Corridor planning and design. | | Corridor as applies to Project plus Project |
| PD-50T: Alignment Selection | Design | Avoidance and minimization decisions made in Corridor planning and design. | Enhancement definition likely completed at project-level. | Corridor plus Project |
| PD-53T: Reduce, Reuse and Recycle Materials (Design) | Design | Design guidelines determined in Corridor planning and design. | Score based on allowing materials and methods in Specifications. Note that as-constructed calculations determine scores in PD-19 and PD-20. | Corridor as applies to Project |
| PD-55T: Regional Employment | Construction | Approach may be determined in Corridor planning and design. | Construction regional employment requirements prescribed in Specifications and confirmed during construction. | Corridor as applies to Project |
| PD-57T: Innovations | Any | | | Corridor plus Project |

1. Criteria designated by a double asterisk (**) include Illinois Tollway-Specific Supplements.
2. PD-50T through PD-57T are Illinois Tollway-Specific Criteria.
3. Consider all Criteria, especially enabling actions, prior to the final scoring phases. However, final scores cannot be determined until these phases are completed.
4. For all Criteria, change orders during Construction shall be considered to determine CSC final score.
5. "Tollway", "Corridor", or "Project" means the respective Illinois Tollway, Corridor, or project score can be taken without further consideration. "Corridor as it applies to project" means the Corridor score can be used as it specifically applies to the particular project section (e.g. if LCCA points taken for bridges in Corridor, only applies to projects with bridges). "Corridor...plus Project" means that the Corridor score can be taken as noted and additional project-specific credit may be considered (e.g. for PD-03 the Corridor may earn 2 points for following a Six Step Framework for CSS-based project development; an additional 1 point may be added for points earned by a specific project for having a Public "Champion"). Note that in this case the Corridor and Project scores are not always additive.

6A.3 Submittals

The completed PINS shall be saved in the relevant project folder in the WBPM system, in the following locations (*submittals shown in italics*). All submittals are project-specific except as noted.

- ☐ 02 Design
 - ☐ 13 Submittals
 - ☐ 01 Preconcept
 - ☐ 01 Submittal Docs
 - *PINS-PLN-Corridor*
 - ☐ 02 Concept
 - ☐ 01 Submittal Docs
 - *PINS-30D-Corridor*
 - *PINS-30D*
 - ☐ 03 Preliminary
 - ☐ 01 Submittal Docs
 - *PINS-60D (if created)*
 - ☐ 04 Pre-Final
 - ☐ 01 Submittal Docs
 - *PINS-95D*
- ☐ 03 Construction
 - ☐ 19 Project Close-out
 - ☐ 04 Related Correspondence
 - *PINS-CSC*

SECTION 6B.0 GUIDANCE FOR STAND-ALONE PROJECTS

6B.1 Guidance by Phase

6B.1.1 Planning Phase

For projects that are NOT part of a larger Corridor planning effort, the planning step (PLN) is completed at the project-level. Typically, the INVEST process begins during the 30% Design phase for stand-alone projects, as they do not have extensive planning phases.

6B.1.2 Conceptual Design Phase (30%)

A Target INVEST Scorecard is prepared at 30% Design for the project. The TM will determine and send the appropriate blank scorecard and the Compendium of Criteria to the DSE. The first step at Conceptual Design is to create a draft PINS-30D. When the PINS-30D is drafted, the DSE hosts a design workshop for their section attended by the Illinois Tollway PM, the Illinois Tollway INVEST staff, and the TM. Based on the results of the workshop, the DSE submits the PINS-30D to the TM via email. Once reviewed and approved, the DSE uploads the PINS-30D to the WBPM system. Once completed, the file shall be saved per the Illinois Tollway's naming convention. For example, the following file would be saved in the appropriate folder per Section 6B.3:

PINS_TOLLWAY_LR_1234-INVEST30D_07022014.xlsx

6B.1.3 Preliminary Design Phase (60%)

The focus during the development of the 60% Design shall be on incorporating the sustainable practices identified at the Pre-Conceptual Planning Sustainability Workshop into on-going Studies, Contract Plans, and Special Provisions. There is no formal INVEST evaluation or scoring required at this phase, however, the project team shall submit the PINS-60D with the 60% Design Submittal to document that sustainable practices have been reviewed and modified as necessary. At this stage of the project, the PINS tracking sheet shall be used to review ongoing studies and the 60% Contract Plans to ensure that appropriate progress is being made in incorporating sustainable practices into the project. Additional best practices to consider at this stage include, but are not limited to, the following:

- Identify any Special Provisions that may be needed and discuss these early with the Illinois Tollway to ensure the ability to incorporate newer sustainable practices, and provide adequate time for Illinois Tollway review and approval;
- Add a Sustainability Lead to the project team and consider adding sustainability coordination topics to meetings for larger, multi-discipline projects;
- Consider additional sustainable practices that would be of value to the project. Incorporate those deemed viable and add to PINS; and

- Leverage a QA/QC Reviewer to complete the PINS (by the Sustainability Lead, if one is assigned).

The PINS form updated in Section 6B.1.2 shall be updated again and saved per the Illinois Tollway's naming convention. Using our sample naming, this file would become the following and would be saved in the appropriate project folder per Section 6B.3.

PINS_TOLLWAY_LR_1234-INVEST60D_11022014.xlsx

6B.1.4 Pre-Final Design Phase (95%)

The focus during the development of the 95% Contract Plans and Special Provisions shall be on incorporating the sustainable practices identified in prior phases and updated at the 60% Design, as well as performing an As-Designed INVEST score.

The Pre-Final evaluation is usually done in a workshop but could also be performed concurrently by the individual project engineers. Completing the PINS update as a QA/QC step of the Contract Plans and Special Provisions provides an opportunity to “catch and fix” any items that have been overlooked during design, and to perform any necessary changes to the Contract Plans and Special Provisions prior to the 100% Design Submittal.

The DSE shall submit the PINS-95D to the TM via email. The TM shall review and approve the PINS-95D and any review comments are conveyed to the DSE via email. Once approved, the TM shall email the PINS-95D to the Illinois Tollway INVEST staff for final review and approval. Once approved by the Illinois Tollway INVEST staff, the DSE shall upload a copy to the WBPM system per the Illinois Tollway's naming convention and saved in the appropriate folders per Section 6B.3. Using our sample naming, they will become:

PINS_TOLLWAY_LR_1234-INVEST95D_01022015.xlsx.

Finally, the TM shall update the INVEST Annual Report. Projects at 95% are included in the Annual Report in the Corridors and Projects in Process section and in Appendix A.

6B.1.5 Pre-Construction Meeting

The DSE shall participate in the Pre-Construction Meeting with the Contractor and CM to highlight any new or unusual sustainable practices that have been incorporated into the Contract Plans and Special Provisions. This will ensure that the Contractor and CM understand the intent of the design so sustainability efforts are not lost during construction. It should also be explained that a post-construction INVEST evaluation will be performed by the CM and input from the Contractor will likely be required. The TM shall provide a copy of the PINS-95D and the Compendium of Criteria to the CM.

The DSE shall coordinate with the CM to ensure that the agenda includes an INVEST item and some time for the DSE to share the relevant information.

6B.1.6 Construction Substantial Completion

For the DSE team, the focus on sustainability during construction is primarily aimed at communication, review of shop drawings and submittals, responding to requests for information (RFIs), and participation in the post-construction INVEST evaluation. The focus of the CM team is to ensure that the sustainable elements, materials, and methods are incorporated into the design without change, wherever possible, and to encourage the Contractor to select sustainable materials.

Upon substantial completion of construction, the CM shall perform a post-construction INVEST evaluation of the Project. The purpose of this evaluation is to ensure that specific sustainable practices identified throughout the design and construction phases, and corresponding INVEST evaluations, were incorporated into the project, and to determine the As-Constructed INVEST score for the project. The CM shall update the As-Designed score, PINS-95D, to establish an As-Constructed score, PINS-CSC.

The CM shall start with the PINS-95D and update it based on material selections, change orders, and field engineering that has taken place to create the draft PINS-CSC. The CM submits the draft PINS-CSC via email to the TM for review and approval. Any review comments are conveyed to the CM via email. Once all changes are made, the TM submits the PINS-CSC to the Illinois Tollway INVEST staff for final approval. The approved PIN is uploaded to the WBPM system by the CM.

The PINS-CSC shall be saved per the Illinois Tollway's naming convention. Using our sample naming, this file would become the following and would be saved in the appropriate project folder per Section 6B.3.

PINS_TOLLWAY_LR_1234-INVESTCSC_01022015.xlsx

Finally, the TM incorporates the score into the Annual Report

6B.2 Scoring Phase and Considerations by Criteria

Table 7 shows the following information for each Criterion:

- Final Scoring Phase – this is the point where work relevant to this Criterion shall be completed so that a final score can be recorded. Scores prior to this phase are estimates.
- Illinois Tollway and Project-Level Scoring Considerations – these describe specific considerations for each Criterion relative to scoring. It includes relevant Illinois Tollway guidance and typical project considerations.

TABLE 7 - SCORING PHASE AND CONSIDERATIONS BY CRITERIA

| INVEST Criterion ^{1,2,3} | Final Scoring Phase ⁴ | Illinois Tollway Scoring Considerations | Project-Level Scoring Considerations |
|--|----------------------------------|---|---|
| PD-01: Economic Analyses | Planning | If the Illinois Tollway performs an EIA it is typically done during planning and project programming. | |
| PD-02: Life-Cycle Cost Analyses | Design | Illinois Tollway typically performs LCCA for paving design. | Consider for structural and drainage detention/retention type selection. |
| PD-03: Context Sensitive Project Development | Design | Illinois Tollway typically leverages 6-step process in planning and design. | |
| PD-04: Highway and Traffic Safety | Design | | Best practice to start in planning and apply more specifically during design. |
| PD-05: Educational Outreach | Design | Most outreach is performed in early planning. | |
| PD-06: Tracking Environmental Commitments | Construction | | Independent compliance monitor is prescribed in Specifications. |
| PD-07: Habitat Restoration** | Design | Enhancement definition may be completed as part of mitigation banking project. | Avoidance and minimization decisions made in planning and early design. |
| PD-08: Stormwater Quality and Flow Control** | Design | | |
| PD-09: Ecological Connectivity | Design | | Avoidance and minimization decisions made in planning and early design. |
| PD-10: Pedestrian Facilities | Design | | Access determined in planning and early design. |
| PD-11: Bicycle Facilities | Design | | Access determined in planning and early design. |
| PD-12: Transit & HOV Facilities | Design | | Access determined in planning and early design. |
| PD-13: Freight Mobility | Planning | | Features determined in planning. |
| PD-14: ITS for System Operations | Planning | | ITS applications selected in planning. |
| PD-15: Historic, Archaeological, and Cultural Preservation | Design | Illinois Tollway projects do not typically meet prerequisites. | Avoidance and minimization decisions made in planning and early design. |
| PD-16: Scenic, Natural, or Recreational Qualities | Design | Illinois Tollway projects do not meet prerequisites. | Avoidance and minimization decisions made in planning and early design. |

| INVEST Criterion ^{1,2,3} | Final Scoring Phase ⁴ | Illinois Tollway Scoring Considerations | Project-Level Scoring Considerations |
|---|----------------------------------|---|---|
| PD-17: Energy Efficiency | Design | Illinois Tollway standard is LED. Illinois Tollway shall be consulted to determine auditing approach. | Project-level calculations determine score. |
| PD-18: Site Vegetation, Maintenance and Irrigation** | Design | | |
| PD-19: Reduce, Reuse and Repurpose Materials | Construction | | As-constructed calculations determine score. Note that allowing materials and methods are scored in PD-53T. |
| PD-20: Recycle Materials** | Construction | | As-constructed calculations determine score. Note that allowing materials and methods are scored in PD-53T. |
| PD-21: Earthwork Balance | Construction | | Determined during design but subject to change during construction |
| PD-22: Long-Life Pavement | Design | | |
| PD-23: Reduced Energy and Emissions in Pavement Materials | Construction | | Pavement production methods determine score. |
| PD-24: Permeable Pavement | Design | | |
| PD-25: Construction Environmental Training | Design | Illinois Tollway shall be consulted to determine approach. | Construction environmental training requirements prescribed in Specifications, confirmation following construction. |
| PD-26: Construction Equipment Emission Reduction | Design | Illinois Tollway Supplemental Specification 107.37 Construction Air Quality - Diesel Vehicle Emission Controls meets the requirements, 2 points applicable to all projects. | Consider larger hauling vehicles where beneficial – will not earn additional points but will improve sustainability of project. |
| PD-27: Construction Noise Mitigation | Design | | Determined during design but subject to change during construction. |
| PD-28: Construction Quality Control Plan | Design | Illinois Tollway's Quality Control Program Manual earns 3 points for first scoring element. | Determine project-specific score for quality price adjustment element. |
| PD-29: Construction Waste Management | Construction | Illinois Tollway shall be consulted to determine approach. | Construction waste management requirements prescribed in Specifications. |
| PD-30: Low Impact Development** | Design | Typically included in Corridor stormwater design. | |

| INVEST Criterion ^{1,2,3} | Final Scoring Phase ⁴ | Illinois Tollway Scoring Considerations | Project-Level Scoring Considerations |
|--|----------------------------------|--|---|
| PD-31: Infrastructure Resiliency Planning and Design | Design | | |
| PD-32: Light Pollution | Design | Illinois Tollway Guidelines for Roadway Illumination | |
| PD-33: Noise Abatement | Design | Illinois Tollway typically performs paving design (quiet pavements). | |
| PD-50T: Alignment Selection | Design | | Avoidance and minimization decisions made in planning and early design. |
| PD-53T: Reduce, Reuse and Recycle Materials (Design) | Design | | Score based on allowing materials and methods in Specifications. Note that as-constructed calculations determine scores in PD-19 and PD-20. |
| PD-55T: Regional Employment | Construction | Illinois Tollway shall be consulted to determine approach. | Construction regional employment requirements prescribed in Specifications and confirmed during construction. |
| PD-57T: Innovations | Any | Approved by INVEST TM | |

1. Criteria designated by a double asterisk (**) include Illinois Tollway-Specific Supplements.
2. PD-50T through PD-57T are Illinois Tollway-Specific Criteria.
3. Consider all Criteria, especially enabling actions, prior to the final scoring phases. However, final scores cannot be determined until these phases are completed.
4. For all Criteria, change orders during Construction shall be considered to determine if they changed prior scoring.

6B.3 Submittals

The completed PINS shall be saved in the relevant project folder in the WBPM system, in the following locations (*submittals shown in italics*). All submittals are project-specific.

- ☐ 02 Design
 - ☐ 13 Submittals
 - ☐ 01 Preconcept
 - ☐ 01 Submittal Docs
 - *PINS-PLN*
 - ☐ 02 Concept
 - ☐ 01 Submittal Docs
 - *PINS-30D*
 - ☐ 03 Preliminary
 - ☐ 01 Submittal Docs
 - *PINS-60D (if created)*
 - ☐ 04 Pre-Final
 - ☐ 01 Submittal Docs
 - *PINS-95D*
- ☐ 03 Construction
 - ☐ 19 Project Close-out
 - ☐ 04 Related Correspondence
 - *PINS-CSC*

SECTION 7.0 SUPPORT FROM THE ILLINOIS TOLLWAY

7.1 INVEST Technical Managers

The INVEST TM(s) are members of the Illinois Tollway's GEC. An INVEST TM is assigned to every project and will reach out to the DSE and/or CM as this Program is implemented, and to the DSE as new projects begin. If a DSE or CM has any questions about the Illinois Tollway's INVEST Program, whether administrative or technical, they should be directed to the assigned INVEST TM.

The INVEST TM(s) are responsible for tracking project submittals, coordinating with the DSEs and/or CMs, reviewing INVEST submittals, providing guidance on how the Illinois Tollway's INVEST Program works, providing information on where to find resources and providing some experience and adjudication on scoring.

The INVEST TM(s) are available to facilitate or lead workshops as needed, and may attend the Evaluation Workshops and Pre-Construction Meetings to provide additional information on the Program.

7.2 Scheduling and Tracking

The INVEST TM(s) are working with the Program Management Office (PMO) to obtain milestone schedule information on active projects. This information is essential to ensure engagement by the INVEST TM at appropriate points in the project life-cycle. The DSE and/or CM are encouraged to provide the best project milestone information possible to the PMO.

7.3 Training

The Illinois Tollway will provide awareness training annually and will provide updated training as the Program evolves. In addition, the Illinois Tollway's INVEST Program and sustainability technical training needs will be monitored and scheduled based on consultant requests, FHWA updates to INVEST, evolving sustainability trends, and general performance on submittals.

DSEs, CMs, and others who would like training for their teams should contact the INVEST TM(s) to be added to invitation lists or to request specific types of training.

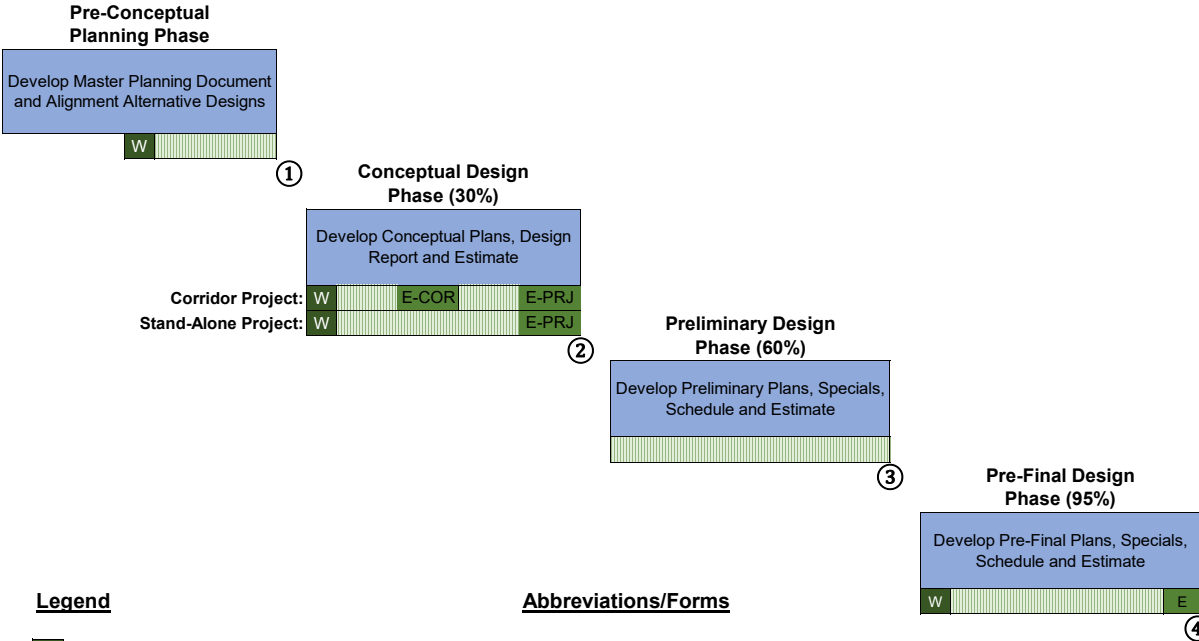
7.4 QA/QC Evaluations

Periodically, a sample of projects will be selected for QA/QC evaluation to learn about best practices being implemented on projects, to ensure consistency in scoring, and to identify potential training needs. If selected, the DSE and CM will likely need to be available to answer any questions stemming from the reviews.

APPENDIX 1 INVEST IMPLEMENTATION PROCESS

ILLINOIS TOLLWAY INVEST IMPLEMENTATION PROCESS

PROJECT DEVELOPMENT PROCESS



Deliverables

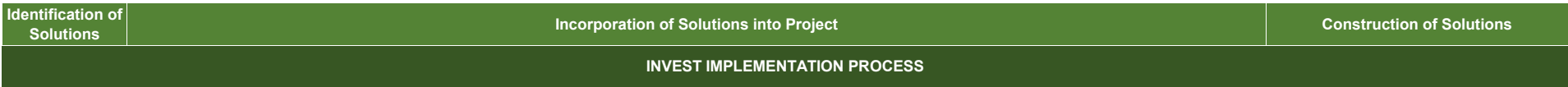
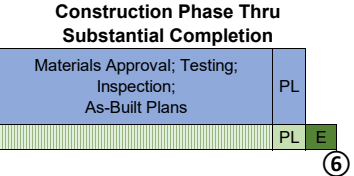
- ① PINS-PLN (Identify Sustainable Practices)
 - ② Corridor Project: PINS-30DCorridor (Target Evaluation)
- OR
- ② Stand-Alone Project: PINS-30D (Target Evaluation)
 - ③ PINS-60D (Review Sustainable Practices)
 - ④ PINS-95D (As-Designed Evaluation)
 - ⑤ Hand-off PINS to CM
 - ⑥ PINS-CSC (As-Constructed Evaluation)

Legend

- W Sustainability Workshop
- E INVEST Evaluation
- Incorporate Solutions
- PL Punchlist

Abbreviations/Forms

- COR = Corridor Project
- PINS = Project INVEST Scorecard
- PRJ = Project



APPENDIX 2 COMPENDIUM OF FHWA AND ILLINOIS TOLLWAY CRITERIA/SUPPLEMENTS



ILLINOIS TOLLWAY

COMPENDIUM OF INVEST CRITERIA

INTEGRATES:

- 1. FHWA INVEST v1.2 Criteria**
- 2. Tollway-Specific Supplements to INVEST v1.2**
- 3. Tollway-Specific Criteria to INVEST v1.2**



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| | |
|---------------|---|
| 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-07: | Habitat Restoration; Supplement for Illinois Tollway |
| PD-08: | Stormwater Quality and Flow Control; Supplement for Illinois Tollway |
| 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-18: | Site Vegetation, Maintenance and Irrigation; Supplement for Illinois Tollway |
| PD-19: | Reduce, Reuse and Repurpose Materials |
| PD-20: | Recycle Materials |
| PD-20: | Recycle Materials; Supplement for Illinois Tollway |
| PD-21: | Earthwork Balance |
| PD-22: | Long-Life Pavement Design |
| PD-23: | Reduced Energy and Emissions in Pavement Materials |

ILLINOIS TOLLWAY COMPENDIUM OF INVEST CRITERIA

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(continued)

| | |
|----------------|--|
| 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; Supplement for Illinois Tollway |
| PD-31: | Infrastructure Resiliency Planning and Design |
| PD-32: | Light Pollution |
| PD-33: | Noise Abatement |
| PD-50T: | Alignment Selection |
| PD-53T: | Reduce, Reuse and Recycle Materials (Design) |
| PD-55T: | Regional Employment |
| PD-57T: | Innovations |

PD-01: Economic Analyses

2-5 points

Goal: Using the principles of benefit-cost analysis (BCA) or economic impact analysis (EIA), provide evidence that the benefits, including environmental, economic, and social benefits, justify the full life-cycle costs.



Sustainability Linkage

Conducting economic analyses supports all of the triple bottom line sustainability principles by ensuring that agencies consider improvements where benefits exceed the investment costs for the project through analysis of impacts to local businesses, emissions, safety, and others.

Background and Scoring Requirements

Background

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

- **“Benefit-Cost Analysis”** – A BCA assesses the benefits of projects and programs in comparison to their costs. It normally includes all direct user and agency costs and benefits that the agency is able to estimate, including operating costs, travel time costs, and often other impacts such as crash and pollution costs, but broader economic impacts are excluded in traditional BCA. Benefit-cost analysis is typically applied in transportation studies to identify the NPV of the societal benefits that can be associated with a project or program, net of the investment costs.
- **“Broader economic impacts”** – Broader economic impacts include: (1) indirect impacts, which occur when industries that are directly affected by goods and services from other industries, and (2) induced impacts, which occur from increased household spending due to higher regional wages. Impacts (1) and (2) are considered "follow-on" impacts, and while they are typically included in an EIA, they are explicitly excluded from a BCA.
- **“Economic Impact Analysis”** – An EIA is concerned with the wider economic impacts such as equity, employment, and property values in an area’s economy due to the investment in the program or project. It includes the travel time or other costs or benefits as well as indirect and induced impacts on business growth that are not included in benefit-cost analysis. It asks the question: “What do the economic indicators of interest look like with or without a project or program?” as measured by forecasted outcomes expected to occur under each scenario. Impacts are shown by the change in the number of disenfranchised communities, jobs, in worker income, and in GDP or gross state product (GSP) that results in future years as a consequence of the transportation programs or projects. For more information, review the FHWA’s SHRP2 [Solutions Easier to Use Tools for Improved Economic Analysis website](#)¹.

Scoring Requirements

Requirement PD-01.1

2-5 points. Perform Economic Analyses

Scoring is based on the following, cumulative requirements:

- **Requirement PD-01.1a**

2 points. Benefit-Cost Analysis

A BCA for the project must be completed using acceptable industry practices. The U.S. DOT provides guidance for developing a BCA within the *Tiger BCA Resource Guide*². In addition, FHWA has developed a project-level BCA tool called *BCA.net*³, which is a web-based BCA tool designed to support the highway project decision-making process. If using the analysis to compare alternatives, one alternative that may be included is a no-build option. Performing a BCA for a project facilitates justification that the environmental, economic, and social benefits expected justify the investment costs for the project.

- **Requirement PD-01.1b**

3 points. Economic Impact Analysis

Perform an EIA, which includes the following (if relevant):

- Quantification of benefits, including social, environmental, and economic factors; and
- Quantification of impacts to regions, land values, and businesses.

Resources

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

1. FHWA, SHRP2 Solutions Easier to Use Tools for Improved Economic Analysis website, http://www.fhwa.dot.gov/goshrp2/solutions/capacity/c03_c11/economic_analysis_tools
2. U.S. DOT, *TIGER BCA Resource Guide* (2014), <http://www.dot.gov/policy-initiatives/tiger/tiger-bca-resource-guide-2014>
3. FHWA, *BCA.net*, <https://fhwaapps.fhwa.dot.gov/bcap/BaseLogin/LoginReg.aspx>

Scoring Sources

The project 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. Results from a Benefit-Cost Analysis and/or Economic Impact Analysis.
2. Documentation of techniques and underlying assumptions for any economic model(s) used to generate results.

PD-02: Life-Cycle Cost Analyses

1-3 points

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

Sustainability Linkage

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



Background and Scoring Requirements

Background

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

LCCA considers all agency expenditures (including planning, engineering, design, construction, maintenance, operations, and administration costs) and user costs (including time, safety, fuel, and other vehicle operating costs associated with normal operations and work zone delays) throughout the life of an alternative, not only initial investments.

Scoring Requirements

Requirement PD-02.1

1-3 points. Complete Life-Cycle Cost Analysis/Analyses

Complete calculations for LCCA of key project features in accordance with generally accepted engineering economics practices. Comparing multiple design alternatives is encouraged but not required. Scoring is based on the following, cumulative requirements:

- **Requirement PD-02.1a**

1 point. Perform LCCA for Pavement Structures Alternatives

Perform an LCCA of all pavement structure alternatives considered in accordance with the method described in the FHWA's *Life-Cycle Cost Analysis in Pavement Design - Interim Technical Bulletin*². This may be completed manually, or by using the FHWA's free *RealCost software*³, or any equivalent software. This requirement may also be accomplished by using pre-determined pavement designs based on context-specific best practices that are part of a formal Pavement Management System if the pavement design was established based on LCCA analyses (e.g., if within a specific region it has been determined through LCCA analyses that a specific pavement type/mix is most appropriate for bus lanes).

- **Requirement PD-02.1b**

1 point. Perform LCCA for Stormwater Infrastructure Alternatives

Perform an LCCA of all stormwater infrastructure alternatives considered. This analysis should include costs for planning; design; initial construction; maintenance including appropriate Best Management Practices (BMPs) maintenance; and operations. With respect to BMPs, careful consideration should be given to factors such as frequency of scheduled maintenance, chronic maintenance problems (e.g., clogging), and failure rates that add to the overall cost of BMP implementation.

- **Requirement PD-02.1c**

1 point. Perform LCCA for Major Features

Perform an LCCA of the project's major feature (bridges, tunnels, retaining walls, or other items not listed in the preceding options) for each of the alternatives considered. For bridges, perform an LCCA in accordance with the guidance in the National Cooperative Highway Research Program (NCHRP) *Report 483 – Bridge Life-Cycle Cost Analysis*⁴. The report provides standard input values for a wide range of potential bridge projects and referenced sources for other input data. LCCA software may be used, including RealCost, with some minor adjustments to the spreadsheet or a bridge LCCA may also be completed by hand.

Resources

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

1. FHWA, *Life-Cycle Cost Analysis Primer* (2002) at <http://isddc.dot.gov/OLPFiles/FHWA/010621.pdf>
2. FHWA, *Life-Cycle Cost Analysis in Pavement Design - Interim Technical Bulletin* (1998), Publication No. FHWA-SA-98-079 at http://www.wsdot.wa.gov/NR/rdonlyres/7A7CC34A-6336-4223-9F4A-22336DD26BC8/0/LCCA_TB.pdf
3. FHWA, RealCost software, at <http://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm>
4. NCHRP, *Report 483 – Bridge Life-Cycle Cost Analysis* (2003) at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_483.pdf

Scoring Sources

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

1. Calculations for the LCCA, including a summary of inputs and outputs.
2. A copy of the owner-agency policy on LCCA if one exists.
3. Calculations for the LCCA performed as part of a Pavement Management System process to set best practice pavement designs.

PD-03: Context Sensitive Project Development

1-10 points

Goal: Deliver projects that harmonize transportation requirements and community values through effective decision-making and thoughtful design.

Sustainability Linkage

Implementing Context Sensitive Solutions supports all of the triple bottom line sustainability principles by ensuring that environmental resources, community values, and economic context of a project are all considered during project development.



Background and Scoring Requirements

Background

Context Sensitive Solutions (CSS) is incorporated in both a project development and public involvement process and the outcomes of using that process in design (per FHWA's [Context Sensitive Solutions website](#)¹). The outcomes are referred to as Context Sensitive Design (CSD) in this document.

Definitions

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

- **“Context Sensitive Solutions (CSS)”** is defined as a collaborative, interdisciplinary approach that involves all stakeholders to provide a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions. Some of the key principles of a CSS process are that it:
 - Engages stakeholders (not just involves them),
 - Embraces a multimodal approach (this is not mentioned anywhere in the article and is key to CSS/CSD),
 - Serves and respects the environmental and social context of the transportation network, and
 - Applies to all of the activities of the transportation agency.

The FHWA office of Office of Project Development & Environmental Review develops and implements programs and activities that advance environmental stewardship and streamlining for FHWA-funded projects, through the application of National Environmental Policy Act (NEPA) principles and the NEPA process. CSS/D is a part of those principles and processes.

- **Context Sensitive Design (CSD)”** is a model for transportation project development. Proposed transportation projects must be planned not only for its physical aspects as a facility serving specific transportation objectives, but also for their effects on the aesthetic, social, economic and environmental values, needs, constraints and opportunities in a larger community setting. Projects designed using this model:
 - Are in harmony with the community and preserve the environmental, scenic, aesthetic, historic, and natural resource values of the area.
 - Are safe for all users.
 - Solve problems that are agreed upon by a full range of stakeholders.

- Meet or exceed the expectations of both designers and stakeholders, thereby adding lasting value to the community, the environment, and the transportation system.
- Demonstrate effective and efficient use of resources (people, time, budget,) among all parties.
- **“Context Sensitive Project Development”** in this document, refers to the development of a project, from planning through design using the process of CSS and resulting in CSD outcomes. The FHWA NEPA project development process is an approach to balanced transportation decision-making that takes into account the potential impacts on the human and natural environment and the public’s need for safe and efficient transportation. The use of CSS with a CSD outcome can be an integral part of this process.
- **“Objectionable views”** are defined as views from the project that are unpleasant or offensive and that arouse distaste or opposition from the community. These views should be defined through a CSS process by community stakeholders.

Relationship with Other Criteria

Several key outcomes of a CSD process are covered in other criteria and are not repeated here. Please refer to the following criteria in addition to PD-03:

- PD-07: Habitat Restoration
- PD-09: Ecological Connectivity
- PD-10: Pedestrian Facilities
- PD-11: Bicycle Facilities
- PD-12: Transit and HOV Facilities
- PD- 15: Historic, Archeological, and Cultural Preservation
- PD-16: Scenic, Natural, or Recreational Qualities
- PD-18: Site Vegetation, Maintenance and Irrigation
- PD-32: Light Pollution
- PD-33: Noise Abatement

Scoring Requirements

Requirement PD-03.1

2 points. Six Step Process for CSS-based Project Development

Evidence exists that the following principles of CSS were applied in the project development process through a formal CSS program or equivalent process that accomplishes the same principles. A public involvement process does not necessarily meet this criterion unless the public and other stakeholders are engaged in two-way communications that ultimately influence the vision and design of the project. For smaller projects that typically do not require involvement of many people, the six-step process defined below should be scaled accordingly.

A NEPA-based project development process generally follows the six-step CSS framework described in National Cooperative Highway Research Program (NCHRP) *Report 480: A Guide to Best Practices for Achieving Context Sensitive Solutions*² and *NCHRP Report 642: Quantifying the Benefits of Context Sensitive Solutions*³, or an equivalent process. *NCHRP Report 480: A Guide to Best Practices for Achieving Context Sensitive Solutions*² describes a general six-step process for incorporating CSS at a project level:

1. Develop a decision-making process and management structure;
2. Define the problem;
3. Develop the project and the evaluation framework for the project;
4. Determine alternatives;
5. Screen the alternatives; and
6. Evaluate and select an alternative.

Requirement PD-03.2

1 point. Deploy a Multi-disciplinary Team

Project Development features a “cradle-to-grave,” project team that includes planners, traffic engineers, public involvement specialists, design engineers, environmental experts, safety specialists, landscape architects, right-of-way staff, freight experts, construction engineers, and others to work on projects who work together to achieve the desired CSS-based vision for the project.

Requirement PD-03.3

1 point. Create Public “Champions”

As a result of CSS performed during the project development process, external “champions” for the project are created in the affected community who are engaged and proactive in supporting the project and who advocate for the project.

Requirement PD-03.4

1 point. Leverage Visualization Tools

Visualization techniques, ranging from project alternative renderings to photo-simulations, are used to assist in the decision regarding design choices.

Requirement PD-03.5

1 point. Design to the Scale of the Project

The appropriate scale of the project is considered and features that adjust the scale of the roadway to the context are incorporated, such as median islands, pedestrian refuge islands, curb bump-outs, bus pull-outs, or other similar features.

Requirement PD-03.6

1-2 points. Obstruct Objectionable or Distracting Views

Points are achieved by removing or obstructing objectionable or distracting views. This may be accomplished through the use of construction screening, vegetative screens, fences, or other similar means. Points shall be achieved per the Table PD-03.6.A. Points are **not** cumulative; rather the highest point value should be used.

TABLE PD-03.6.A. AVAILABLE POINTS FOR OBSTRUCTING OBJECTIONABLE OR DISTRACTING VIEWS

| Requirement | No. Points | Requirement Description |
|--------------------|-------------------|--|
| PD-03.6a | 1 | Enhance Features. Obstruct objectionable views during construction. |
| PD-03.6b | 2 | Enhance Features. Obstruct objectionable views permanently. |

Requirement PD-03.7

1 point. Incorporate Appropriate Context Design Features

Credit is achieved by integrating context sensitive aesthetic treatments, as determined by participating stakeholders, into the design of transportation facilities. Examples may include street furniture, signage, community identifiers, lighting, or appurtenances. Community murals identified as part of a roadway project by the local community that are incorporated into the project would also qualify.

Requirement PD-03.8

1 point. Bridge and Structural Element Aesthetics

Points are achieved if aesthetics for these structural items are incorporated into the design. Structural elements include bridges, sound walls, box culverts, large headwalls, guard rails, and retaining walls. Elements that should be considered when evaluating the structure's aesthetics include Visual Design Elements and Aesthetic Design Qualities. Visual Design Elements include: line, shape, form, color, and texture. Aesthetic Design Qualities include: order, proportion, rhythm, harmony, balance, contrast, scale, illusion, and unity.

Resources

Above-Referenced Resources

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

1. FHWA, Context Sensitive Solutions website, <http://contextsensitivesolutions.org/>
2. NCHRP, Report 480: *A Guide to Best Practices for Achieving Context Sensitive Solutions* (2002), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_480a.pdf
3. NCHRP, Report 642: *Quantifying the Benefits of Context Sensitive Solutions* (2009), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_642.pdf

Additional Resources

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

4. FHWA, Environmental Review Toolkit website, <https://www.environment.fhwa.dot.gov/index.asp>

Scoring Sources

The project 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 CSS or equivalent process applied on the project.
2. Contract Documents.
3. Technical Memoranda and Reports.

PD-04: Highway and Traffic Safety

1-10 points

Goal: Safeguard human health and reduce social and economic impacts from crashes by incorporating science-based quantitative safety analysis processes within project development that will reduce serious injuries and fatalities within the project footprint.

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

Background

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

- **“Nominal safety”** – Refers to the extent to which a site (corridor, intersection, segment, or area) meets currently applicable design standards and guidelines. *Substantive* safety refers to actual or anticipated safety performance as defined by crash frequency and crash severity. Substantive safety reflects the science of safety: objective knowledge built on science-based discoveries of data-driven assessments of the safety impacts of road design, road user actions or behaviors, and vehicle attributes.
- **“Road Safety Audits” or “Road Safety Assessments”** – The formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. RSAs *qualitatively* report on potential road safety issues and identify opportunities for improvements in safety for all road users based on input from designers, traffic engineers, maintenance experts, law enforcement, and human factors experts. RSAs are particularly beneficial at the planning and design stages of project development. Guidance on RSAs can be found on FHWA’s [Safety website](#)¹.

Scoring Requirements

Requirement PD-04.1

2 points. Incorporate Human Factors Considerations into RSA

One of the following scores applies:

- **0 points.** Rely solely on published design and operational performance standards during the project development process.
- **2 points.** Evaluate, document, and incorporate interactions between road users and the roadway using fundamentals captured in Chapter 2 of the *Highway Safety Manual (HSM)*² and the *Human Factors Guideline for Road Systems (NCHRP Report 600 series)*³. Road Safety Audits (RSA)/Assessments are completed in accordance with FHWA’s *Road Safety Audit Guidelines*⁴ and include human factors principles (from Chapter 2 of the *Highway Safety Manual*² and the *Human Factors Guideline for Road Systems*³).

Requirement PD-04.2

1 point. Build Awareness among the Public Regarding Contributing Factors to Crashes

Use media, for example the agency website or flyers, to raise awareness among the public about contributing factors to crashes on the existing facility or similar facilities on the network in a manner that is easy to understand. The purpose of these awareness efforts would be to support an improved understanding of road users about their personal responsibility in preventing crashes and to improve overall safety culture.

Requirement PD-04.3

1-6 points. Explicit Consideration of Safety using Quantitative, Scientifically Proven Methods

Best practices for using quantitative safety methods and measures to identify and evaluate, for example, safety improvements or actions, are presented in the advanced approaches in the HSM that account for regression to the mean (RTM), the impact of countermeasures presented in Part D of the HSM, and highly rated CMFs in the FHWA CMF Clearinghouse. Predictive methods for evaluation of quantitative safety refers to analytical approaches that result in a calculation of the predicted and/or expected frequency and/or severity of crashes for a given site or set of conditions. Such methods are described in the *AASHTO Highway Safety Manual*². They incorporate the use of safety performance functions, crash modification factors that meet the HSM inclusion rules, and local or state-specific calibration.

Tools that can be used in this process include AASHTO *SafetyAnalyst*⁵, the Interactive Highway Safety Design Model (IHSDM), spreadsheet tools developed to apply the predictive methods in the HSM, and analytical tools that use substantive safety as the basis of the analysis. While crash rates have been in use for many years, these (and other methods that do not account for the characteristics of crash data and the impact of, for example, RTM) do not represent state of the practice.

The *Integrating the HSM into the Highway Project Development Process*⁶ guide describes examples of the application of the HSM in the project development process.

Incorporate substantive safety performance into project development decision-making through the use of scientifically proven and statistically reliable predictive methods for evaluation of quantitative safety. Significant project decisions include establishment of project type and design criteria, selection of project design alternatives, and development of preliminary and final design details, including the use of design exceptions as necessary.

No credit is given for using design and operational performance standards and guidelines to assess nominal safety of the project throughout the project development process; or using less reliable quantitative safety methods such as crash rates to forecast future anticipated safety performance; or conducting RSAs that only assess nominal safety performance to describe safety (for example, assessing and documenting whether design standards and guidelines are met).

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

- **Requirement PD-04.3a**

1 point. Establish the Project Type as Defined in the HSM

Establish the project type, as defined in the HSM, during scoping of project alternatives through a quantitative and statistically reliable process. This process includes consideration of historic safety performance of the existing facility or similar facilities.

- **Requirement PD-04.3b**

2 points. Develop and Evaluate the Project Design and/or Operational Alternatives

Develop and evaluate project design and/or operational alternatives using explicit consideration of substantive safety through quantitative, statistically reliable methods.

- **Requirement PD-04.3c**

3 points. Use Quantitative and Statistically Reliable Methods and Knowledge

Use quantitative and statistically reliable methods and knowledge to assess substantive safety performance in the development of preliminary and final design details. Where a project includes design exceptions, evaluate the safety impact of the design exception(s) with these methods, and identify potential mitigating actions to improve safety performance. Note: if the project has no design exceptions, the agency can earn 3 points by documenting that their policies and processes for evaluation and documentation of design exceptions incorporate substantive safety principles described above.

Requirement PD-04.4

1 point. Evaluate Safety Performance of the Project after Implementation

Given the relative rarity of crashes, a statistically reliable post-evaluation period may take several years. As agencies may wish to complete a sustainability assessment sooner than that, earning one credit for this step is possible by documenting that agencies (a) have formal safety project evaluation policy and process in place that are statistically reliable, and (b) indicating that the agency intends to apply such process to this project.

A statistically reliable evaluation process includes at least the following elements:

- Collection and recording of the traffic volumes, roadway, and crash data for the three years prior to implementation for use after implementation.
- Keeping record of the implementation date (i.e., actual start of construction work and completion date of construction (last day before official opening) is recorded for use after implementation).
- The agency is able to retrieve the abovementioned information for a post-implementation safety performance review.
- The method used in the evaluation process is advanced enough to account for regression to the mean (RTM).

The Empirical Bayes (EB) before-after study (with or without comparison sites) method is considered the most appropriate means assessing the safety effectiveness of a treatment. The EB method accounts for regression to the mean (RTM) effects which are common to highway and traffic safety studies and applications. The HSM provides details on how to conduct post-implementation evaluations to demonstrate statistically valid safety effects. The evaluation shall assess three to five years of before and after data in determining the effect of the project on crashes and crash severity. The EB methods rely on predictive methods, for example, the use of safety performance functions, crash modification factors that meet the HSM inclusion rules, and local or state-specific calibration. If such models do not exist or calibrations of the HSM models have not been completed, the naive before-after study approach is acceptable.

One of the following scores applies:

- **0 points.** Perform no post-evaluation of the project, or use only less reliable methods such as crash rates to evaluate the safety performance of the project after implementation.
- **1 point.** Use a statistically reliable, science-based method to evaluate the safety effectiveness of the implemented project.

Resources

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

1. FHWA, Safety website, <http://safety.fhwa.dot.gov/rsa>
2. AASHTO, Highway Safety Manual, https://bookstore.transportation.org/collection_detail.aspx?ID=135
3. NCHRP, Human Factors Guideline for Road Systems (NCHRP Report 600 series), http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_600Second.pdf
4. FHWA, *Road Safety Audit Guidelines*, http://safety.fhwa.dot.gov/rsa/guidelines/documents/FHWA_SA_06_06.pdf
5. AASHTO, SafetyAnalyst, <http://safetyanalyst.org/>
6. FHWA, Integrating the HSM into the Highway Project Development Process (2012), http://www.camsys.com/pubs/hsm_integration.pdf

Scoring Sources

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

1. Documentation of examples where human factors were considered in the project development process; or, if an RSA took place, documentation of the RSA, which may include resumes or biographies of RSA team members demonstrating their experience and qualifications to conduct RSAs. The documentation needs to include evidence that the fundamentals of human factors were applied (reflect knowledge and application of Chapter 2 of the HSM and the *Human Factors Guideline for Road Systems* (NCHRP 600 series).
2. Documentation of public awareness or information presented to the public to support a change in safety culture. These will include information (quantitative) on contributing factors, for example, speeding, drinking and driving, and distracted driving based on historic crash performance.
3. Documentation of the project scoping process, including data and analysis describing how the existing facility's safety performance was used to make decisions on scope of project improvements.
4. Project reports, technical memos, or other supporting documentation that demonstrate application of HSM-quality evaluations of the project and alternatives considered. These include documentation of the existing safety performance (frequency, crash type, severity) and comparison with an appropriate benchmark. Include analysis of the expected safety performance of alternatives considered (with specific reference to SPFs and CMFs used), as well as how quantitative safety was considered as part of overall project decision-making.
5. Design exception review and evaluation reports approved by the appropriate agency authority that include quantitative estimates of the expected safety performance of the design exception, specific mitigation measures, and estimates of the quantitative safety performance of the proposed mitigation measures. Where no design exceptions were required, documentation of the agency's processes and procedures for design exceptions that cite reference to and use of substantive, science-based crash analyses and methods.
6. Documentation of the post-implementation effectiveness evaluation of the project, including a collection of crash data before and after implementation, and shall follow the Empirical Bayes process or advanced methods that account for RTM. Where post-evaluation requires a lengthy period beyond project implementation, documentation of the agency's formal process for evaluation with a statement of intent or policy regarding post-evaluation can be submitted.

PD-05: Educational Outreach

2 points

Goal: Increase public, agency, and stakeholder awareness of the integration of the principles of sustainability into roadway planning, design, and construction.

Sustainability Linkage

Educational outreach supports all of the triple bottom line principles by communicating to the public how social, environmental, and economic issues relate to roadway projects.



Background and Scoring Requirements

Background

This criterion awards points for incorporating public educational outreach that promotes and educates the public about sustainability including social, environmental, and economic principles. Specifically, this criterion requires communicating how sustainability principles are being integrated into the planning, design, construction, and operational phases of the roadway project. Credit can be achieved by leveraging public involvement processes where possible.

Note that performing a routine public involvement process does not accomplish this criterion unless it includes specific efforts to educate the audience about the sustainability of the project. Also note that the word “sustainability” does not have to be used specifically, and that terminology should be appropriate to the audience.

Scoring Requirements

Requirement PD-05.1

2 points. Install Educational Elements or Perform Educational Activities

Install or perform a minimum of two different educational elements from the Table PD-05.1.A.

TABLE PD-05.1.A. REQUIREMENTS FOR EDUCATIONAL ELEMENTS (CONTINUED ON NEXT PAGE)

| Requirement | Educational Element | Recommended Requirements |
|-------------|---|---|
| PD-05.1a | Include sustainability in a Project Development Process | Specifically include sustainability as a consideration in a project development process that harmonizes transportation requirements and community values through effective decision-making and thoughtful design. Examples of this type of development process include complete streets, context sensitive solutions, neighborhood-aware design, and similar. |
| PD-05.1b | Include sustainability in Public Involvement | Specifically include sustainability education and promotion of sustainability as a project element throughout the public involvement process for the project. |

| Requirement | Educational Element | Recommended Requirements |
|--------------------|----------------------------|---|
| PD-05.1c | Install point-of-interest | Install and maintain off-road point-of-interest kiosk(s) that display(s) information about the project and its sustainability features, as appropriate. |
| PD-05.1d | Project website | Provide a publicly available and maintained informational project website with capacity for submitting feedback and comments. |
| PD-05.1e | Stakeholder guide | Include sustainability and how it is being applied to the project in agency and/or stakeholder guide, specification, or policies, as appropriate. |
| PD-05.1f | School presentations | Perform presentation(s) about the project and its sustainability features for primary and secondary schools. |
| PD-05.1g | Professional presentations | Perform professional technical presentation(s) about the project and its sustainability features. |

Resources

None referenced.

Scoring Sources

The project 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. Public Involvement and Outreach materials showing sustainability was specifically included.
2. Text or printed copy of the information offered at the kiosk (i.e., brochure or static installation).
3. Website address and/or screen captures.
4. An agency guide, specification, or policy.
5. A copy of school or professional presentations and the date of the presentation.

PD-06: Tracking Environmental Commitments

2-5 points

Goal: Ensure that environmental commitments made by the project are completed and documented in accordance with all applicable laws, regulations, and issued permits.

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

Scoring Requirements

Requirement PD-06.1

2-3 points. Use Formal Compliance Tracking System

Agencies are responsible for meeting commitments made throughout the project to regulatory agencies, property owners, tenants, the community, and other stakeholders. This criterion requires the project owner to facilitate the tracking and compliance of commitments through a formal environmental compliance tracking system. Scoring for this requirement is based on the following, cumulative requirements. The first requirement must be accomplished to earn the second.

- **Requirement PD-06.1a**

2 points. Use an Environmental Compliance Tracking System (ECTS)

Beginning in project development, use a comprehensive ECTS for the project and related facilities to identify how environmental commitments will be identified, tracked, fulfilled, and verified throughout planning, design, construction, and operations and maintenance. The ECTS should include all regulatory and non-regulatory commitments that apply to the development work and additional properties, including surveys, borings, batch plants, staging, equipment storage, employee parking, and field offices, as well as land that is purchased, leased, occupied, or used for the work.

At a minimum, the system should: identify commitments in a single list; identify an environmental compliance manager; ensure that environmental commitments are communicated from one phase of a project to another; leverage tracking mechanisms (such as databases, forms, or lists); identify training needed for necessary design and construction staff; and provide periodic reports verifying the commitments have been fulfilled. The tracking system should be updated and maintained throughout the project development and any monitoring period.

For more information on environmental compliance tracking systems, see AASHTO's [Center for Environmental Excellence website](#)¹.

- **Requirement PD-06.1b**

1 additional point. ECTS has Mechanism to Communicate from Planning to Maintenance

The environmental compliance tracking system has a formal mechanism to communicate commitments from transportation planning through operations and maintenance. To earn credit, this ECTS must be used on this project from planning through construction and handed off to maintenance and operations.

Requirement PD-06.2

2 points. Assign Independent Environmental Compliance Monitor

The Owner shall require that the principal project constructor assigns an *independent* environmental compliance monitor who will provide quality assurance services and report directly to and make recommendations to the regulatory and Lead Agencies. The Independent Environmental Monitor should be a recognized expert or persons knowledgeable about natural resources protection and construction, and should report directly to regulatory agencies about problems observed during design review and construction phases, including, but not limited to, erosion and sediment control problems.

Resources

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

1. AASHTO, Center for Environmental Excellence website, <http://environment.transportation.org/>

Scoring Sources

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

1. Documentation of environmental tracking system, including instructions on what is to be included and how the chain of documentation flows throughout the phases of projects.
2. Contact documents requiring the construction contractor to assign an independent environmental compliance manager.

PD-07: Habitat Restoration

1-7 points

Goal: Avoid, minimize, rectify, reduce, and compensate the loss and alteration of natural (stream and terrestrial) habitat caused by project construction and/or restore, preserve, and protect natural habitat beyond regulatory requirements.



Affected Triple Bottom Line Principles

Sustainability Linkage

Minimizing or avoiding impacts to habitat and restoring habitat beyond required regulations enhances the ecosystem and therefore supports the environmental principle of the triple bottom line.

Background and Scoring Requirements

Background

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

- **“Traditional Alternative”** – The traditional alternative is the alternative that would most likely be approached without consideration of impacts to habitat. For new alignments, this is typically the alignment that is most geometrically fitting given the beginning and end points. For reconstruction, this is typically the alignment option that widens the cross-section in-place without shifting alignments.

In no case should the traditional alternative be exaggerated beyond alignments that would be considered appropriate for the context in order to inflate the perceived reduction in impacts to habitats for this criterion.

- **“Mitigation”** – Per the Council on Environmental Quality (CEQ)’s *NEPA Act, Part 1508 Terminology and Definitions*¹, mitigation includes:
 - Avoiding the impact altogether by not taking a certain action or parts of an action.
 - Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
 - Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
 - Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
 - Compensating for the impact by replacing or providing substitute resources or environments.

Credit for enhancement can be obtained for this criterion through project-specific mitigation or through the use of mitigation banking.

Scoring Requirements

Requirement PD-07.1

1-3 points. Avoid or Minimize Impacts to Habitats or Enhance Features

Points shall be achieved per table PD-07.1.A on the next page. Points are **not** cumulative; rather the highest point value earned should be used.

TABLE PD-07.1.A. POINTS AND REQUIREMENTS FOR HABITAT RESTORATION (CONTINUED ON NEXT PAGE)

| Requirement | Points | Method |
|--------------------|---------------|---|
| PD-07.1a | 1 | Minimize Impacts to Habitat. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize impacts to habitat as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alternative. |
| PD-07.1b | 2 | Avoid or Eliminate Impacts to Habitat. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly avoid impacts to habitat as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 75% or more as compared to the traditional alternative. Alternatively, the project can eliminate the impacts to habitat as part of the project. |
| PD-07.1c | 2 | Relocate Species. For project required to mitigate habitat impacts through relocation, selectively relocate impacted species prior to construction where doing so has been documented in surveys, to prevent loss of species. |
| PD-07.1d | 3 | Rectify or Compensate Habitat Features. For projects required to mitigate habitat impacts through restorative practices, implement a restoration/preservation approach that restores and/or preserves an upland buffer area surrounding the required stream or wetland mitigation site. The amount of buffer must be an appropriate amount so it improves the habitat quality of the wetland or stream it is protecting. |
| PD-07.1e | 3 | Rectify or Compensate Habitat Features. For projects not required to mitigate habitat impacts, implement a habitat restoration effort that mitigates for the habitat of non-listed, Candidate species under the Federal Endangered Species Act (see the Federal Register’s Recovery Crediting Guidance ¹). For example, provide nesting locations for birds or other wildlife. |

Requirement PD-07.2

1-2 points. Avoid or Minimize Impacts to High Quality Aquatic Resources (HQAR)

Points shall be achieved per the table PD-07.1.A. Points are **not** cumulative; rather the highest point value earned should be used.

TABLE PD-07.2.A. POINTS AND REQUIREMENTS FOR HABITAT RESTORATION

| Requirement | Points | Method |
|--------------------|---------------|--|
| PD-07.2a | 1 | Minimize Impacts to HQAR. Completely avoid HQAR as defined by the US Army Corp of Engineers <u>and</u> provide a buffer less than 100-feet. |
| PD-07.2b | 2 | Avoid Impacts to HQAR. Completely avoid HQAR as defined by the US Army Corp of Engineers <u>and</u> provide a buffer of at least 100-feet. |

Requirement PD-07.3

1-2 points. Avoid or Minimize Impacts to High Quality Environmental Resources

Points shall be achieved per the table PD-07.1.A on the next page. Points are **not** cumulative; rather the highest point value earned should be used.

TABLE PD-07.3.A. POINTS AND REQUIREMENTS FOR HABITAT RESTORATION (CONTINUED ON NEXT PAGE)

| Requirement | Points | Method |
|-------------|--------|--|
| PD-07.3a | 1 | <p>Minimize Impacts to High Quality Environmental Resources. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize the impacts to high quality environmental resources, such as sites with threatened or endangered species, as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alternative. Potential methods of avoidance include the use of retaining wall, berms, plantings, and reducing right of way footprint.</p> |
| PD-07.3b | 2 | <p>Avoid Impacts to High Quality Environmental Resources. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize the impacts to high quality environmental resources, such as sites with threatened or endangered species, as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 75% or more as compared to the traditional alternative. Potential methods of avoidance include re-routing of the alignment, using retaining wall to minimize right of way takes, or bridging of the resource.</p> |

Resources

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

1. CEQ, *NEPA Act, Part 1508 Terminology and Definitions*, <https://ceq.doe.gov/nepa/regs/ceq/1508.htm>
2. Federal Register, *Recovery Crediting Guidance*, 73 Fed Reg. 44761, (2008), <http://www.gpo.gov/fdsys/pkg/FR-2008-07-31/pdf/E8-17579.pdf>

Scoring Sources

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

1. Contract documents showing the baseline conditions of the site (including existing habitat quality) and improvements to be constructed and planted.
2. Technical reports or permitting documentation that describes the species which are intended to benefit from the site and the value of the habitat lift (above and beyond requirements) that is satisfying this criterion.
3. Technical report that describes minimization that occurred throughout the project development process.

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PD-07: Habitat Restoration



(Supplement for Illinois Tollway Only)

Supplement Purpose

The purpose of this supplement is to incorporate additional best practices and scoring elements relevant to the Illinois Tollway into the INVEST criteria used to evaluate the Tollway's projects. Supplemental information was sourced from Tollway specific policies, procedures and practices, as well as sustainable practices included in the *Illinois Livable and Sustainable Transportation (I-LAST) Rating System and Guide*, version 2.02 that are not specifically mentioned in INVEST.

Scoring Requirements

PD-07.1: 1-3 points. Avoid or Minimize Impacts to Habitats or Enhance Features. Points shall be achieved per table PD-07.1.A. Points are **not** cumulative; rather the highest point value should be used.

The scoring element highlighted above is supplemented by adding the following rows to the scoring Table PD-07.1.A.

TABLE PD-07.1.A. POINTS AND REQUIREMENTS FOR HABITAT RESTORATION

| Requirement | Points | Method |
|-------------|--------|--|
| PD-07.1f | 2 | Enhance Features. Use one of the following methods to enhance habitat features: <ul style="list-style-type: none">• Mitigate 105% or more. Provide at least 105% of the mitigation area required by the regulatory and/or permitting agencies.• Provide nesting locations. Provide enhancements to existing wildlife habitat with additional nesting locations (e.g. bird and bat houses, nesting boxes, and turtle nesting areas).• Other. Provide other enhancements that are approved by the Tollway's INVEST Technical Manager for inclusion in this Criterion. |
| PD-07.1g | 3 | Enhance Features. Use one of the following methods to enhance habitat features: <ul style="list-style-type: none">• Mitigate 110% or more. Provide at least 110% of the mitigation area required by the regulatory and/or permitting agencies. To qualify for a 3 point credit, the area of over-mitigation must be at least 0.5 acres.• Provide mussel relocation prior to construction. Relocate mussels prior to construction, where their presence has been documented in surveys, to prevent loss of species.• Other. Provide other enhancements that are approved by the Tollway's INVEST Technical Manager for inclusion in this Criterion. |

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PD-08: Stormwater Quality & Flow Control

(Supplement for Illinois Tollway Only)



1-6 points

Supplement Purpose

The purpose of this supplement is to provide methods for stormwater control BMPs that work well within the Midwest and on Illinois Tollway property, as well as provide consistency in scoring on various Tollway projects. Supplemental information was sourced from Tollway specific policies, procedures, and practices, as well as sustainability practices noted in the references. This supplement is intended to replace FHWA's PD-08.

Scoring Requirements

PD-08.1: 1-3 points. Water Quality Treatment. Treat target pollutants from at least 80 percent of the total annual runoff volume. To calculate the points earned for this scoring requirement, follow Steps 1 through 4 below.

Note: All of PD-08.1 will be replaced with the following scoring requirements below.

The scoring element highlighted above is replaced by the scoring described below:

To calculate the total number of points achieved for this criterion, follow the directions in each of the scoring sections below for Runoff Rate Control, and Runoff Volume Control, and add the points achieved in each of the three areas up to a maximum of six points total.

Requirement PD-08.1

1-3 Points. Runoff Rate Control

Runoff control requires managing the runoff flow from the peak rainfall event for the 50 year storm simulation. The allowable release rate is determined by calculating the impervious area managed at the allowable release rate. Points shall vary depending on the release rate reduction.

TABLE PD-08.1. RUNOFF RATE CONTROL

| Runoff Rate ¹ | Points |
|-------------------------------------|--------|
| Allowable Release Rate ² | 0 |
| 2/3 Allowable Release Rate | 1 |
| 1/3 Allowable Release Rate | 2 |
| Zero Release | 3 |

1 – Runoff Rate = Added Impervious Area managed at Allowable Release Rate + bypass flow.

2 – Minimum allowable release rate shall equal the existing release rate of the added impervious area.

PD-08.2: 1-3 points. Flow Control. Manage the flow from at least 80 percent of the total annual runoff volume. To calculate the points earned for this scoring requirement, follow Steps 5 through 8 below (the steps for this scoring requirement start at 5 to avoid confusion with scoring requirement PD-08.1).

Note: All of PD-08.2 will be replaced with the following scoring requirements below.

The scoring element highlighted above is replaced by the scoring described below:

Requirement PD-08.2

1-3 Points. Runoff Volume Control

Volume control requires managing the runoff volume by providing storage below the runoff flow outlet to allow smaller events to infiltrate and larger events to mimic the predevelopment hydrograph. Points shall vary depending on the event managed.

TABLE PD-08.2. RUNOFF VOLUME CONTROL

| Rainfall Event Managed | Points |
|------------------------------|--------|
| 1-Year, 30-Minute Rainfall | 0 |
| 10-Year, 30-Minute Rainfall | 1 |
| 50-Year, 30-Minute Rainfall | 2 |
| 100-Year, 30-Minute Rainfall | 3 |

Resources

The following resources provide information on the criterion topic:

1. NOAA Atlas 14 Point Precipitation Frequency Estimates, <http://hdsc.nws.noaa.gov>

Scoring Sources

The project 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. Project Drainage Report or other relevant calculations and studies
2. Project Contract Documents

PD-09: Ecological Connectivity

1-4 points

Goal: Avoid, minimize, or enhance wildlife, amphibian, and aquatic species passage access, and mobility, and reduce vehicle-wildlife collisions and related accidents.

Sustainability Linkage

Improving ecological connectivity supports all of the triple bottom line sustainability principles by improving habitat for species while reducing accidents, therefore preventing the impacts associated with personal and public property damage, injury, and the loss of life.



Background and Scoring Requirements

Background

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

- **“Traditional Alternative”** – The traditional alternative is the alternative that would most likely be approached without consideration of impacts to habitat. For new alignments, this is typically the alignment that is most geometrically fitting given the beginning and end points. For reconstruction, this is typically the alignment option that widens the cross-section in-place without shifting alignments. In no case, should the traditional alternative be exaggerated beyond alignments that would be considered appropriate for the context in order to inflate the perceived reduction in impacts to habitats for this criterion.

Credit for enhancement can be obtained for this criterion through project-specific mitigation or through the use of mitigation banking.

Scoring Requirements

In order to achieve points for this criterion, the following prerequisite must be met.

Prerequisite PD-09.1P

0 points. Conduct Ecological Assessment

Conduct a site-specific ecological assessment of the roadway project using GIS data or regional expertise. Report the resulting impacts that the roadway has on the major ecosystems, according to the best scientific knowledge available. A project or resource agency biologist should be involved with the assessment. The ecological assessment should be consistent with the State-approved wildlife action plans, if available.

Requirement PD-09.1

1-3 points. Avoid or Minimize Impacts to Ecological Connectivity or Enhance Features

Points shall be achieved per Table PD-09.1.A on the following page. Points are **not** cumulative; rather the highest point value earned should be used. Note that more points are available for enhancing features on new alignments than existing alignments because more opportunities typically exist to improve ecological connectivity on new alignments.

TABLE PD-09.1.A. POINTS AND METHODS TO MINIMIZE IMPACTS TO AND ECOLOGICAL CONNECTIVITY

| Requirement | Points | Method |
|--------------------|---------------|--|
| PD-09.1a | 1 | Minimize Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize impacts to ecological connectivity as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alternative. |
| PD-09.1b | 2 | Avoid Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly avoid impacts to ecological connectivity as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 75% or more as compared to the traditional alternative. |
| PD-09.1c | 2 | Enhance features. For existing alignments only. Replace in-kind, retrofit, or upgrade any and all existing culverts and wildlife fencing structures or planting deemed structurally deficient, damaged, obsolete, insufficiently sized, or otherwise inadequate. Actions must be approved by the project ecologist, resource/regulatory biologist, or other appropriate staff. |
| PD-09.1d | 3 | Enhance features. For new alignments only. Install new dedicated or multi-use wildlife crossing structures and protective fencing (if needed) or planting as recommended by the wildlife assessment. Actions must be approved by the project ecologist, resource/regulatory biologist, or other appropriate staff. |
| PD-09.1e | 3 | Restore features. Re-establish past habitats, infrastructure, or add connectivity to re-establish corridors and habitats. Actions must be approved by the project ecologist, resource/regulatory biologist, or other appropriate staff. Some examples of restorative features include: <ul style="list-style-type: none"> • Construction of fish ladders. • Acquisition of parcels within the watershed or parcels identified by resource agencies that provide special protection and enhancement of these habitats. |

Dedicated wildlife crossings are structural features of the roadway that are not used by motorized vehicles. Where deemed appropriate by an ecologist, crossings may be shared by non-motorized modes of transport. No points will be awarded in the following conditions:

1. For projects that maintain or rehabilitate existing ecological connections to out-of-date or current standards (i.e., routine maintenance of drainage culverts does not qualify).
2. Pre-existing ecological connectivity features: all new features or upgrades must be due to and completed as part of the roadway project.
3. Projects that add wildlife connectivity features where such features are clearly outside of the project context.
4. Projects located in a network that is systematically inadequate. However, points could be awarded for such projects where it is demonstrated that a program is in place at the owner agency for systematic improvements on that network, and that this project fits this program.

Requirement PD-09.2

1 point. Advanced Consultation and Integration with Broader Ecological Plans

The project team went above and beyond current consultant requirements by engaging natural resource and regulatory agencies throughout the planning process and by ensuring consistency with broader (metropolitan or statewide) planning goals and objectives.

Resources

None referenced.

Scoring Sources

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

1. Ecological study performed for the project provided in NEPA documentation. State permitting documentation that includes an ecological connectivity element.
2. Contract documents showing wildlife crossing improvements.
3. Technical report that describes minimization that occurred throughout the project development process.

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PD-10: Pedestrian Facilities

1-3 points

Goal: Provide safe, comfortable, convenient, and connected pedestrian facilities for people of all ages and abilities within the project footprint.

Sustainability Linkage

Planning and designing for increased pedestrian activity supports all of the triple bottom line sustainability principles by improving the safety for all users, enhancing livability and quality of life in communities, improving access to economic and educational opportunities and essential services, supporting local businesses and economic development, promoting physical activity and public health, and reducing vehicle emissions.



Affected Triple Bottom Line Principles

Background and Scoring Requirements

Background

To receive credit for this criterion, the project must enhance existing pedestrian facilities or provide new pedestrian facilities that are context-sensitive and appropriate. Reconstruction of pedestrian facilities in kind when widening roadways and/or bridges does not meet the requirements of this criterion, although this is still encouraged.

Applicable Pedestrian Guidelines

Per the FHWA Memorandum: *Bicycle and Pedestrian Facility Design Flexibility*¹ and the *Questions & Answers about Design Flexibility for Pedestrian and Bicycle Facilities*², FHWA recommends a flexible approach to pedestrian facility design. The AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*³ is the primary national resource for planning, designing, and operating pedestrian facilities. The National Association of City Transportation Officials' (NACTO) *Urban Street Design Guide*⁴, and the Institute of Transportation Engineers (ITE) *Designing Urban Walkable Thoroughfares: A Context Sensitive Approach*⁵ guide builds upon the flexibilities provided in the AASHTO guide and can be used when designing safe and convenient pedestrian facilities. The NACTO guide does not supersede compliance with 2010 Americans with Disabilities Act (ADA) *Standards for Accessible Design*⁶, the *Public Rights-Of-Way Accessibility Guidelines*⁷ (PROWAG), and *The Manual on Uniform Traffic Control Devices for Streets and Highways*⁸ (MUTCD).

Qualifying Features

For pedestrian facilities to meet scoring requirements, improvements must be context sensitive and appropriate, go beyond minimum requirements, meet the needs of users of all ages and abilities, and include features that are safe, comfortable, convenient, and connected, such as those listed below.

- Examples of **Safe and Comfortable** features include:
 - Increased sidewalk width – an increased width allows for pedestrian amenities without impeding on the walkway width and increases pedestrian comfort.
 - Improved intersection design for pedestrians – such as countdown signal heads, narrower lanes, pedestrian medians, and curb extensions.

- Trees – provide a physical buffer between pedestrians and moving vehicles, while also providing shade and potentially reducing traffic speeds.
- Sufficient lighting on all sidewalks within the project footprint
- Landscaping, art, furniture, and social amenities (such as parklets, sidewalk cafes, and other gathering spaces) as appropriate to promote the use of the facilities and create a comfortable, pleasing facility.
- Examples of **Convenient and Connected** features include:
 - New facilities that connect to existing facilities in the vicinity as part of the project.
 - Infrastructure that connects homes to places of employment, schools, shopping, services, transit, and recreation areas.

Scoring Requirements

Prerequisite PD-10.1P

0 points. Meet ADA Requirements

Facilities must meet ADA requirements to receive credit. No credit is given for improvements and it is assumed that retrofits to existing facilities will bring them up to required ADA standards.

Requirement PD-10.1

1 point. Install Missing Pedestrian Connections

Review pedestrian master plans and other relevant local, regional, and state documents to determine if the project presents an opportunity to incorporate missing pedestrian connections AND fill gaps in the pedestrian network as part of the project.

Requirement PD-10.2

1-2 points. Install Safe, Comfortable, Convenient, and Connected Pedestrian Features

One of the following requirements may apply:

- **Requirement PD-10.2a**

1 point. Enhance Existing Pedestrian Facilities

Implement new or improve existing pedestrian facilities to include both safe and comfortable features and convenient and connected features. Current facilities do not qualify for this criterion without additional effort, such as upgrades, improvements, or construction of new features. The attempt to enhance pedestrian transportation should be deliberate and a direct result of the project. No points are earned for improvements and retrofits to bring existing facilities into ADA compliance. Examples of enhancements include curb extensions, pedestrian crossing islands, adding a landscaped buffer to an existing sidewalk, and making intersections safer and more comfortable to navigate on foot.

OR

- **Requirement PD-10.2b**

2 points. Develop New Pedestrian Facilities

Design and construct new pedestrian facilities that include both safe and comfortable features and convenient and connected features. New facilities include physical or constructed changes to the roadway structure, dimensions, or form that provide pedestrian access within the right-of-way (ROW) or roadway corridor.

Reconstruction of facilities with the same features does not meet this requirement (e.g. widening road and replacing sidewalk, or constructing a new bridge with the same sidewalk as a prior bridge, etc.)

Resources

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

1. FHWA, *Bicycle and Pedestrian Facility Design Flexibility* (2013), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design_flexibility.cfm
2. FHWA, *Questions & Answers about Design Flexibility for Pedestrian and Bicycle Facilities* (2014), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design_flexibility_qa.cfm
3. AASHTO, *Guide for the Planning, Design, and Operation of Pedestrian Facilities, First Edition* (2004), https://bookstore.transportation.org/item_details.aspx?id=119
4. NACTO, *Urban Street Design Guide* (2013), <http://nacto.org/usdg/streets/>
5. ITE, *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (2010), <http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>
6. United States Department of Justice, *Americans with Disabilities Act (ADA) Standards for Accessible Design* (2010), http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm
7. United States Access Board, *Public Rights-of-Way Accessibility Guidelines (PROWAG)* (2011), <http://www.access-board.gov/guidelines-and-standards/streets-sidewalks>
8. FHWA, *Manual on Uniform Traffic Control Devices for Streets and Highways* (2009 with Revisions 1 and 2, May 2012), http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm

Additional Resources

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

9. FHWA, *Bicycle & Pedestrian Design Guidance website* (2015), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/
10. United States Access Board, *Shared Use Paths Guidelines and Standards* (2011) at <http://www.access-board.gov/guidelines-and-standards/streets-sidewalks>

Scoring Sources

The project 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. Purpose and need or other planning documents addressing pedestrian access on the roadway project, including how it fits with existing land uses and/or existing General and Transportation Plans.
2. Results of public input on proposed pedestrian facilities, if any.
3. Contract documents showing enhanced pedestrian facilities incorporated.

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PD-11: Bicycle Facilities

1-3 points

Goal: Provide safe, comfortable, convenient, and connected bicycling facilities within the project footprint.

Sustainability Linkage

Planning and designing for increased bicycling supports all of the triple bottom line sustainability principles by improving the safety for all users, enhancing livability and quality of life in communities, improving access to economic and educational opportunities and essential services, supporting local businesses and economic development, promoting physical activity and public health, and reducing vehicle emissions.



Background and Scoring Requirements

Background

To receive credit for this criterion, the project must enhance existing bicycle facilities or provide new bicycle facilities that are context-sensitive and appropriate. Reconstruction of bicycle facilities in kind when widening roadways and/or bridges does not meet the requirements of this criterion, although this is still encouraged.

Applicable Bicycle Guidelines

Per the FHWA Memorandum: *Bicycle and Pedestrian Facility Design Flexibility*¹ and the *Questions & Answers about Design Flexibility for Pedestrian and Bicycle Facilities*², FHWA recommends a flexible approach to bicycle facility design. The AASHTO *Guide for the Development of Bicycle Facilities*³ is the primary national resources for planning, designing, and operating bicycle facilities. The National Association of City Transportation Officials' (NACTO) *Urban Bikeway Design Guide*⁴, NACTO *Urban Street Design Guide*⁵, and the Institute of Transportation Engineers (ITE) *Designing Urban Walkable Thoroughfares: A Context Sensitive Approach*⁶ guide builds upon the flexibilities provided in the AASHTO guide and can be used when designing safe and convenient bicycle facilities. The NACTO guides do not supersede compliance with 2010 Americans with Disabilities Act (ADA) *Standards for Accessible Design*⁷, the *Public Rights-Of-Way Accessibility Guidelines*⁸ (PROWAG), and The *Manual on Uniform Traffic Control Devices for Streets and Highways*⁹ (MUTCD).

Qualifying Features

For bicycle facilities to meet scoring requirements, improvements must be context sensitive and appropriate, go beyond minimum requirements, meet the needs of users of all ages and abilities, and include features that are safe, comfortable, convenient, and connected, such as those listed below.

- Examples of **Safe and Comfortable** features include:
 - Bicycle-friendly stormwater drains (grates)
 - Resurfaced bike lanes
 - Traffic calming features
 - Buffered Bike Lanes/ Contra-Flow Bike Lanes/ Left-Side Bike Lanes

- Separated Bike Lanes (also known as Cycle Tracks and Protected Bike Lanes)
- Intersection treatments such as Bike Boxes, Median Refuge Islands, and Through Bike Lanes
- Separation between high-speed/high-volume traffic and bicyclists, such as
 - Widened shoulders
 - Parallel bike routes (bike boulevards or bikeways)
 - Multi- /Shared-Use Paths
 - Dedicated bicycle bridges and tunnels
- Bicycle signals, signing, and pavement marking, such as
 - Rapid Flash Beacons
 - Signal Detection and Actuation
 - Colored Pavement
 - Bike Route Wayfinding
- Landscaping specifically intended to enhance bicycle facilities
- Lighting
- Examples of **Convenient and Connected** features include:
 - Parking and bicycle share parking (except bicycle amenities at park-and-ride lots, bicycle parking is included in PD-12: Transit and HOV Facilities)
 - End-of-trip facilities as appropriate to promote the use of the bicycle facilities
 - Facilities that connect homes to places of employment, schools, shopping, and essential services such as health care, transit, and recreation areas
 - New facilities that connect to existing bike facilities as part of the project

Scoring Requirements

Requirement PD-11.1

1 point. Install Missing Bicycle Connections

Review bicycle master plans and other relevant local, regional, and state documents to determine if the project presents an opportunity to incorporate missing bicycle connections AND fill gaps in the bicycle network as part of the project. High traffic volumes and speeds should not be used as justification for not accommodating bicyclists because many of these roadways are the only linkages that connect different parts of communities.

Requirement PD-11.2

1-2 points. Install Safe, Comfortable, Convenient, and Connected Bicycle Features

One of the following requirements may apply:

- **Requirement 11.2a**

1 point. Enhance Existing Bicycle Facilities

Implement new features or enhance existing bicycle facilities to include both safe and comfortable features and convenient and connected features. Current facilities do not qualify for this criterion without additional effort, such as upgrades, improvements, or construction of new features. The attempt to enhance bicycle transportation should be deliberate and a direct result of the project. One way that an existing bicycle facility can be enhanced is to design and implement improvements at intersections, driveways, and other potential conflict points.

OR

- **Requirement PD-11.2b**

2 points. Develop New Bicycle Facilities

Design and construct new bicycle facilities that include both safe and comfortable features and convenient and connected features. New facilities include physical or constructed changes to the roadway structure, dimensions, or form that provide bicycle access within the right-of-way (ROW) or roadway corridor. To earn points, the bicycle facilities must be Class I (separated) or Class II (bike lanes). Lanes shared with motorized vehicles and shoulders do not meet this requirement. Reconstruction of facilities with the same features does not meet this requirement (e.g. widening road and replacing bike lane, or constructing a new bridge with the same bicycle facilities as a prior bridge, etc.)

Resources

Above-Referenced Resources

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

1. FHWA, *Bicycle and Pedestrian Facility Design Flexibility* (2013), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design_flexibility.cfm
2. FHWA, *Questions & Answers about Design Flexibility for Pedestrian and Bicycle Facilities* (2014), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design_flexibility_qa.cfm
3. AASHTO, *Guide for the Development of Bicycle Facilities*, 4th Edition (2012), https://bookstore.transportation.org/collection_detail.aspx?ID=116
4. NACTO, *Urban Bikeway Design Guide, Second Edition* (2014), <http://nacto.org/cities-for-cycling/design-guide/>
5. NACTO, *Urban Street Design Guide* (2013), <http://nacto.org/usdg/streets/>
6. ITE, *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (2010), <http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>
7. United States Department of Justice, *Americans with Disabilities Act (ADA) Standards for Accessible Design* (2010), http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm
8. United States Access Board, *Public Rights-of-Way Accessibility Guidelines (PROWAG)* (2011), <http://www.access-board.gov/guidelines-and-standards/streets-sidewalks>
9. FHWA, *Manual on Uniform Traffic Control Devices for Streets and Highways* (2009 with Revisions 1 and 2, May 2012), http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm

Additional Resources

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

10. FHWA, *Separated Bike Lane Planning and Design Guide* (2015), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/page00.cfm
11. FHWA, *Bicycle & Pedestrian Design Guidance website* (2015), http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/
12. United States Access Board, *Shared Use Paths Guidelines and Standards* (2011), <http://www.access-board.gov/guidelines-and-standards/streets-sidewalks>

Scoring Sources

The project 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. Purpose and Need addressing bicycle access within the roadway project, including how it fits with existing land uses and/or existing General and Transportation Plans, project analysis, or a Bicycle Master planning process.
2. Results of public input on proposed bicycle facilities, if any.
3. Copy of the contract specification and plans for proposed bicycle facilities.
4. Total cost associated with new or improved bicycle facilities.

PD-12: Transit and HOV Facilities

1-5 points

Goal: Promote use of public transit and carpools in communities by providing new transit and high occupancy vehicle (HOV) facilities, or by upgrading existing facilities within the project footprint.



Sustainability Linkage

Promoting transit and HOV use supports all of the triple bottom line sustainability principles by expanding modal choices available to the public while also reducing traffic congestion, commuting costs, and emissions.

Background and Scoring Requirements

Scoring Requirements

To meet any of the requirements below, the transit and HOV facilities installed shall be consistent with the need, purpose, and appropriateness for transit and HOV facilities within the project footprint. To receive points for this criterion, the project must include contextually appropriate transit and/or HOV facilities that go beyond minimum design standards and requirements, and strive to create safe, versatile, attractive, and convenient transit and HOV networks that are integrated with pedestrian and bicycling networks.

Requirement PD-12.1

1–5 points. Install Transit Features

Achieve the requirements within the project footprint listed in Table PD-12.1,A, which is roughly based on the Federal Transit Authority (FTA) criteria from *Characteristics of Bus Rapid Transit for Decision-Making (CBRT)*¹, FTA’s *TCRP 90, Bus Rapid Transit*², and AASHTO’s *Guide for High-Occupancy Vehicle (HOV) Facilities, 3rd Edition*³.

Points are **not** cumulative; rather the highest point value achieved should be used.

TABLE PD-12.1.A. AVAILABLE POINTS FOR TRANSIT AND HOV ACCESS FEATURES (CONTINUED ON NEXT PAGE)

| Requirement | No. Points | Requirement Description |
|-------------|------------|--|
| PD-12.1a | 1 | <p>Any of one the following:</p> <ul style="list-style-type: none"> • Enhance at least 50 percent of transit station or stop amenities (such as lighting, trash/recycling bins, benches, bike parking, pay phones, heating and/or cooling, etc.) • Improve at least 50 percent of the transit and HOV facility signage (related to transit and HOV) and vehicular access (beyond basic ADA requirements) • Provide transit shelters at more than 50 percent of the corridor stations/stops • Provide seamless pedestrian access within at least a half-mile and/or seamless bicycle access within at least three miles of a public transportation stop or park and ride lot. (see the Federal Register’s <i>Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law</i>⁴.) • Provide park and ride lot(s) in strategic locations. |

| Requirement | No. Points | Requirement Description |
|-------------|------------|---|
| PD-12.1c | 2 | Any one of the following: <ul style="list-style-type: none"> • Implement two or more of the improvements from PD-12.1a. • Implement physical or constructed changes to the roadway structure, dimensions, or form that provide for future HOV access or minor dedicated transit access within the right-of-way (ROW), such as a carpool lane for HOV vehicle, queue jump lanes for transit vehicles, shoulder-running buses, on-street bus lane, bus rapid transit, or an expressway bus lane. |
| PD-12.1d | 3 | Implement physical or constructed changes to the roadway structure, dimensions, or form that provide HOV access or minor dedicated transit access within the ROW, such as a carpool lane for HOV vehicles, queue jump lanes for transit vehicles, or shoulder-running buses . |
| PD-12.1e | 4 | Implement physical or constructed changes to the roadway structure, dimensions, or form that provide dedicated transit access within the ROW, such as an on-street bus lane, bus rapid transit, or an expressway bus lane . |
| PD-12.1f | 5 | Implement physical or constructed changes to the roadway structure, dimensions, or form that provide exclusive mass transit access within the ROW, such as at-grade or grade-separated transit-ways or transit served park-and-ride lots . |

Resources

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

1. FTA, *Characteristics of Bus Rapid Transit for Decision-Making (CBRT)* (2009), http://www.fta.dot.gov/documents/CBRT_2009_Update.pdf
2. FTA, *TCRP 90, Bus Rapid Transit* (2009), http://www.nbrti.org/docs/pdf/tcrp_rpt_90v1.pdf
3. AASHTO, *Guide for High-Occupancy Vehicle (HOV) Facilities, 3rd Edition* (2004), https://bookstore.transportation.org/item_details.aspx?ID=114
4. Federal Register, *Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law* (2011), <https://federalregister.gov/a/2011-21273>

Scoring Sources

The project 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. Purpose and need for transit and HOV access on the roadway project, including how it fits with existing land uses and/or existing General and Transportation Plans.
2. Contract plans and specifications showing project improvements.
3. Total cost associated with new or improved transit and HOV facilities.
4. Contract specifications and budget items addressing transit and HOV.

PD-13: Freight Mobility

1-7 points

Goal: Enhance mobility of freight movements, decrease fuel consumption and emissions impacts, and reduce freight-related noise.

Sustainability Linkage

Enhancing freight mobility supports the environmental and economic sustainability principles by providing features that make freight transportation more efficient, thereby reducing fuel consumption, decreasing emissions, and reducing noise pollution.



Background and Scoring Requirements

Scoring Requirements

Facilities installed for this requirement shall be consistent with the need, purpose, and appropriateness for freight mobility within the project footprint.

Requirement PD-13.1

1 – 7 points Implement Freight Access Features

Implement one or more of the features in Table PD-13.1.A. Points for features are cumulative if roadways have more than one feature; however, this criterion shall not exceed a total of seven points.

**TABLE PD-13.1.A. POINTS AND REQUIREMENTS FOR FREIGHT ACCESS PROJECT FEATURES
(CONTINUED ON THE FOLLOWING PAGE)**

| Requirement | Points | Feature | Requirement Descriptions |
|-------------|--------|--|--|
| PD-13.1a | 1 | No-idling policy and signage (no-idling policy within certain parameters, such as outside air temperature) | <ul style="list-style-type: none">Implementation and appropriate number consistent with project setting |
| PD-13.1b | 1 | Construct new rest area or rest stop, or expand existing rest area or rest stop | <ul style="list-style-type: none">Provides a significant number of new truck parking spots at or within a reasonable distance to a rest areaRegion near proposed rest area experiences extensive interstate shoulder, interchange shoulder, and/or off-road, non-assigned parking by tractor-trailers |

| Requirement | Points | Feature | Requirement Descriptions |
|-------------|--------|---|---|
| PD-13.1c | 2 | Safety improvements specifically for freight (e.g., additional safety signage, speed warnings systems for hills, other intelligent transportation system solutions) | <ul style="list-style-type: none"> • Implementation and appropriate number consistent with project setting • Meet requirements in the AASHTO Policy on Geometric Design of Streets and Highways¹ such that there are no height, weight, or turning radius restrictions for freight vehicles |
| PD-13.1d | 2 | Physical or otherwise constructed grade, alignment, or other design adjustments for truck safety, mobility, and the reduction of freight-related noise | <ul style="list-style-type: none"> • Implementation and appropriate number consistent with project setting • Include railroad overpass clearance improvements for rail links targeted for freight mobility (i.e., do not preclude rail double stack clearance) • Pullout areas for snow chain-up |
| PD-13.1e | 3 | Construct new dedicated truck delivery parking areas or repurpose an existing parking area for truck delivery-only. | <ul style="list-style-type: none"> • Speeds 35 miles per hour or less (local traffic) • Accommodate 40-foot delivery trucks; design can be for smaller delivery trucks if appropriate based on nearby businesses • Accessible within the project site (i.e., located in a parking lane on a local street) • Financed with project budget • Appropriate signage (type and number) within project area |
| PD-13.1f | 3 | Automated Weigh-In-Motion stations | <ul style="list-style-type: none"> • Accessible within the project site (i.e., located along the right-of-way), or in close proximity to the roadway |
| PD-13.1g | 3 | Increase transportation efficiencies for moving freight through features such as dedicated rail or intermodal facilities. | <ul style="list-style-type: none"> • Include features that promote the reduction of traditional truck traffic on the roadway system, grade separated crossings, rail line connections, and dedicated freight connector roadways. • Ensure connections between intermodal freight facilities (rail, water port, airport) and nearby highways have sufficient capacity, minimize distance and incompatible, adjacent land uses to the greatest degree possible, and are appropriately designed and maintained |
| PD-13.1h | 4 | Virtual Weigh-In-Motion stations | <ul style="list-style-type: none"> • Accessible within the project site (i.e., located along the right-of-way) • Within close proximity to the roadway project right-of-way |

| Requirement | Points | Feature | Requirement Descriptions |
|-------------|--------|--|--|
| PD-13.1i | 4 | Construct a new electrified rest stop or electrify an existing rest stop | <ul style="list-style-type: none"> • Minimum five electric hookups per stop. • Accessible within the project site (i.e., located at a highway exit) • Within close proximity to the roadway project right-of-way. |
| PD-13.1j | 5 | Construct a new or convert an existing mixed-traffic lane to a truck-only lane | <ul style="list-style-type: none"> • Minimum density of 10% truck traffic (Hansen et al., 2008) • Minimum volume of 1300 trucks per hour per lane (Hansen et al., 2008) |

Resources

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

1. AASHTO, *Policy on Geometric Design of Streets and Highways* (2011) at https://bookstore.transportation.org/collection_detail.aspx?ID=110

Scoring Sources

The project 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. Purpose and need for freight access on the roadway project.
2. Results of public input on proposed freight upgrades or installations, if any.
3. Contract documents showing freight facilities.

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PD-14: ITS for System Operations

1-5 points

Goal: Improve the efficiency of transportation systems through deployment of technology and without adding infrastructure capacity in order to reduce emissions and energy use, and improve economic and social needs.



Affected Triple Bottom Line Principles

Sustainability Linkage

Intelligent Transportation System (ITS) applications support all of the triple bottom line principles by improving mobility, reducing congestion, and improving safety while avoiding environmentally- and economically-costly physical capacity increases.

Background and Scoring Requirements

Background

Include Intelligent Transportation System (ITS) applications listed in the ITS Joint Program Office (JPO), Office of the Assistant Secretary for Research and Technology (OST-R) [ITS Applications Overview website](#)¹ or equivalent source (also see FHWA's [Office of Operations website](#)²). Table PD-14.1.A lists the standard ITS applications and FHWA and ITS JPO website categories allowable for this criterion. All applications installed should be compliant with owner and/or state ITS architecture(s) (inter-operability). Visit the aforementioned website for more information on each of these applications.

The following list from the OST-R [Connected Vehicle Applications website](#)³ describes vehicle technologies that are being developed and researched to address real-world problems:

- **“Vehicle-to-Vehicle (V2V) Communications for Safety:** This research will investigate key questions such as are vehicle based safety applications using V2V communications effective and do they have benefits. Research is designed to determine whether regulatory action by the National Highway Transportation Safety Administration is warranted to speed the adoption of these safety capabilities.
- **Vehicle-to-Infrastructure (V2I) Communications for Safety:** This research will investigate similar questions about V2I communications, with an initial focus on applications based on the relay of traffic signal phase and timing information to vehicles. The purpose is to accelerate the next generation of safety applications through widespread adoption of V2I communications.
- **Data Capture and Management:** This research will assess what traffic, transit and freight data are available today from various sources, and consider how to integrate data from vehicles acting as "probes" in the system. The goal is to accelerate the adoption of transportation management systems that can be operated in the safest, most efficient and most environmentally friendly way possible.
- **Dynamic Mobility Applications:** This research will examine what technologies can help people and goods effortlessly transfer from one mode of travel (car, bus, truck, train, etc.) or route to another for the fastest and most environmentally friendly trip. The research seeks to make cross-modal travel truly possible for people and goods, and enable agencies and companies to manage their systems in light of the fact that people and goods will be changing modes often.

- **Road Weather Management:** This research will consider how vehicle-based data on current weather conditions can be used by travelers and transportation agencies to enable decision-making that takes current weather conditions and future weather forecasts into account.
- **Applications for the Environment: Real-Time Information Synthesis (AERIS):** This research will explore how anonymous data from tailpipe emissions can be combined with other environmental data. The goal is to enable transportation managers to manage the transportation network while accounting for environmental impact.”

Scoring Requirements

Requirement PD-14.1

1-5 points. Install ITS Features

Install one or more allowable applications for the categories in Table PD-14.1.A as defined per the FHWA ITS Applications Overview website referenced above, or equivalent. Points are awarded based on how many categories are installed; multiple applications in one category do not achieve additional points. Points for installing applications from multiple categories are cumulative; however, this criterion shall not exceed a total of five points.

TABLE PD-14.1.A. ALLOWABLE ITS APPLICATIONS FOR INTELLIGENT TRANSPORTATION SYSTEMS (CONTINUED ON NEXT PAGES)

| Requirement | Points | Category | Allowable Applications (Install 1 or More per Category) |
|--------------------|---------------|--|---|
| PD-14.1a | 1 | Electronic Payment & Pricing | Electronic Toll Collection Congestion Pricing Value Pricing |
| PD-14.1b | 1 | Emergency Management / Response & Recovery | Hazardous Materials Management Early Warning System Evacuation & Re-Entry Management Emergency Traveler Information Temporary Incident Management |
| PD-14.1c | 1 | Enforcement | Speed Enforcement Traffic Signal Enforcement Managed Lane Enforcement Ramp Meter Enforcement |
| PD-14.1d | 1 | Information Dissemination | Dynamic Message Signs (DMS) Highway Advisory Radio (HAR) In-Vehicle Systems (IVS) In-Terminal/Wayside Dynamic Parking Internet/Wireless 511 |
| PD-14.1e | 1 | Information Management | Data Archiving |

| Requirement | Points | Category | Allowable Applications (Install 1 or More per Category) |
|--------------------|---------------|-----------------------------|---|
| PD-14.1g | 1 | Lane Management | HOV Facilities Reversible Flow Lanes Congestion Pricing Lane Control Variable Speed Limits Emergency Evacuation Transit Signal Priority |
| PD-14.1h | 1 | Ramp Control | Ramp Metering Ramp Closures Priority Access |
| PD-14.1i | 1 | Road Weather Management | Pavement Conditions Atmospheric Conditions Water Level Fixed Winter Maintenance Mobile Winter Maintenance Bridge Anti-Icing Systems |
| PD-14.1j | 1 | Surveillance | Traffic Surveillance Infrastructure Surveillance |
| PD-14.1k | 1 | Traffic Control | Adaptive Signal Control Advanced Signal Systems Special Events Vehicle Restrictions |
| PD-14.1l | 1 | Traffic Incident Management | Call Boxes Response Routing Service Patrols |
| PD-14.1m | 1 | Traveler Information | Internet/Wireless 511 |
| PD-14.1n | 1 | Crash Prevention and Safety | Highway-Rail Crossing Warning Systems Active Collision Warning Active Animal Warning |
| PD-14.1o | 1 | Work Zone Management | Temporary Traffic Management Lane Control Variable Speed Limits Speed Enforcement Intrusion Detection Road Closure Management |

Resources

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

1. Office of the Assistant Secretary for Research and Technology (OST-R), ITS Applications Overview website, <http://www.itsoverview.its.dot.gov>
2. FHWA, Operations website at <http://ops.fhwa.dot.gov>

3. Office of the Assistant Secretary for Research and Technology (OST-R), Connected Vehicle Applications website, http://www.its.dot.gov/connected_vehicle/connected_vehicle_apps.htm

Scoring Sources

The project 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 the ITS applications and their corresponding categories.
2. Contract documents showing ITS applications to be installed on the project.
3. Photo(s) or other documentation of installed applications.

PD-15: Historic, Archaeological and Cultural Preservation

1-3 points

Goal: Preserve, protect, or enhance cultural and historic assets, and/or feature National Scenic Byways Program (NSBP) historic, archaeological, or cultural intrinsic qualities in a roadway

Sustainability Linkage

Preserving historic, archaeological, and cultural resources supports the social principle by emphasizing significant features that are valued by the community and by providing educational facilities or visual and/or physical access where applicable.



Background and Scoring Requirements

Scoring Requirements

In order to achieve points for this criterion, one of the following prerequisites must apply as noted in Scoring Requirement PD-15.1:

Prerequisite PD-15.1P

0 points. Listed in US National Register of Historic Places

Any part of the project or resource within the project boundaries is listed in the United States National Register of Historic Places (NRHP) or has been determined eligible for the National Register by a State, Local, or Tribal Historic Preservation Officer.

OR

Prerequisite PD-15.2P

0 points. Along America's Byways[®] or Equivalent

Any portion of the project is along one of America's Byways[®] (National Scenic Byway or All-American Road), a State Scenic Byway, an Indian Tribe Scenic Byway, or other route that was designated or officially recognized as such because of its significant *historic, cultural, and/or archaeological* features.

OR

Prerequisite PD-15.3P

0 points. Historic and/or Cultural Significance to Community

Any part of the project or resource within the project boundaries is recognized by the community as having *historic, cultural, and/or archaeological* significance to the community.

See Next Page

Requirement PD-15.1

1-3 points. Avoid or Minimize Impacts to Historic, Archeological or Cultural Qualities or Enhance Features

Points shall be achieved per table PD-15.1.A. Points are **not** cumulative; rather the highest point value earned should be used.

TABLE PD-15.1.A. POINTS AND REQUIREMENTS FOR HISTORIC, ARCHAEOLOGICAL, AND CULTURAL PRESERVATION

| Requirement | Points | Method |
|--------------------|---------------|--|
| PD-15.1a | 1 | Minimize Impacts. Show that an effort has been made to minimize “adverse effects” to the features from Prerequisite PD-15.1P or PD-15.2P , as described in Section 106 of the National Historic Preservation Act (NHPA). |
| PD-15.1b | 2 | Avoid Impacts. Show that measures have been taken to specifically avoid impacts to the features from Prerequisite PD-15.1P or PD-15.2P . Or show that impacts to the features were minimized and that the remaining impacts were deemed not adverse. |
| PD-15.1c | 3 | Enhance features. Protect, preserve, and/or enhance historic, archaeological, or cultural resources identified in Prerequisite PD-15.1P or PD-15.2P . This could be done through the installation of informational or interpretive facilities (e.g., viewpoint, kiosk, sign, or other installation for visitors detailing historic, archaeological, or cultural significance), where appropriate, to explain the resources or direct roadway users to the site, or through other activities. |
| PD-15.1d | 1 | Avoid Impacts. Show that measures have been taken to specifically avoid impacts to the features from Prerequisite PD-15.3P . |

Resources

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

1. FHWA, America’s Byways®, www.byways.org
2. NCHRP, United States National Register of Historic Places, <http://www.nps.gov/nr/>

Scoring Sources

The project 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 eligibility of the resource or location for the United States NRHP.
2. Documentation from associated organization(s), indicating what recognition of a tribal or other appropriate interests were or will be represented.
3. Description of project features and policies that minimize adverse effects according to Section 106 of NHPA.
4. Description of activities to avoid or improvements to enhance features.

PD-16: Scenic, Natural, or Recreational Qualities

1-3 points

Goal: Preserve, protect, and/or enhance routes designated with significant scenic, natural, and/or recreational qualities in order to enhance the public enjoyment of facilities.

Sustainability Linkage

Preserving scenic, natural, or recreational qualities supports the social principle by providing the public with an opportunity for increasing their appreciation and respect of the natural environment through facilities such as visitor centers, recreational features, and/or scenic viewpoints, and through promoting community use of facilities.



Background and Scoring Requirements

Scoring Requirements

In order to achieve points for this criterion, both of the following prerequisites must apply:

Prerequisite PD-16.1P

0 points. Location along America’s Byway® or Equivalent

Any portion of the project is along one of [America’s Byways® \(National Scenic Byway or All-American Road\)](#)¹, a State Scenic Byway, an Indian Tribe Scenic Byway, or other route that was designated or officially recognized as such because of its significant scenic, natural, and/or recreational qualities. This includes bridges spanning scenic and recreational waterways.

AND

Prerequisite PD-16.2P

0 points. Maintain Access

Existing access to scenic, natural, or recreational qualities has not been removed as a part of this project unless it is specifically removed to protect the scenic, natural, and/or recreational qualities themselves.

Requirement PD-16.1

1-3 points. Avoid or Minimize Impacts to Scenic, Natural, or Recreational Qualities or Enhance Features

Points shall be achieved per Table PD-16.1.A on the next page. Points are **not** cumulative; rather the highest point value earned should be used.

TABLE PD-16.1.A. POINTS AND REQUIREMENTS FOR SCENIC, NATURAL, OR RECREATIONAL QUALITIES

| Requirement | Points | Method |
|-------------|--------|--|
| PD-16.1a | 1 | Minimize Impacts. Show that an effort has been made to minimize “adverse effects” to the features from Prerequisite PD-16.1P. |

| Requirement | Points | Method |
|-------------|--------|--|
| PD-16.1b | 1 | Provide Access. Provide at least one access from the project to a designated area for vehicles to exit the traffic stream, stop, and experience scenic, natural, or recreational features along the roadway. These areas may be scenic viewpoints or overlooks, welcome centers, tourist activities, or information centers or recreation areas. They must be identified with signage conforming to 23 CFR 655 (the <i>Manual on Uniform Traffic Control Devices</i> ² , current revision) Part 2 – Signs. |
| PD-16.1c | 2 | Avoid Impacts. Show that measures have been taken to specifically avoid impacts to the features from Prerequisite PD-16.1P. |
| PD-16.1d | 3 | Enhance Features. Protect, preserve, or enhance scenic, natural, and/or recreational qualities along the roadway. This may include improvements to existing access points, signage, views, or to the scenic, natural, and/or recreational qualities themselves. Also included would be protecting these qualities by the removal of an existing access point if it has been determined that the access threatens them. |

Resources

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

1. FHWA, America’s Byways® (National Scenic Byway or All-American Road), <http://www.fhwa.dot.gov/byways/>
2. FHWA, *Manual on Uniform Traffic Control Devices*, <http://mutcd.fhwa.dot.gov/>

Scoring Sources

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

1. Documentation of national, State, or Indian tribe designation if a byway designation is used to satisfy this criterion or other documentation showing scenic, natural, or recreational values of a project.
2. Contract documents showing roadside access point or other protection, preservation, or enhancements.
3. Description of activities to minimize impacts to features.
4. Description of activities to avoid or improvements to enhance features.

PD-17: Energy Efficiency

1-8 points

Goal: Reduce energy consumption of lighting systems through the installation of efficient fixtures and the creation and use of renewable energy.

Sustainability Linkage

Reduction of energy consumption and conversion to renewable energy sources support the environmental and economic sustainability principles by reducing the demand for fossil fuel generated energy, reducing emissions, and reducing in long-term energy costs.



Background and Scoring Requirements

Scoring Requirements

Requirement PD-17.1

1 point. Evaluate Energy Needs and Implement Alternatives

Evaluate energy needs for the project and implement alternatives to reduce power consumption while still meeting lighting and safety standards. These alternatives could include reduction of lighting; retrofit or installation of energy efficient luminaires, beacons, and traffic signal equipment and lamps; replacing signs with retro reflective signs to eliminate sign lighting; and installation of renewable energy sources.

Requirement PD-17.2

1-6 points. Reduce Total Energy Consumption

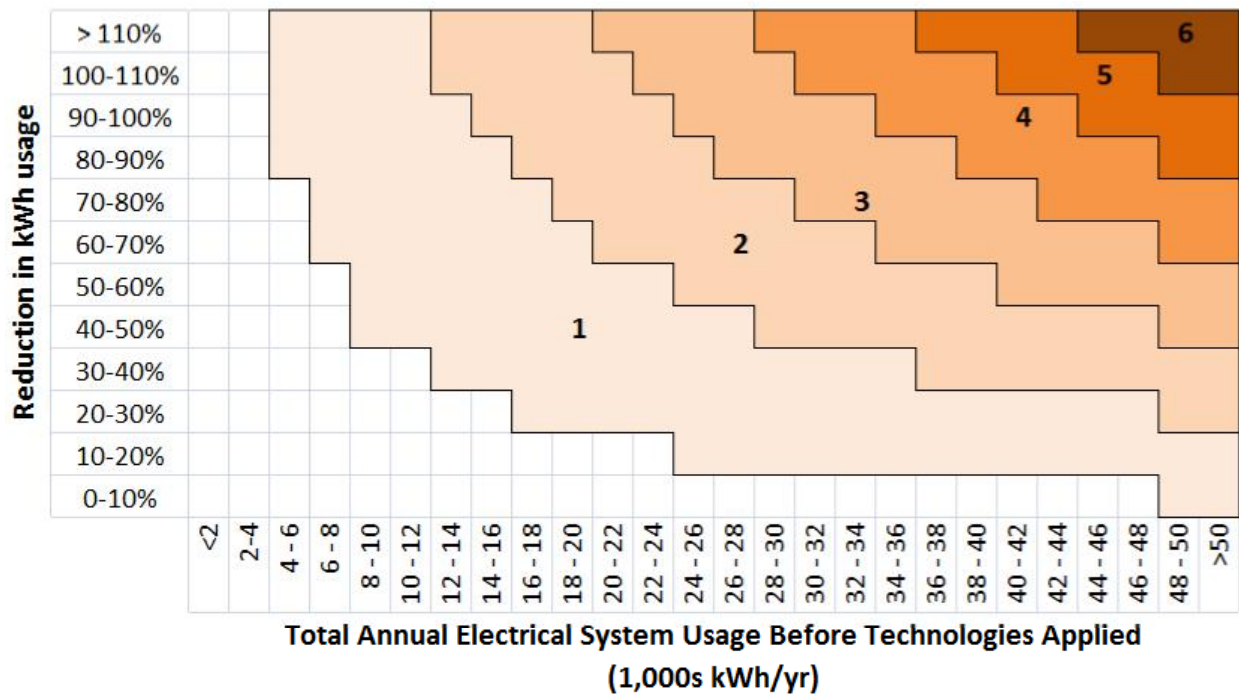
Reduce the energy consumption on the project through the installation of energy efficient lighting; the use of cut-off or full cut-off fixtures; and signal fixtures (e.g. LED lighting, induction lighting, or other new technology that is Underwriters Laboratories Inc. (UL) listed for the intended use) and through the installation of autonomous, on-site, renewable power sources (e.g., solar panels). All lighting facilities and systems considered for this criterion must be appropriate for the project. This means that installing pedestrian safety lighting on a project with no pedestrian accessibility will not be awarded credit. Similarly, lighting for new and/or improved driveways and parking lots are subject to the credits only if they are included within the project scope and budget boundaries.

Points are awarded based on the percentage of reduced power use. To determine this reduction, compare the annual power consumption for the baseline condition to the power consumption for the energy efficient electrical system design. Calculations for power consumption should be based on the following assumptions:

- The baseline condition should be calculated using the existing electrical system and assuming new improvements were to be constructed with high-pressure sodium (HPS) luminaires with cut-off optics.
- The baseline condition should be based on the lighting system operating 12 hours/day and 7 days/week.
- The two designs must both meet the same lighting standards.
- Wattage used for energy consumption shall be based on luminaire "input wattage" not lamp wattage.
- Consider contributions by renewable energy sources as a reduction in the power required.

- Do not include power savings associated with daylight sensors and activity level sensors.
- Use Table PD-17.2.A to calculate the number of points awarded based on these calculations.

TABLE PD-17.2.A. POINTS EARNED FOR ENERGY EFFICIENT ELECTRICAL SYSTEM DESIGN



Requirement PD-17.3

1 point. Establish Auditing Plan

Establish a plan for auditing energy use after the project is complete, as part of operations and maintenance.

Resources

None referenced.

Scoring Sources

The project 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):

- Documentation of energy usage evaluation and reduction plan.
- Calculations documenting energy usage if the roadway project was to be constructed with high-pressure sodium (HPS) luminaires and fixtures, the expected energy usage as designed, and the resulting energy savings as a percentage of calculation no. 1.
- Contract documents and/or cut sheets of the luminaires being installed on the project.
- Sample cut sheets and specifications for each technology installed on the project that shows the expected wattage of the component(s) used or generated.
- Documentation of plan for auditing energy use after construction.

PD-18: Site Vegetation, Maintenance and Irrigation

1-6 points

Goal: Promote sustainable site vegetation within the project footprint by selecting plants and maintenance methods that benefit the ecosystem.

Sustainability Linkage

Using sustainable site vegetation supports the environmental and economic sustainability principles by enhancing and protecting the ecosystem by choosing native and non-invasive species, and by reducing maintenance costs.



Background and Scoring Requirements

Background

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

- **“Native plant species”** – Plants native to the EPA Level III ecoregion per the EPA’s [Level III and IV Ecoregions of the Continental United States website](#)¹ that contains the roadway project site or known to naturally occur within 200 miles of the roadway construction site (also see Sustainable Sites Initiative’s [Guidelines and Performance Benchmarks](#)²).
- **“Non-invasive plant species”** – The following items should be performed to ensure that a plant species is considered “non-invasive”: 1) Consult existing local (e.g. city, county, and State natural resources agencies) vegetation policy and procedure that is applicable to the roadway project and ensure vegetation selected and seed mixes used are specifically formulated to prevent the use of invasive plant species and noxious weeds. The [National Invasive Species Information Center’s website](#)³ provides information on how to identify invasive species, 2) Use local and/or regional lists to identify invasive plant species; and 3) Comply with noxious weed laws. The Natural Resources Conservation Service provides Federal- and State-listed noxious species lists by state at USDA’s [Introduced, Invasive, and Noxious Plants website](#)⁴.
- **“Noxious weeds”** – Plants introduced into an ecosystem, which are often invasive, that once established are highly destructive, competitive and difficult to control. They have economic and ecological impacts and are very difficult to control once established. Some noxious weeds are a public health threat to humans and animals, while others destroy native and beneficial plant communities, increase erosion concerns, and clog waterways.
- **“Site vegetation”** – All vegetation associated with a particular roadway project and shall include all vegetation within the roadway’s right-of-way or disturbed area associated with the roadway project (whichever is greater). This can include, but is not limited to, roadside vegetation, decorative planting (e.g., planter boxes or potted plants in urban areas), and vegetation contained in stormwater facilities (e.g., bioswales and rain gardens). Vegetation includes plants and plant propagules such as seeds.

Highway corridors provide opportunities for the movement of invasive species through the landscape. Invasive plant or animal species can move on vehicles and in the loads they carry. Invasive plants can be moved from site to site during spraying and mowing operations. Weed seed can be inadvertently introduced into the corridor during construction on equipment and through the use of mulch, imported soil or gravel, and sod. Some invasive plant

species might be deliberately planted in erosion control, landscape, or wildflower projects. Millions of miles of highway rights-of-ways traverse public and private lands. Many of these adjacent lands have weed problems and the highway rights-of-way provide corridors for further spread. (*Federal Highway Administration Guidance on Invasive Species*⁵).

As explained by the United States National Arboretum (USNA) on their *Invasive Plants website*⁶, invasive species are particularly problematic in construction areas and road cuts as they thrive where the continuity of a natural ecosystem is breached. Ultimately, invasive plants alter habitats and reduce biodiversity. Rich, diverse plant communities can become barren, inhospitable expanses of invasive plants with little value to wildlife. Invasive plants may even deplete groundwater resources. Plants introduced to North America from other parts of the world have come to dominate millions of acres of forest, desert, prairie, and wetlands by out-competing native species.

Native plant species are beneficial and sustainable for roadway projects as they are well adapted to their native climate and soil types. Once established, native plants require little to no maintenance. Properly selected native plant species do not need insecticides or routine irrigation to thrive (sometimes, spot irrigation is needed to control invasive species). Native plants provide habitat for native animals and insects; native wildlife prefers native plants.

While not as beneficial to a native ecosystem, non-invasive plant species that are adapted to site conditions and climate can be considered if there are no native species available that would meet design intent. The following attributes should be considered in determining whether plants are appropriate for the site: cold hardiness, heat tolerance, salt tolerance, soil moisture range, plant water use requirements, soil volume requirements, soil pH requirements, sun/shade requirements, pest susceptibility, and maintenance requirements.” (Sustainable Sites Initiative’s *Guidelines and Performance Benchmarks*²) Both native and non-native plants selected should embody these attributes.

Scoring Requirements

In order to achieve points for this criterion, the following prerequisite must be met:

Prerequisite PD-18.1P

0 points. All site vegetation shall use, or consist of, native and/or non-invasive species and non-noxious species only. The project shall minimize disturbance of native species.

Requirement PD-18.1

1 – 3 points. Vegetation Planning and Selection

Implement one or more of the features in TablePD-18.1.A. Points for features are cumulative if the project has more than one feature; however, Requirement PD-18.1 shall not exceed a total of three points.

TABLE PD-18.1.A. VEGETATION PLANNING AND SELECTION

| Requirement | Points | Feature | Minimum Requirements |
|--------------------|---------------|-------------------------------|--|
| PD-18.1a | 1 | Long-term vegetation planning | Have an integrated vegetation management plan to maintain the project and/or corridor, including management of site vegetation and management of invasive species (or continued efforts to eradicate them). This could include a plan and/or financing to support site vegetation. |

| Requirement | Points | Feature | Minimum Requirements |
|-------------|--------|---|---|
| PD-18.1b | 1 | Vegetation to replace or enhance structures | Use non-invasive species for snow fences, sight screens, or other otherwise constructed items (vegetation for more than 50% of the project need for snow fences, sight screens to meet this requirement) and/or use non-invasive species to enhance the aesthetics of structural features, such as retaining walls and noise walls. |
| PD-18.1c | 1 | Invasive species prevention during construction | Bring only equipment free of dirt, mud, and organics into sensitive sites, such as wetlands, prairies, and water bodies. Have a written plan for the inspection and cleaning of vehicles to prevent the unintentional spread of invasive species during construction. |
| PD-18.1d | 2 | Native species | <ul style="list-style-type: none"> Plants or seed with a variety of native plant species only. (Non-invasive and non-noxious plants transplanted from impact areas within the project limits may be used.) Use five or more native species in plantings to increase biodiversity and native habitat for wildlife. Selection of native species shall be appropriate for the context of the project. Salvage rare plants and retain existing vegetation where possible. Reuse native plants salvaged from other projects. Eradicate all existing invasive and noxious plant species or, in cases where eradication is impossible, implement an invasive species management plan. |

Requirement PD-18.2

1-2 points. Maintenance and Irrigation

Implement one or more of the features in Table PD-18.2.A. Points for features are cumulative if project has more than one feature; however, Requirement PD-18.2 shall not exceed a total of three points.

TABLE PD-18.2.B. VEGETATION MAINTENANCE

| Requirement | Points | Feature | Minimum Requirements |
|-------------|--------|----------------------------|---|
| PD-18.2a | 1 | Non-mechanical maintenance | No mowing or other mechanical means of maintenance is planned or required for long-term vegetation maintenance. |
| PD-18.2b | 1 | No long-term irrigation | No irrigation is planned or needed after the plant establishment period. |

| Requirement | Points | Feature | Minimum Requirements |
|-------------|--------|---|--|
| PD-18.2c | 1 | Non-potable water for irrigation | Use captured rainwater, gray water, captured stormwater, non-potable water conveyed by a public agency, and /or other context-appropriate non-potable water (both in the plant establishment period and beyond) for irrigation needs. |
| PD-18.2e | 1 | Reduction in use of fertilizers, insecticides, and herbicides | Appropriately use only fertilizers and pesticides (herbicides, insecticides, fungicides) acceptable in USDA Organic farming. No use of synthetic fertilizers or synthetic pesticides during the construction and plant establishment period. |

Resources

Above-Referenced Resources

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

1. EPA, Level III and IV Ecoregions of the Continental United States website, http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm
2. The Sustainable Sites Initiative, *Guidelines and Performance Benchmarks* (2009), <http://www.coconino.az.gov/documentcenter/view/5469>
3. USDA, National Invasive Species Information Center's website, <http://www.invasivespeciesinfo.gov/index.shtml>
4. USDA, Introduced, Invasive, and Noxious Plants website, <http://plants.usda.gov/java/noxiousDriver>
5. FHWA, *Federal Highway Administration Guidance on Invasive Species* (August 10, 1999), http://www.environment.fhwa.dot.gov/ecosystems/wildlife/inv_guid.asp
6. USNA, *Invasive Plants* (2008), <http://www.usna.usda.gov/Gardens/invasives.html>

Additional Resources

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

7. USDA, *Introduced, Invasive, and Noxious Plants*, <https://plants.usda.gov/java/noxiousDriver>
8. FHWA, *Roadside Use of Native Plants*, http://www.environment.fhwa.dot.gov/ecosystems/vegmgmt_rdsduse.asp

Scoring Sources

The project 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 vegetation or landscape plan showing type, size, and location of all plant species. This can often be found in the standard project plans.
2. The specification sections relating to site vegetation. These are typically found in the technical specifications.
3. A copy of, or reference to (e.g., web address), the policy or procedure used to select plant species.
4. A design study report approved by the appropriate agency or authority that includes analysis of existing site vegetation, impacts, reuse of vegetation, references to evaluate the invasive species and noxious plants, and planned vegetation species.

5. An integrated vegetation management plan covering the long-term maintenance of vegetation (including irrigation, fertilizer and pesticide use, mechanical maintenance, and control of invasive species.)

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PD-18: Site Vegetation



(Supplement for Illinois Tollway Only)

Supplement Purpose

The purpose of this supplement is to incorporate additional best practices and scoring elements relevant to the Illinois Tollway into the INVEST criteria used to evaluate the Tollway's projects. Supplemental information was sourced from Tollway specific policies, procedures and practices, as well as sustainable practices included in the *Illinois Livable and Sustainable Transportation (I-LAST) Rating System and Guide*, version 2.02 that are not specifically mentioned in INVEST.

Scoring Requirements

PD-18.1: 1-3 Points. Vegetation Planning and Selection: Implement one or more of the features in Table PD-18.1.A. Points for features are cumulative if the project has more than one feature; however, Requirement PD-18.1 shall not exceed a total of three points.

The scoring element highlighted above is supplemented by adding the following rows to the scoring Table PD-18.1.A and adding the text below the table:

TABLE PD-18.1.A. VEGETATION PLANNING AND SELECTION

| Requirement | Points | Feature | Minimum Requirements |
|-------------|--------|---|---|
| PD-18.1e | 1 | Enhance native vegetation | Re-establish/expand native vegetation if in reclaimed work areas or abandoned old alignments. |
| PD-18.1f | 1 | Increase biodiversity and native habitat of wildlife | Use five or more native species in plantings to increase biodiversity and native habitat of wildlife. Selection of native species shall be appropriate to meet context and safety considerations for the project. |
| PD-18.1g | 1 | Mowing and vegetation management plan | Require a mowing and vegetation management plan to increase mowing heights and provide appropriate mowing frequency. |
| PD-18.1h | 1-2 | Avoidance/protection of individual and contiguous stands of desirable trees and localized areas of established, desirable vegetation. | <ul style="list-style-type: none">One point will be awarded for projects that through preservation and new planting increase the number of non-invasive tree species in the project area.Two points will be credited for avoidance of, or preservation of, local specimen trees as defined by the Tollway's guidance for tree replacement. |
| PD-18.1i | 2 | Minimize potential salt splash impacts through use of berms or vegetative screening | The project design minimizes salt spray, or incorporates a border of salt tolerant low maintenance plantings, or protects existing salt sensitive species by applying a sustainable solution. |

Scoring Sources

Add the following text to this section:

6. Appendix 7, Roadside Mowing Guide in the Tollway's Erosion and Sediment Control Landscape Manual.
7. Sections 250 to 254 and Sections 280 to 285 of the Standard Specifications.

PD-19: Reduce, Reuse and Repurpose Materials

1-12 points

Goal: Reduce lifecycle impacts from extraction and production of virgin materials by recycling materials.

Sustainability Linkage

Reducing and reusing 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

This criterion focuses on reducing and reusing materials while *PD-20: Recycle Materials* focuses on efforts to recycle materials per the descriptions and definitions provided below.

When pavements are originally constructed, the best materials available at the time are usually sourced and used during construction. As resources diminish, that often means that the best materials available for reconstruction are already in place in the existing infrastructure. In addition to reducing waste, recycling pavements allows us to reclaim the best materials that were originally available for construction.

Programs for waste reduction in the United States have generally taken on the concept of the 3Rs: reduce, reuse, and recycle. For the purposes of this criterion, as well as to *PD-20: Recycle Materials*, the key terms are defined as follows:

- **“Reducing”** is used in this tool to refer to processes that reduce the need for virgin paving and structural materials. Examples include soil stabilization methods to reduce the need for structural backfill or to reduce the required thickness of a new pavement or overlay; pavement preservation technologies that extend the life of existing pavements and reduce the need for new materials; bridge preservation technologies that extend the life of existing bridges and reduce the need for new structures and materials; retrofitting existing bridge structures to reduce the need for new structures and materials; or processes that incorporate existing pavement structures into new pavement structures (such as crack-and-seat and rubblization) to reduce the need for new materials and avoid the transportation of the existing used materials which would otherwise be removed from a project.
- **“Reusing”** is the reuse of a material or by-product from another industry for a new function in a transportation application. Examples of the beneficial use of industrial by-products include the incorporation of materials such as coal ash, fly ash, foundry sand, slag, asphalt shingles, construction and demolition materials, or other materials into a transportation project. These reused materials replace traditional materials with similar properties in specific applications. The reuse of these materials should assure that the engineering properties of the final product or mixture are equal to or better than obtained from using traditional materials, and that their economic value is demonstrated in accordance with the FHWA Recycling Policy. Reused materials provide environmental benefit by reducing the unnecessary landfilling of these materials. With proper engineering, these materials can be successfully incorporated into transportation applications and provide economic value to our projects.

- **“Recycling”** is the use of old materials for a new and similar use in a transportation application, or the salvaging and reprocessing of previously used materials from other transportation applications into a new transportation project. See PD-20: Recycle Materials for examples.
- **“Retrofit”** is defined as the addition of new features or technology to an older or existing facility. For INVEST purposes, a project would include retrofit components in order to reinforce structures to become more resistant and resilient to the forces of natural hazards and other environmental factors such as aging and weathering. It involves the consideration of changes in the mass, stiffness, damping, load path, and ductility of materials, as well as radical changes such as the introduction of energy absorbing dampers and base isolation systems.
- **“Existing pavement material”** is defined as all material within the project limits in the existing pavement structure (including surfacing and base material). This includes travelled lanes and shoulders, and pavement structures for physically separated bicycle and pedestrian pathways.
- **“Existing structural material”** is defined as all material within the project limits in existing non-pavement structures such as bridges (including overpasses), retaining walls, and stormwater infrastructure, such as vaults, pipes, and culverts. All existing structural materials include their foundations, for which volumes may be difficult to estimate. Where actual weights are not available, reasonable estimates may be used or volume may be estimated. To compute volume of hollow structural sections such as prefabricated members or corrugated steel, estimate the mass of the material and adjust for material density to determine volume. Note that for typical reinforced concrete sections, the steel does not need to be separated from the composite section for purposes of volume calculations and a composite density may be used.

Scoring Requirements

Implement one or more of the methods listed below. **Points for different scoring requirements are cumulative; however, this criterion shall not exceed a total of eight points.**

Requirement PD-19.1

2-4 points. Pavement Preservation

Perform pavement preservation activities such as crack sealing, chip sealing, slurry sealing, microsurfacing, or thin ACP overlays that extend the remaining service life of pavements. This scoring requirement applies to pavement preservations and not rehabilitation or reconstruction activities. FHWA’s *ACTION Pavement Preservation Definitions Memo*¹ defines pavement preservation as "a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations."

Points are awarded based on increase in remaining service life per Table PD-19.1.A.

TABLE PD-19.1.A. POINTS AWARDED FOR PAVEMENT PRESERVATION ACTIVITIES

| Points | Increase in Remaining Service Life ¹ |
|--------|---|
| 1 | 1 to 2 years |
| 2 | 2 to 5 years |
| 3 | 5 to 7 years |
| 4 | 7 to 10 years |

¹ More than 10 years is considered rehabilitation and isn’t eligible for this scoring requirement.

Requirement PD-19.2

1-3 points. Reduce Pavement Materials

Reduce the amount of new pavement materials needed through soil stabilization methods to reduce the required thickness of a new pavement or processes that incorporate existing pavement structures into new pavement structures. Points are awarded per Table PD-19.2.A based on the percentage of pavement area treated. The area treated is calculated based on the entire area of existing pavement materials that are preserved or reconstructed.

Soil stabilization methods may include the use of geosynthetics (geogrids and fabrics) to reduce the thickness of aggregate required for stabilization of subgrade; the use of geosynthetics to reduce the thickness of aggregate above the geosynthetics that would have been required for structural support when subgrade soils are susceptible to pumping and base course intrusion; the use of portland cement and/or cementitious by-product materials for soil stabilization for pavement construction, if it can be demonstrated that this process will reduce the use of natural aggregate (virgin aggregate or material hauled from off-site source) use for stabilization; other chemical stabilization; and fractured slab techniques, including crack-and-seat, and rubblization.

TABLE PD-19.2.A. POINTS AWARDED FOR REDUCING PAVEMENT MATERIALS

| Points | Percentage Pavement Area Treated |
|---------------|---|
| 1 | 50–74% |
| 2 | 75–99% |
| 3 | 100% |

Requirement PD-19.3

2-4 points. Bridge Preservation

Perform bridge preservation activities such as deck overlays, crack sealing, joint sealing, removing channel debris, lubricating bearings, cathodic protection, electrochemical chloride extraction and cleaning, and painting that extend the remaining service life of bridges. This scoring requirement applies to bridge preservations and not rehabilitation or reconstruction activities. For definitions and examples of bridge preservation, see the FHWA [Bridge Preservation Guide](#)². Points are awarded based on increase in remaining service life per Table PD-19.3.A.

TABLE PD-19.3.A. POINTS AWARDED FOR BRIDGE PRESERVATION ACTIVITIES

| Points | Increase in Remaining Service Life |
|---------------|---|
| 2 | 2 to 5 years |
| 3 | 5 to 7 years |
| 4 | 7 to 10 years |

Requirement PD-19.4

1-3 points. Retrofitting Bridges

Retrofit existing bridge structures to reduce the need for new structures and materials. This could include methods such that improve or add: stainless steel wire mesh composites, full height steel jackets, elastomeric bearings,

steel restrainer cables, shear keys, fiber reinforced polymers wraps, shape memory alloy devices, metallic and viscoelastic dampers, or pipe seat extenders. Points are awarded based on increase in remaining service life per Table PD-19.3.A above.

Requirement PD-19.5

1-3 points. Repurpose Pavements or Structures

Reuse existing pavements, structures, or structural elements for a new use by repurposing them for a use that requires equal or less loading. The purpose of this scoring requirement is to maintain and leverage existing pavements, structures, and structural elements for new uses where possible instead of using new materials. One method is to maintain existing pavements when new alignments are proposed and use the existing pavement for a new use, such as realigning a highway but maintaining the old one as a frontage road or multiuse path. Another method is to convert existing pavement to a different use, such as converting parking to travelled lanes (or vice versa) or converting pavement to multiuse paths or plazas.

Pavement to be repurposed shall not be processed or moved in any way; it shall remain in-place. Points are awarded per Table PD-19.5.A based on the percentage of existing pavement material (by area) reused and repurposed calculated based on the entire area of existing pavement materials included in the project.

TABLE PD-19.5.A. POINTS AWARDED FOR REUSING AND REPURPOSING PAVEMENTS IN PLACE

| Points | Percentage Pavement Reused and Repurposed |
|--------|---|
| 1 | 25–49% |
| 2 | 50–74% |
| 3 | 75% or more |

Requirement PD-19.6

1-3 points. Reuse Industrial By-Products

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

- **Requirement PD-19.6a**

1 point. Use By-Products for Pipe Bedding or Backfill

Using foundry sand or other industrial by-products in pipe bedding and backfill.

- **Requirement PD-19.6b**

2 points. Use By-Products in Roadway Elements

Reuse industrial by-products in pavement materials, ancillary structures, and other roadway elements. These could include one or more of the following: coal ash, fly ash, foundry sand, slag, tires, asphalt shingles, and construction and demolition materials.

Requirement PD-19.7

1 point. Recycling and Reuse Plan

Develop and implement a project-specific plan for the innovative reuse of waste materials other than the methods listed in PD-19.1 through PD-19.6.

Resources

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

1. FHWA, *ACTION Pavement Preservation Definitions Memo*, <http://www.fhwa.dot.gov/pavement/preservation/091205.cfm>
2. FHWA, *Bridge Preservation Guide*, <http://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf>

Scoring Sources

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

1. Calculations showing the remaining service life of pavements or bridges expected before the project and after, and clearly demonstrating an extended service life as a result of the treatments applied.
2. Calculation of the percentage pavement area treated, including the area of pavement treated and the existing pavement area preserved and retrofitted.
3. The approved mix design for the pavement materials.
4. Recycling and Reuse Plan.

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PD-20: Recycle Materials

1-10 points

Goal: Reduce lifecycle impacts from extraction, production, and transportation of virgin materials by recycling materials.

Sustainability Linkage

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

This criterion focuses on recycling of materials while *PD-19: Reduce, Reuse and Repurpose Materials* focuses on efforts to reduce and reuse materials per the descriptions and definitions provided below.

When pavements are originally constructed, the best materials available at the time are usually sourced and used during construction. As resources have diminished, that often means that the best materials available for reconstruction are already in place in the existing infrastructure. In addition to reducing waste, recycling pavements allows us to reclaim the best materials that were originally available for construction.

Programs for waste reduction in the United States have generally taken on the concept of the 3Rs: reduce, reuse, and recycle. For the purposes of this criterion, as well as for *PD-19: Reduce, Reuse and Repurpose Materials*, the key terms are defined as follows:

- **“Reducing”** is used in this tool to refer to processes that reduce the need for virgin paving and structural materials. See *PD-19: Reduce, Reuse and Repurpose Materials* for examples.
- **“Reusing”** is the reuse of a material or by-product from another industry for a new function in a transportation application. See *PD-19: Reduce, Reuse and Repurpose Materials* for examples.
- **“Recycling”** is the use of old materials for a new and similar use in a transportation application, or the salvaging and reprocessing of previously used materials from other transportation applications into a new transportation project. Examples of recycling solutions include the incorporation of reclaimed asphalt pavement (RAP) and recycled concrete aggregate (RCA); cold-in-place recycling (CIR); hot-in-place recycling (HIR); and full depth reclamation (FDR). Also included are the salvage and recycling of aggregate, rock, asphalt, concrete, wood, metal (rebar, sign posts, signal poles, etc.), and other materials that have previously been used in other transportation applications and can be incorporated into a new project. Examples include the salvage and recycling of sign posts, signal poles, luminaries, rock or concrete used as rip-rap, and asphalt millings used as a shouldering material. For bridges, an example would be using recycled steel girders from a roadway bridge for a new pedestrian structure.
- **“Existing pavement material”** is defined as all material within the project limits in the existing pavement structure (including surfacing and base material). This includes travelled lanes and shoulders, and pavement structures for physically separated bicycle and pedestrian pathways.
- **“Existing structural material”** is defined as all material within the project limits in existing non-pavement structures, such as bridges (including overpasses), retaining walls, and stormwater infrastructure such as

vaults, pipes, and culverts. All existing structural materials include their foundations, for which volumes may be difficult to estimate. Where actual weights are not available, reasonable estimates may be used or volume may be estimated. To compute volume of hollow structural sections such as prefabricated members or corrugated steel, estimate the mass of the material and adjust for material density to determine volume. Note that for typical reinforced concrete sections, the steel does not need to be separated from the composite section for purposes of volume calculations and a composite density may be used.

Scoring Requirements

Implement one or more of the methods listed below. Points for different methods are cumulative; however, this criterion shall not exceed a total of eight points.

Requirement PD-20.1

1-5 points. Recycled Asphalt Pavement or Recycled Concrete Aggregate

Use RAP or RCA in new pavement lifts or granular base course or embankments. The recycled materials can originate from the project and be recycled onsite or offsite and returned or recycled materials can originate from an offsite source. However, no points are awarded for removing paving materials from the project and sending them offsite to be recycled for another project(s).

Points are awarded based on the origin of the source material and location of recycling activities as well as the Average Recycled Content (ARC) per the following calculation and using Tables PD-20.1.A or PD-20.1.B (on the next page) as follows below.

$$ARC (\%) = \frac{\sum r_n}{\sum W_n} \times 100\%$$

Where:

r_n is the total weight or volume of RAP or RCA.

W_n is the total weight or volume of either all existing pavement materials or all bedding, backfill, and granular embankment materials per the method of recycling used.

n represents the number of materials considered in accordance with the method used.

TABLE PD-20.1.A. POINTS FOR AVERAGE RECYCLED CONTENT (PERCENT BY WEIGHT OR VOLUME OF MATERIALS) WHEN ORIGINATING FROM PROJECT AND RECYCLED ONSITE

| Recycling Method Used | Points Earned | | | | |
|---|---------------|-----|-----|-----|-------------|
| | 1 | 2 | 3 | 4 | 5 |
| Percent average recycled material (ARC) required for recycling in pavements (onsite recycling) | 10% | 20% | 30% | 40% | 50% or more |
| Percent average recycled material (ARC) required for granular base course or embankments (onsite recycling) | 20% | 30% | 40% | 50% | 60% or more |

TABLE PD-20.2.B. POINTS FOR AVERAGE RECYCLED CONTENT (PERCENT BY WEIGHT OR VOLUME OF MATERIALS) WHEN ORIGINATING FROM ONSITE AND RECYCLED OFFSITE OR ORGINATING OFFSITE

| Recycling Method Used | Points Earned | | | |
|--|---------------|-----|-----|-------------|
| | 1 | 2 | 3 | 4 |
| Percent average recycled material (ARC) required for recycling in pavements (offsite source or recycling) | 20% | 30% | 40% | 50% or more |
| Percent average recycled material (ARC) required for granular base course or embankments (offsite source or recycling) | 30% | 40% | 50% | 60% or more |

Requirement PD-20.2

2-6 points. In-Place Asphalt Pavement Recycling

Recycle pavement materials in place using cold-in-place recycling, hot-in-place recycling, and full depth reclamation methods. Points are awarded based on the percentage of pavement area recycled compared to the entire area of existing pavement materials as shown in Table PD-20.2.A.

TABLE PD-20.2.A. POINTS AWARDED FOR IN PLACE RECYCLING

| Percentage Pavement Area Recycled | Points Awarded by Method of Recycling | | |
|-----------------------------------|---------------------------------------|-----|-----|
| | HIR | CIR | FDR |
| 50–74% | 2 | 3 | 4 |
| 75–99% | 3 | 4 | 5 |
| 100% | 4 | 5 | 6 |

Requirement PD-20.3

1-2 points. Reuse of Sub-base Granular Material

Reuse the subbase granular material of existing pavement elements as subgrade embankment or as part of the new subbase during construction of the proposed new pavement structure.

Points are awarded based on the percentage of pavement area for which sub-base material was reclaimed and reused compared to the entire area of existing pavement materials as shown in Table PD-20.3.A.

TABLE PD-20.3.A. POINTS AWARDED FOR REUSE OF SUB-BASE GRANULAR MATERIAL

| Percentage Pavement Area Recycled | Points Awarded for Sub-base Reused |
|-----------------------------------|------------------------------------|
| 50–74% | 1 |
| 75–100% | 2 |

Requirement PD-20.4

1 point. Recycle Minor Structural Elements

Relocate and reuse at least 90 percent of the minor structural elements, including existing luminaires, signal poles, and sign structures that are required to be removed and/or relocated onsite or by the agency. Signs mounted on posts are not included in this criterion.

In order to achieve credit, the minor structural elements must be moved and reused onsite or provided to the agency's Maintenance & Operations group specifically for reuse. Elements shall be counted by numbers of foundations without regard to size of the structure. In this case, a signal pole would be counted as a single structure and an overhead sign structure would be counted twice because it has two foundations.

Requirement PD-20.5

2 points. Salvage or Relocate Buildings

Salvage or move a building instead of demolishing it.

Resources

None referenced.

Scoring Sources

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

1. A calculation that shows the computed percentage of pavement and/or structural material recycled.
2. Calculation of the percentage pavement area recycled in-place.
3. Documentation showing the origin and processing location of RAP or RCA.
4. A calculation that shows the percentage of luminaires, signal poles, and sign structures reused.
5. A payment clause or item for salvaging and relocating a building.

PD-20: Recycle Materials



(Supplement for Illinois Tollway Only)

Supplement Purpose

The purpose of this supplement is to incorporate additional best practices and scoring elements relevant to the Illinois Tollway into the FHWA's INVEST criteria used to evaluate the Tollway's projects. Supplemental information was sourced from Tollway specific policies, procedures and practices, as well as sustainable practices included in the *Illinois Livable and Sustainable Transportation (I-LAST) Rating System and Guide*, version 2.02 that are not specifically mentioned in FHWA's INVEST.

Scoring Requirements

Add the following scoring element to the end of FHWA's Criterion:

Requirement PD-20.6

1 point. Fractionated Recycled Asphalt Pavement

One additional point will be awarded for the use of fractionated recycled asphalt pavement (FRAP) at a higher percentage than RAP in the manufacturing of hot mix asphalt.

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PD-21: Earthwork Balance

1-5 points

Goal: Reduce the need for transport of earthen materials by balancing cut and fill quantities.

Sustainability Linkage

Balancing cut and fill quantities in a project supports the environmental and economic sustainability principles by reducing the environmental and economic costs associated with the transport of earthen materials.



Background and Scoring Requirements

Scoring Requirements

Requirement PD-21.1

3 points. Balance Cut and Fill Volumes within 10 Percent

Balance earthwork cut (excavation) and fill (embankment) volumes such that the percent difference between cut and fill is less than or equal to 10 percent of the average total volume of material moved. For purposes of this criterion, it is recommended that the owner use the following method and definitions, or equivalent, to compute cut and fill volumes. Include miscellaneous additional cut and fill such as outlet ditches and muck excavations, and account for moisture and density as well as shrink and swell. Note that for purposes of this criterion, all volumes are positive quantities.

One of the following scoring requirements may apply.

- **Requirement PD-21.1a**

3 points. Balance Cut and Fill Volumes without Construction Banking

Show that that design volumes (for projects that haven't been constructed) or actual construction volumes (for projects that have been constructed) meet:

$$\frac{(A + C) - (B + D)}{\frac{1}{2}(A + C + B + D)} \times 100\% \leq 10\%$$

A = Volume of Cross Section Cut

B = Volume of Cross Section Fill

C = Volume of Miscellaneous Cut

D = Volume of Miscellaneous Fill

Include the following materials in the calculations: (1) Soil stabilizer materials or other soil additives, (2) Removed topsoil materials, and (3) Unused cut or imported fill materials placed in stockpiles.

Exclude the following materials from the calculations: (1) Mechanical stabilizers such as rock bolts and geotextile fabric materials, (2) Structural aggregate for base courses in pavements, foundations, or superstructures such as bridges, (3) Structural backfill and drain rock specifically intended for utility trenches and stormwater infrastructure, and (4) Rock (Stable Rock, defined by the Occupational Health and Safety Administration) cuts sourced within the project boundary that are intended for use as structural aggregate within the project boundary.

OR

- **Requirement PD-21.1b**

1 point. Balance Cut and Fill Volumes Using Construction Banking

Show that the design volumes (for projects that haven't been constructed) or actual construction volumes (for projects that have been constructed) meet the Requirement PD-21.1a only if construction banking is used and the following requirements are met:

- Construction banking may be accomplished using adjacent projects or other phases of the same project.
- Trucking distance from banking stockpiles to project limits must be less than 10 miles.
- Banking stockpiles must be used and earthwork balanced within a period of 24 months.
- All stockpiles must have a temporary erosion and sedimentation control (TESC) plan in place and appropriate measures must be installed. Maintenance for TESC methods must be accounted for in the project being evaluated or the adjacent project sharing earthwork banking and maintenance must be completed and documented.

Requirement PD-21.2

1 point. Earthwork Management Plan

Establish, implement, and actively manage an Earthwork Management Plan for earthwork activities that focuses on reducing hauling, labor, and fuel costs

- Positioning and stockpiling – plan how fill is moved around the site to decrease dump truck travel trips.
- Actively manage available soil stockpiles with project earthwork needs.
- Provide guidance on how to manage cut and fills, for example:
 - Balancing “cuts and fills” per construction stage so that traffic can be maintained on the existing pavement during construction.
 - Off-siting of construction staging areas in previously developed area to eliminate land disturbance outside of the constructed project limits.
 - No land use or staging outside of that required for the proposed project footprint.
 - Reuse of top soil onsite (non-hazardous only).

Requirement PD-21.3

1 point. Preserve or reuse topsoil or spoils.

Show that the contract design requires the Contractor to preserve or reuse topsoil or spoils as noted in one or more of the practices below:

- **Topsoil Preservation.** Topsoil depth is maintained or increased in planting areas, appropriate for the proposed plant community.
- **Topsoil Preservation.** Design minimizes or eliminates the requirement for fertilizer nutrients.
- **Reuse of Topsoil.** Allow the reuse of top soil removed for grading and reuse of this material on site as long as it is determined non-hazardous material. This can include the use of soil to create berms elsewhere within the corridor, thereby eliminating the need for trucking or disposal.
- **Reuse Spoils within Project Corridor.** Utilize spoil material as fill as specified in plans and specifications within project limits or at locations specified in the plans.

Resources

None referenced.

Scoring Sources

The project 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. Grading plan, reporting total cut and fill quantities and total miscellaneous cut/fill.
2. Inspector or Contractor's actual construction earthwork volumes for the project, including actual cut and fill, volume of unused embankment materials, and volumes of imports to and exports from site.

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PD-22: Long-Life Pavement

1-7 points

Goal: Minimize life-cycle costs by designing long-lasting pavement structures.

Sustainability Linkage

Including long-life pavement supports the environmental and economic principles by reducing the life-cycle costs of the road and the need for raw materials over time.



Background and Scoring Requirements

Background

The definition of long-life pavement for this criterion is:

- Service life of 40+ years for new construction and major reconstruction projects that add travel lanes to an existing roadway or bridge. Service life of 20+ years for small reconstruction and bridge replacement projects that do not expand capacity of the roadway, preservation projects, and restoration projects.
- Pavement will have reduced potential for rutting, cracking, faulting, and spalling.
- Pavement will maintain desirable ride and surface texture characteristics with minimal intervention activities, if warranted, for ride and texture, joint resealing, and minor repairs.

This criterion is not applicable to roads that are not surfaced with hot mix asphalt (HMA) or portland cement concrete (PCC), such as gravel roads, dirt roads, and roads sealed with bituminous surface treatments. Existing pavements that are to partially remain in place (in any condition) can also qualify for this criterion. In these cases, evaluation shall be based on the final pavement structure, which may include (1) existing pavement remaining in place, and (2) any new pavement structure added. In this manner, a diamond grind of an existing PCC pavement or an overlay of an existing HMA pavement can qualify for this criterion if the resultant pavement structure meets the requirements stated above.

Scoring Requirements

Implement one or more of the methods listed below. **Points for different scoring requirements are cumulative; however, this criterion shall not exceed a total of seven points.**

Requirement PD-22.1

1-5 points. Long-Life Pavement Design

Long-life pavement design must be in accordance with a design procedure that is formally recognized, adopted, and documented by the project owner. In many instances (but not all), this could be the process described in AASHTO's *Guide for Design of Pavement Structures, 4th Edition with 1998 Supplement*¹ or the process described in AASHTO's *Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice*².

One of the following scores applies:

- **0 points.** No long-life pavement is used, it does not meet the minimum requirements of this criterion, or it does not meet the minimum quantities described below.

- **1 point. Bus Pull-outs.** Design at least 95 percent of the total new or reconstructed pavement surface area dedicated to bus pullouts to meet long-life pavement design criteria with specific bus axel loads considered. The length of the bus pullout designed should, at a minimum, include all pavements subject to turning and deceleration forces.
- **2 points. Dedicated or Primary Bus Lanes.** Design at least 75 percent of the total new or reconstructed pavement surface area for dedicated or primary bus lanes to meet long-life pavement design criteria with specific bus axel loads considered. Compute the total surface area of all trafficked lanes dedicated to buses and show that, at a minimum, 75 percent of that area is designed for long-life. Include stripe-to-stripe lane widths, including intersections.
- **5 points. Regularly Trafficked Lanes.** Design at least 75 percent of the total new or reconstructed pavement surface area for regularly trafficked lanes of pavement to meet long-life pavement design criteria. Compute the total surface area of all trafficked lanes and show that, at a minimum, 75 percent of that area is designed for long-life. Do not include shoulders, medians, sidewalks, and other incidental paved areas in the computation.

Requirement PD-22.2

5 points. Increase Asphalt Concrete Pavement Density

Design and specify 100 percent of the total new or reconstructed asphalt pavement for regularly trafficked lanes using materials and technologies to achieve a field construction density of 94 percent of maximum theoretical density. The density at construction must represent the in-place density after the asphalt mixture has been compacted with the rollers, but prior to opening the roadway to traffic.

Compute the total asphalt pavement quantity of all trafficked lanes and show 100 percent of the quantity is designed and specified using materials and technologies to meet this requirement. Do not include drainage layers, permeable base course, asphalt treated permeable base (ATPB), open graded surface course, surface friction course, and other permeable designed layers of asphalt pavement in the computation. Do not include shoulders, medians, sidewalks, and other incidental paved areas in the computation.

Requirement PD-22.3

2 point. Leverage Pavement Smoothness Incentive

Leverage a performance-based pay incentive for pavement smoothness targeting a pavement ride quality of 58.5% or better. Alternatively, the specifications may require that the contractor meet this ride quality goal without providing a pay incentive (mandatory performance).

Resources

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

1. AASHTO, *Guide for Design of Pavement Structures*, 4th Edition with 1998 Supplement (1993, 1998), https://bookstore.transportation.org/item_details.aspx?id=374
2. AASHTO, *Mechanistic-Empirical Pavement Design Guide*, Interim Edition: A Manual of Practice (2008), https://bookstore.transportation.org/item_details.aspx?ID=1249

Scoring Sources

The project 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. Calculations indicating the total percentage of trafficked lane pavement surface areas designed for long-life.
2. The project owner's formally recognized, adopted, and documented pavement design procedure.
3. Documentation showing long-life pavement was designed using a minimum 20- or 40-year service life (per the appropriate requirements above).
4. Documentation showing long-life pavement was designed and specified using materials and technologies to achieve a construction field density of 94 percent of maximum theoretical density (per the appropriate requirements above).

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PD-23: Reduced Energy and Emissions in Pavement Materials

1-3 points

Goal: Reduce energy use in the production of pavement materials.

Sustainability Linkage

Reducing energy use in the production of pavement materials supports all of the triple bottom line principles by lessening impacts to air quality through reduced emissions and reducing energy consumption.



Affected Triple Bottom Line Principles

Background and Scoring Requirements

Scoring Requirements

Implement one or more of the methods listed below. **Any of the following requirements (Requirements PD-23.1, PD-23.2, or PD-23.3) may earn 3 points, however, this criterion shall not exceed a total of 3 points.**

Requirement PD-23.1

1-3 points. Asphalt Production

Use low-energy material for at least 50 percent of the total projects asphalt material. One of the following scores may meet this requirement:

- **Requirement PD-23.1a**

1-3 points. Warm Mix Asphalt (WMA)

Mixing temperature shall be measured as the temperature of the mixture as it exits the mixing drum (for drum plants) or pugmill (for batch plants). This credit requires a recommended hot mix asphalt (HMA) mixing temperature to be provided by the asphalt binder supplier. This recommended temperature should be as if no WMA technology were to be used. If the recommended mixing temperature is provided as a range, use high end of the range for calculation of the required temperature reduction.

Use the highest point value achieved from only one of the following options:

- **0 points.** Warm Mix Asphalt is not used.
- **1 point.** Use Warm Mix Asphalt. Reduce the mixing temperature of HMA by a minimum of 30°F from that recommended as the mixing temperature by the asphalt binder supplier.
- **2 points.** Use Warm Mix Asphalt. Reduce the mixing temperature of HMA by a minimum of 40°F from that recommended as the mixing temperature by the asphalt binder supplier.
- **3 points.** Use Warm Mix Asphalt. Reduce the mixing temperature of HMA by a minimum of 50°F from that recommended as the mixing temperature by the asphalt binder supplier.

OR

- **Requirement PD-23.1b**

3 points. Asphalt Production Using Energy and Fuel Saving Technologies

Burn recycled oil, waste materials, or natural gas; or use other energy and fuel saving technologies in asphalt production to reduce conventional fuel usage by a minimum of 25 percent. Recycled oils, garbage, or other materials that would otherwise go to waste that are used for burner fuel or any other energy or fuel saving technologies that can be shown to reduce the normal electricity or petroleum fuel usage by 25 percent.

Requirement PD-23.2

3 points. Raw Material – Cement Production

One of the following scores may meet this requirement:

- **Requirement PD-23.2a**

3 points. Cement Production Using ENERGY STAR® Certified Plant

Use an ENERGY STAR® certified cement production plant for cement materials used on the project. To be ENERGY STAR® certified, the plant must score in the top 25 percent based on the EPA National Energy Performance Energy Rating System.

OR

- **Requirement PD-23.2b**

3 points. Cement Production Using Fuel Saving Technologies

Burn recycled oil, waste materials, natural gas, or other fuel saving technologies in cement production to reduce conventional fuel usage by a minimum of 25 percent. Recycled oils, garbage, or other materials that would otherwise go to waste that are used for burner fuel or any other fuel saving technologies that can be shown to reduce the normal petroleum fuel usage by 25 percent.

OR

- **Requirement PD-23.3c**

3 points. Cement Production Using Limestone Additive

Use blended cement using a minimum 3 percent ground limestone addition. Per Advanced Concrete Pavement Technology's (ACPT) *TechBrief: Blended and Performance Cements*⁴ the use of 5 percent ground limestone in cement is permitted by ASTM C150 (and AASHTO M 85), which reduces the cement clinker in concrete and ultimately reduces the carbon footprint.

Requirement PD-23.3

3 points. Concrete Production

One of the following scores may meet this requirement:

- **Requirement PD-23.3a**

3 points. Concrete Production in Plant with Demonstrated Reduction in Energy and Carbon Footprint

Concrete shall be supplied from a concrete plant that can demonstrate a carbon footprint and embodied energy 15 percent below the national averages as established in the National Ready Mixed Concrete

Association's (NRMCA) *Sustainable Concrete Plant Guidelines*. Carbon footprint and embodied energy shall be calculated using the NRMCA Carbon Calculator.

OR

- **Requirement PD-23.3b**

3 points. Concrete Production in NRMCA Sustainable Concrete Plant

Concrete shall be supplied from a concrete plant that is an NRMCA Certified Sustainable Concrete Plant (Silver).

Resources

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

1. National Ready Mixed Concrete Association's (NRMCA), *Sustainable Concrete Plant Guidelines* (2011), <http://www.nrmca.org/sustainability/Certification/SCP%20Guidelines%20Version%201.1.pdf>
2. NRMCA, Carbon Calculator, <http://www.nrmca.org/sustainability/Certification/PlantCertification.asp>
3. NRMCA, Certified Sustainable Concrete Plant (Silver), <http://www.nrmca.org/sustainability/Certification/PlantCertification.asp>
4. Advanced Concrete Pavement Technology (ACPT), *TechBrief: Blended and Performance* (2011), <http://www.fhwa.dot.gov/pavement/concrete/pubs/hif11025/index.cfm>

Scoring Sources

The project 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. Calculations to show at least 50 percent of the total project pavement material meets requirement options 1, 2, 3, or 4.
2. Asphalt or concrete pavement mix designs showing the requirements of options 1 or options 3 were met.
3. Documentation for the cement production facility, asphalt plant, or concrete mixing plant showing the requirements were met.

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PD-24: Permeable Pavement

1-2 points

Goal: Improve flow control and quality of stormwater runoff through use of permeable pavement technologies.

Sustainability Linkage

Permeable pavements primarily have environmental benefits to the natural and built environment.



Background and Scoring Requirements

Background

Using permeable pavement is a low-impact development technique that can be used as part of a roadway stormwater management plan.

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

- **“Permeable,” “porous” or “pervious”** are used interchangeably to describe a pavement structural system that has more voids than a conventional paved surface such as concrete or asphalt. As a result, both infiltration and evaporation are allowed as water passes through the pavement section.
- **“Permeable pavements”** include, but are not limited to, porous asphalt pavement, pervious concrete pavement, or permeable block pavers.
- **“Secondary pavement areas”** shall include all pavements that are not intended for high speed traffic or heavy trucks. Appropriate uses would include parking lots, alleys, access roadways, sidewalks, bike lanes, multi-use paths, and shoulders. However shoulders planned for future trafficked uses through widening should be excluded (for example, shoulders to become mainline lanes or shoulders used for shoulder-running buses).

Scoring Requirements

Prerequisite PD-24.1P

0 points. Include Maintenance Plan

The project must include a maintenance plan for permeable pavements (or a design memo justifying why one is not necessary).

Prerequisite PD-24.2P

0 points. Exclude Sanded and Sealed Areas

Permeable pavements must not be placed in areas where sand may be used for snow and ice control or where the pavement will be sealed (during project or in the future).

Requirement PD-24.1

1-2 points. Permeable Pavement

One of the following scores may apply:

- **1 point.** Use permeable pavement to treat at least 50% of the secondary pavement areas on the project.
- **2 points.** Use permeable pavement to treat at least 75% of the secondary pavement areas on the project.

Resources

None referenced.

Scoring Sources

The project 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. Contract documents.
2. Technical memoranda or reports.

PD-25: Construction Environmental Training

1 point

Goal: Provide construction personnel with the knowledge to identify environmental issues and best practice methods to minimize impacts to the human and natural environment.

Sustainability Linkage

Environmental training for construction personnel supports the environmental and social principles by ensuring that workers understand the importance of protecting and enhancing the human and natural environment, follow environmental regulations, and implement sustainable construction methods correctly.



Background and Scoring Requirements

Scoring Requirements

Implementation of regulatory permits and related training, including a Stormwater Pollution Prevention Plan (SWPPP) may be included in an Environmental Awareness Training Program, but does not meet the following requirements on its own.

Requirement PD-25.1

1 point. Implement Formal Environmental Awareness Training

The owner shall require the Contractor to plan and implement a formal environmental awareness training program during construction in order to provide tools and information to assist staff in ensuring that projects stay in compliance with environmental laws, regulations, and policies.

The Contractor shall provide an environmental awareness training plan that is customized to the project, including:

- A list of the types of project personnel to be trained. This list may be by job-type and/or by employer and need not contain actual employee names. Personnel should include members of the owner's organization or its construction representative, assigned regulatory agency staff, and prime and subcontractors. Suggested classifications of personnel to be trained include, but are not limited to, managers, inspectors, superintendents, operators, and laborers.
- A description of the types, goals, and objectives of training to be given. Types of training might include one or more of the following: topic-specific trainings, topic-specific emails, regular toolbox meetings, standing topics on regular agendas, classroom training, and more. This criterion cannot be met by one-time-only discussions of environmental topics, such as at a preconstruction meeting. Training does not have to be lengthy classroom training and it does not need to be dedicated to environmental issues only.
- A process to track training efforts, including dates, means (e.g., online, classroom, field training), topics, the identification of those participating in training, and attendance numbers.
- A process to measure training effectiveness such as self-assessment, pre-test and post-test, and productivity measurement, which includes names of attendees, topic, dates, and location of training.

The environmental awareness training plan shall address the following training elements as a minimum, or state why any are inappropriate:

- Permit conditions, performance standards, environmental commitments, and environmental regulations related to the project
- Overall importance of environmental issues
- Identifying work activities that present the greatest risk for compliance
- Required environmental qualifications/certifications
- Environmental records management
- Environmental compliance monitoring and reporting procedures
- Environmental notification triggers and emergency response procedures
- Oil spill prevention and response procedures
- Construction stormwater management, erosion and sediment control procedures, and in-water work
- Reduction of air pollution
- Management of known or suspected contamination
- Hazardous materials management

Some types of environmental training may be required. These requirements should be included in the plan; however, the plan should go above and beyond what is required by regulations and should cover all potential environmental issues.

Resources

None referenced.

Scoring Sources

The project 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. Contract Documents showing an Environmental Awareness Training Plan is required.
2. Contractors' Environmental Awareness Training Plan.

PD-26: Construction Equipment Emission Reduction

1-2 points

Goal: Reduce air emissions from non-road construction equipment.

Sustainability Linkage

Reducing emissions from construction equipment supports environmental and social principles by lessening impacts to air quality and reducing fossil fuel consumption.



Background and Scoring Requirements

Scoring Requirements

Requirement PD-26.1

1-2 points. Implement Methods to Reduce Emissions

Implement one or more of the methods to reduce emissions in Table PD-26.1.A. **Points for methods are cumulative if roadways have more than one feature; however, this criterion shall not exceed a total of two points.**

TABLE PD-26.1.A. METHODS TO REDUCE CONSTRUCTION EQUIPMENT EMISSIONS (CONTINUED ON NEXT PAGE)

| Requirement | No. Points | Method |
|-------------|------------|--|
| PD-26.1a | 1 | Use non-road construction equipment that have engines that meet the current U.S. Environmental Protection Agency (EPA) Tier emission standards (Tier 3/Interim, Tier 4 as of April 2011) in effect for non-road engines of the applicable engine power group and account for at least 50 percent of the non-road construction equipment fleet operating hours for the project. |
| PD-26.1b | 1 | Use non-road construction equipment that have diesel retrofit devices for after-treatment pollution control verified by EPA or the California Air Resources Board (CARB) for use with non-road engines and account for at least 50 percent of the non-road construction equipment fleet operating hours for the project. |
| PD-26.1c | 1 | Owner shall require contractor to implement a no-idling policy during construction. The policy should include, at a minimum, the following topics (or equivalents): <ul style="list-style-type: none"> • When drivers arrive at loading or unloading areas to drop off or pick up passengers, they should turn off their vehicles as soon as practical to eliminate idling time and reduce harmful emissions. Vehicles should not be restarted until passengers are ready to depart. Exceptions include conditions that would compromise passenger safety, such as extreme weather or idling in traffic. • Delivery vehicles should turn off their engines while making deliveries to the construction site. • All drivers of any company vehicle should receive a copy of the policy and have an opportunity to discuss it at the beginning of construction. |

| Requirement | No. Points | Method |
|--------------------|-------------------|--|
| PD-26.1d | 1 | Contractor reduces emissions related to hauling earthwork onsite by using larger non-road hauling vehicles and establishes a materials hauling plan to make efficient use of backhauls, maximizing efficiency, and minimizing the number of “empty” trucks. |
| PD-26.1e | 2 | Use non-road construction equipment that have engines that meet the current U.S. EPA Tier emission standards (Tier 3/Interim, Tier 4 as of April 2011) in effect for non-road engines of the applicable engine power group and account for at least 75 percent of the non-road construction equipment fleet operating hours for the project. |
| PD-26.1f | 2 | Use non-road construction equipment that have diesel retrofit devices for after-treatment pollution control verified by EPA or the CARB for use with non-road engines and account for at least 75 percent of the non-road construction equipment fleet operating hours for the project. |

Resources

None Referenced.

Scoring Sources

The project 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 signed letter from the prime contractor stating the total non-road construction fleet operating hours and the percentage of those operating hours that meet at least one of the three criteria.
2. Provide a list of all non-road construction equipment used on the project that contains the following information for each piece of equipment:
 - Make and model of each piece of equipment.
 - Operating hours associated with the project.
3. Contract Documents requiring the Contractor to have a no-idling policy.

PD-27: Construction Noise Mitigation

1-2 points

Goal: Reduce annoyance or disturbance to surrounding neighborhoods and environments from road construction noise.

Sustainability Linkage

Reducing noise from construction supports environmental and social principles by reducing impacts to quality of life, community facilities, and sensitive habitat.



Background and Scoring Requirements

Scoring Requirements

Require the Contractor to plan and monitor noise control measures throughout construction with care above and beyond what is typically required by regulations (i.e., NEPA).

Requirement PD-27.1

1 Point. Construction Noise Mitigation Plan

The Owner shall require the Contractor to establish, implement, and maintain a formal Noise Mitigation Plan (NMP) during roadway construction. The Contract Documents should include a requirement for a NMP that contains, at minimum, the following information for all elements of construction:

1. Responsible party for noise mitigation activities, contact information, their responsibilities, and qualifications. Include information for the NMP preparer, if applicable, or if completed by an outside party.
2. Project location and distance to closest receptor of noise. Include a description of the surrounding zoning and parcel information (i.e., commercial, residential, hospitals, schools, parks, sensitive habitat).
3. A list of proposed construction activities (e.g., demolition, excavation, paving, bridge foundations, finishing).
4. Dates and working hours of proposed construction activities.
5. A list of noise-generating devices used during each construction activity listed in #3.
6. A list of noise-mitigating devices used during each construction activity listed in #3, including personal safety equipment requirements for all site employees.
7. Noise permit numbers, agency, or local authority policies associated with construction work, as applicable.
8. Description of noise monitoring standards, methods, and acceptable levels.
9. Description of correction procedures for non-compliant noise levels.
10. Description of complaint or feedback mechanism for public use.
11. Signature of responsible party.

Some state and local owner agencies already have requirements for such plans written into their standard specifications. However, a written specification requiring the prime contractor to have an NMP is insufficient, especially because many local authorities and owner agencies offer certain exemptions to their policies, such as daylight work schedules or projects with minimal areas of land-disturbing activities.

Requirement PD-27.2

1 Point. Monitor Noise Receptors

Require contractor to monitor noise and the effectiveness of mitigation measures at the receptors throughout construction to ensure compliance with the NMP.

Resources

None referenced.

Scoring Sources

The project 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. Contract documents requiring contractor to develop a Noise Mitigation Plan and/or monitor noise during construction.
2. Noise Mitigation Plan.
3. Applicable noise permits, or agency or local authority noise policies.

PD-28: Construction Quality Control Plan

2-5 points

Goal: Improve quality by requiring the contractor to have a formal Quality Control Plan (QCP).

Sustainability Linkage

Implementation of a Construction Quality Control Plan promotes higher quality construction and supports the environmental and economic principles of the triple bottom line by minimizing life-cycle costs and raw material usage.



Background and Scoring Requirements

Scoring Requirements

Requirement PD-28.1

3 points. Quality Control Plan

Require the Contractor to plan and implement quality control measures throughout construction with care and for materials above and beyond what is typically required by specifications and regulations. The Owner shall require the Contractor to establish, implement, and maintain a formal QCP during roadway construction. The Contract Documents should include a requirement for a QCP that includes, at a minimum, the following information:

- Key quality control personnel, their responsibilities, and qualifications (resumes, certifications with expiration dates, etc.).
- Project location and locations of major pavement and earthwork sources.
- Procedures used to control quality during construction including (as a minimum):
 - Items to be monitored (including pavement mix designs)
 - Submittals required, approximate dates, responsible person, and submittal process
 - Testing to be done (including testing standards and frequency)
 - When corrective action is required (action limits)
 - Procedures to implement corrective action
 - Procedures to modify QCP if ineffective or when modifications are necessary
 - Critical inspection point notification plan. As an example, 48 hours before concrete delivery, 48 hours before asphalt paving operations begin, etc.
- The QCP should cover all project construction; not just the pavement.
- Subcontractors need to be included in this plan, which typically means identifying a responsible party and obtaining a quality control procedure from the subcontractor. The Prime contractor shall maintain authority to enforce the QCP for work performed by all subcontractors. Expected beginning and ending dates for the subcontractors should be included.
- The QCP should be approved by the owner before construction begins.

Some state and local owner agencies already have requirements for such plans written in to their standard specifications. Such existing requirements should be able to meet the requirements above; however, some only address construction quality for hot mix asphalt (HMA) or Portland cement concrete (PCC) paving and not

construction of the overall project. While paving needs to be covered in the QCP, all other major components of construction (e.g., structures, earthwork, drainage, traffic control items, etc.) must also be covered.

Some state highway agencies use contractor testing in their acceptance process. In these cases, the independent assurance tests must be performed on samples that are taken independently of quality control samples. QCPs are required in these cases, as defined in CFR 637, Title 23.

A large document that repeats language from the contract specifications need not be generated for this scoring requirement. Rather, the document should clearly identify the major aspects of the prime contractor's plan to control project construction quality and who is responsible for quality control for a particular item or process, when key inspections are made, when corrective actions are to be taken, and how they are to be taken.

Requirement PD-28.2

2 points. Quality Price Adjustment Clauses

Leverage the use of Quality Price Adjustment Clauses to link payment and performance of the constructed products. Quality Assurance specifications generally include statistically based acceptance plans, require contractor process control testing, and have provisions for pay adjustments based on the degree of compliance with specified requirements. Quality assurance specifications and programs may lead to better contractor control of the quality of the specified product; however, they do not diminish the need for effective construction inspection. For more information, see FHWA's *Technical Guidance on Price Adjustment Clauses for Quality*¹.

Resources

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

1. FHWA, Technical Guidance on Price Adjustment Clauses for Quality, (January 24, 1992), <http://www.fhwa.dot.gov/programadmin/contracts/core03.cfm>

Scoring Sources

The project 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. Contract Document Specifications requiring contractor to establish and implement a project-specific QCP.
2. Contract Document Specifications requiring quality price adjustment clauses.

PD-29: Construction Waste Management

1-4 points

Goal: Utilize a management plan for road construction waste materials to minimize the amount of construction-related waste destined for landfill.

Sustainability Linkage

Managing construction waste supports the environmental and economic principles of the triple bottom line by reducing landfill waste and by encouraging recycling and reuse of construction materials, thereby decreasing raw material consumption.



Background and Scoring Requirements

Background

Construction and demolition waste constitutes any material that must be hauled off-site for disposal or reprocessing, or, if disposed (stockpiled) within the project right-of-way (ROW), is not intended for use as structural material (e.g., pavements, embankments, shoulders, base materials, and fill). Materials that leave the ROW for reprocessing (recycling) activities to return later for use on within the project boundaries are not considered C&D waste. Typical C&D waste for roadway construction projects may include, but is not limited to, any of the following:

- Paving (e.g., asphalt, concrete)
- Milling , concrete slough and grindings, cobble
- Metals (e.g., waste steel rebar, metal guardrails, pipes, luminaires, signs, aluminum, and various household metals)
- Plastic (e.g., waste plastic pipes)
- Excavated soil cuttings and boulders
- Sediment removed from temporary construction settling ponds
- Land clearing debris or excess topsoil
- Hazardous materials including liquids
- Wood and paper products (e.g., packaging materials, copier paper, paper products, cardboard, and pallets)
- Glass
- Household trash or compostables (including recyclable materials generated from mobile office)
- Packaging

The CWMP is typically completed by the prime contractor, submitted to the owner agency for approval, and implemented by all parties on the construction site. The CWMP need only apply to wastes generated during the project construction phase.

Scoring Requirements

Requirement PD-29.1

1 point. Construction and Demolition Waste Management Plan

The Owner shall require the Contractor to establish, implement, and maintain a formal Construction and Demolition Waste Management Plan (CWMP) during roadway construction, or its functional equivalent. The Contract Documents should include a requirement for a CWMP that contains, at minimum, the following information:

- Type of construction and demolition waste expected (C&D waste)
- Expected (or actual) tonnage
- Goal for percentage of waste diverted from landfills
- Contact information of responsible party for hauling
- Destination of waste (e.g., recycling facility, landfill, contractor's backyard)
- Contact information of responsible party at disposal site
- Strategy for waste generated from mobile office activities and personal worker (household) waste
- Opportunities for recycling of construction waste materials.

Requirement PD-29.2

1-2 points. Divert Waste from Landfills

The Contractor demonstrates that a percentage of the construction waste, including the materials listed above, has been diverted from landfills. The percentage diverted should be calculated by weight. One of the following scores applies:

- **1 point.** Divert at least 50 percent of the construction waste from landfills.
- **2 points.** Divert at least 75 percent of the construction waste from landfills.

Requirement PD-29.3

1 point. Haul Excess Materials Directly to other Projects for Recycling

Reduce lifecycle transport costs and impacts by coordinating and transporting suitable excess excavated material that cannot be used within the project limits to offsite projects where it will be reused. Only projects that transport materials directly to specific project sites are eligible for this credit, non-specific stockpiling sites for future recycling are excluded.

Resources

None referenced.

Scoring Sources

The project 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. Contract Document requiring contractor to establish and implement a project-specific CWMP or its functional equivalent.
2. Documentation showing the construction materials were diverted from landfills. This should include trucking tickets with weights, destinations, and materials, and calculations of percentages diverted from landfills.

PD-30: Low Impact Development



(Supplement for Illinois Tollway Only)

1-3 points

Supplemental Purpose

The purpose of this supplement is to provide methods for incorporating BMPs that work well within the Midwest and on Illinois Tollway property. Supplemental information was sourced from Tollway specific policies, procedures, and practices, as well as sustainability practices noted in the references. This supplement is intended to replace FHWA's PD-30.

Scoring Requirements

PD-30.1: 1-3 points. Use effective BMPs. Use effective BMPs or stormwater management techniques that mimic natural hydrology to treat pollutants. To calculate the points earned for this scoring requirement, follow Steps 1 through 3 below:

Note: all of PD-30.1 will be replaced with the following scoring requirements below.

The scoring element highlighted above is replaced by the scoring described below:

To calculate the total number of points achieved for this criterion, follow the directions below, and add the points achieved up to a maximum of three points total.

Requirement PD-30.1

1-3 Points. Water Quality requires treating pollutants from the on-site impervious surfaces. Maintaining or establishing a comprehensive stormwater treatment train utilizing a variety of LID practices is an efficient way to treat runoff pollutants. Identify LID practices from Table PD-30.A, implement in the project where beneficial and per the Tollway's Drainage Design Manual, then compare that number to Table PD-30.B to determine the achieved score.

TABLE PD-30.A. LID PRACTICES¹ FOR WATER QUALITY

- Vegetated Ditches
- Soil Quality Restoration
- Vegetated Filter Strip
- Furrow
- Sand/Media Filter
- Permanent Ditch Check
- Infiltration Trench
- Drywell
- Bioswale
- Native Landscaping
- Level Spreader
- Infiltration Basin/Vault
- Oil Containment Boom
- Sedimentation Basin/Forebay
- Mechanical Treatment Device
- Naturalized Wetland/Detention Basin
- Coagulation/Flocculation Basin
- Constructed Treatment Wetland
- Permeable Pavement Surface
- Wet Pond, utilized for Irrigation or Brine

1 – See resource material for definition and examples.

TABLE PD-30.B. POINTS EARNED FOR LID PRACTICES IMPLEMENTED

| No. of LID Practices ² Implemented | Points |
|--|--------|
| ≤ 4 | 0 |
| 5 – 7 | 1 |
| 8 – 12 | 2 |
| 13+ | 3 |

2 – Per Table PD-30.A LID Practices for Water Quality.

Resources

The following are additional resources provide information on the criterion topic:

1. Iowa Department of Natural Resources, Stormwater Manual (2015), <http://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manual>
2. Washington State Department of Transportation, Highway Runoff Manual (2014), <http://www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm>
3. Illinois Department of Transportation, District 2 Standards (2011), 1.1 Furrowed Roadway Slopes http://www.idot.illinois.gov/assets/uploads/files/doing-business/standards/district-specific-standards/2/district-standards/d-2_standards_full_size.pdf

Scoring Sources

The project 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. Project Drainage Report or other relevant calculations and studies
2. Project Contract Documents

PD-31: Infrastructure Resiliency Planning and Design

1-12 points

Goal: Respond to vulnerabilities and risks associated with current and future hazards (including those associated with climate change) to ensure transportation system reliability and resiliency.

Sustainability Linkage

Designing for infrastructure resiliency in the face of potential hazards supports all of the triple bottom line principles by reducing spending on infrastructure replacement, improving the safety and security of multimodal transportation system, providing energy savings from long-lasting investments, and reducing effects of vehicle travel on climate changes.



Affected Triple Bottom Line Principles

Background and Scoring Requirements

This criterion, PD-31: Infrastructure Resiliency Planning and Design, is related to SPR-16: Infrastructure Resiliency (Regional) and SPS-16: Infrastructure Resiliency (State).

Background

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

- **“Adaptation”** is adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects.
- **“Climate Change”** refers to any significant change in the measures of climate lasting for an extended period of time. Climate change includes major variations in temperature, precipitation, or wind patterns, among other environmental conditions, that occur over several decades or longer. Changes in climate may manifest as a rise in sea level, as well as increase the frequency and magnitude of extreme weather events now and in the future.
- **“Extreme Weather Events”** can include significant anomalies in temperature, precipitation and winds and can manifest as heavy precipitation and flooding, heatwaves, drought, wildfires and windstorms (including tornadoes and tropical storms). Consequences of extreme weather events can include safety concerns, damage, destruction, and/or economic loss. Climate change can also cause or influence extreme weather events.
- **“Extreme Events”**, for the purposes of this criterion, refers to risks posed by climate change and extreme weather events. The definition does not apply to other uses of the term nor include consideration of risks to the transportation system from other natural hazards, accidents, or other human induced disruptions.¹
- **“Greenhouse Gas (GHG) Emissions”** are gases emitted, in this case, mostly by vehicles engaged in activities to construct or use the transportation facility. These gases absorb and emits radiation within the thermal infrared range and contributes to the greenhouse effect. Greenhouse gases greatly affect the temperature of the Earth and are the primary source of climate change.
- **“Preparedness”** means actions taken to plan, organize, equip, train, and exercise to build, apply, and sustain the capabilities necessary to prevent, protect against, ameliorate the effects of, respond to, and recover from climate change related damages to life, health, property, livelihoods, ecosystems, and national security.

- **“Resilience”** or resiliency is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.

Climate Change Effects on Transportation Infrastructure

The U.S. Global Change Research Program’s 2014 Report, *Climate Change Impacts in the United States*¹ summarizes 4 Key Messages related to transportation infrastructure and climate changes:

1. The impacts from sea level rise and storm surge, extreme weather events, higher temperatures and heat waves, precipitation changes, Arctic warming, and other climatic conditions are affecting the reliability and capacity of the U.S. transportation system in many ways.
2. Sea level rise, coupled with storm surge, will continue to increase the risk of major coastal impacts on transportation infrastructure, including both temporary and permanent flooding of airports, ports and harbors, roads, rail lines, tunnels, and bridges.
3. Extreme weather events currently disrupt transportation networks in all areas of the country; projections indicate that such disruptions will increase.
4. Climate change impacts will increase the total costs to the nation’s transportation systems and their users, but these impacts can be reduced through rerouting, mode change, and a wide range of adaptive actions.”

Scoring Requirements

Requirement PD-31.1

2 points. Address Climate Change in Project Development

Incorporate consideration of climate change at a project-specific level in project development and environmental reviews.

Requirement PD-31.2

1-6 points. Incorporate Future Climate Change Effects in the Design Process or the Design

One of the following scoring requirements may apply; PD-31.2a and PD-31.2b are not cumulative.

- **Requirement PD-31.2a**

3 points. Incorporate Future Consideration of Climate Change Effects in the Design Process

Incorporate and document consideration of the effects of climate change in the design process.

For example, when designing a bridge over a water body, a project analysis might consider future climate change effects, such as rising storm water levels. However, the owner may decide that there is an acceptable factor of safety already included in the design, that the potential impacts are acceptable or can be mitigated, or that the cost to make changes is more significant than the risks of the effects pose.

One of the following scores applies:

- **0 points.** Climate change effects are not considered in the design process.
- **1 points.** Climate change effects are qualitatively considered in the design process.
- **3 points.** Climate change effects are quantitatively considered in the design process.

OR

- **Requirement PD-31.2b**

4 or 6 points. Incorporate Future Consideration of Climate Change Effects into the Design

Based on a project-specific identification of hazards, and assessment of risks and vulnerabilities resulting from those hazards, incorporate additional design efforts above and beyond requirements and regulations to address the vulnerabilities identified. The U.S. Global Change Research Program's 2014 Report, *Climate Change Impacts in the United States*¹ lists additional design actions as "Adaptive Strategies to Reduce Impacts" and describes that actions may include, but are not limited to: retrofitting pavements, stormwater drainage facilities, structures and other infrastructure; relocating facilities to avoid impacts; upgrading design of stormwater drainage facilities above and beyond what is required to mitigate changing weather patterns; designing new pavements, structures and other infrastructure to higher standards than is typically required by design requirement or regulation; or designing protection of existing infrastructure. Some examples of design changes include:

- **Alignment and Grade** – For example, raising the grade of a roadway above levels required in current regulations to address higher flood levels resulting from climate changes.
- **Stormwater Drainage System** – For example, increasing the capacity of conveyance and detention facilities to address higher flood levels resulting from climate changes.
- **Pavement Structures** – For example, designing pavements to withstand the effects of heat waves resulting from climate changes.
- **Bridge Structures** – For example, designing bridge piers to withstand the effects of scour or storm surges resulting from more intense flooding events.
- **Tunnels and other Structures** – For example, designing tunnels or sign structures to withstand the effects of more intense weather or seismic events than is required.

Agencies can use FHWA's 11-step process for engineering transportation assets to be more resilient to climate impacts and the associated tools that were developed under *Phase II of the Gulf Coast Study*^{2,3}. This process describes consideration of multiple alternatives and cost benefit analysis of designed infrastructure.

One of the following scores applies:

- **0 points.** No design changes are required to accommodate future climate change effects or no changes are incorporated in the design.
- **4 points.** Design changes are incorporated in the design of one design discipline (e.g. bridges, pavements, drainage, etc.).
- **6 points.** Design changes are incorporated in the design of more than one design discipline (e.g. bridges and pavements, drainage and bridges, etc.).

Requirement PD-31.3

4 points. Mitigate Climate Change and Extreme Weather Effects

Mitigate the effects of GHG emissions through design efforts above and beyond requirements and regulations. Some examples of strategies meeting this requirement, include, but are not limited to:

- Incorporating transportation system and operational efficiencies by optimizing the design, construction, operation, and use of transportation networks. The strategies range from anti-idling ordinances to traffic management to congestion pricing. The objective of this group of strategies is to reduce the energy use and

GHG emissions associated with a given unit of passenger or freight travel (e.g., person-miles, vehicle-miles, or ton-miles of travel).

- Reduce travel activity by reducing growth in vehicle-miles traveled. The objective of this group of strategies is to influence travelers' activity patterns, thereby reducing total travel, shifting travel to more efficient modes, increasing vehicle occupancy, or otherwise taking actions that reduce energy use and GHG emissions associated with personal travel.

Resources

Above-Referenced Resources

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

1. U.S. Global Change Research Program, *Climate Change Impacts in the United States* (2014), <http://nca2014.globalchange.gov/downloads>
2. FHWA, *U.S. DOT Gulf Coast Study Phase 2*, http://www.fhwa.dot.gov/environment/climate_change/adaptation/case_studies/gulf_coast_study/engineering_and_tasks/task32.pdf and http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study/
3. FHWA, *U.S. DOT Gulf Coast Study Phase 2 (Tools)*, http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study/index.cfm#l2

Additional Resources

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

4. FHWA, *FHWA Order 5520: Transportation System Preparedness and Resilience to Climate Change and Extreme Weather Events* (2014), <http://www.fhwa.dot.gov/legisregs/directives/orders/5520.cfm>
5. FHWA, *Integrating Climate Change into the Transportation Planning Process* (2008), http://www.fhwa.dot.gov/environment/climate_change/adaptation/publications_and_tools/integrating_climate_change/climatechange.pdf
6. FHWA, Climate Adaptation Website, http://www.fhwa.dot.gov/environment/climate_change/adaptation/
7. FHWA, Vulnerability Assessment Framework Website, http://www.fhwa.dot.gov/environment/climate_change/adaptation/adaptation_framework/
8. TRB, *E-C152: Adapting Transportation to the Impacts of Climate Change*, <http://onlinepubs.trb.org/onlinepubs/circulars/ec152.pdf>

Scoring Sources

The project 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. Contract documents including plans and specifications showing designed infrastructure.
2. Design documentation showing design above and beyond requirements and regulations was performed to specifically address the effects of GHG emissions and climate changes.

PD-32: Light Pollution

1-3 points

Goal: To safely illuminate roadways while minimizing unnecessary and potentially harmful illumination of the surrounding sky, communities, and habitat.

Sustainability Linkage

Reducing lighting pollution benefits both the natural and human environment.

Background and Scoring Requirements

Background

Roadway lighting is an essential component of safe roadway design. However, in addition to useful light that illuminates the roadway, light can be emitted upward directly from existing light fixtures, or reflect from the roadway surface, both of which contribute to sky glow. Light from overhead fixtures can “trespass” and illuminate surfaces and areas other than the roadway, including private property and or natural areas. Mismanaged lighting can alter the appearance of a dark sky; eclipse natural starlight; disrupt the feeding, sleeping, mating, and migration cycles of wildlife; and disrupt the growth cycles of plants. However, in many cases, careful lighting design can provide safe driving conditions while minimizing wasted light and adverse lighting effects.

The purpose of this criterion is to promote the management of Backlight, Uplight, and Glare (BUG) using prescribed Backlight, Uplight, and Glare ratings to evaluate luminaire optical performance related to light trespass, sky glow, and high angle brightness control. For the purposes of this criterion, the key terms are defined as follows:

- **“Backlight”** refers to the light directed in back of mounting pole.
- **“Glare”** is the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted causing annoyance, discomfort, or loss in visual performance and visibility.
- **“Glare ratings”** refer to the amount of light emitted from the luminaire at angles known to cause glare.
- **“Light trespass”** is the effect of light that strays from the intended purpose and becomes an annoyance, a nuisance, or a deterrent to visual performance.
- **“Lighting boundary”** is located at the edge of the roadway plus any adjacent features intended to be lit, such as sidewalks, bikepaths, multi-use paths, etc. It does not include adjacent areas to be lit for private purposes such as parking lots or car dealerships.
- **“Lighting Zone”** is the lighting zone type being modelled based on characteristics of the natural environment, including, but not limited to, flora, fauna and humans as described by the Illuminating Engineering Society of North America (IES).
- **“Roadway or Highway lighting”** is defined as lighting provided for freeways, expressways, limited access roadways, and roads on which pedestrians, cyclists, and parked vehicles are generally not present. The primary purpose of roadway or highway lighting is to help the motorist remain on the roadway and help with the detection of obstacles within and beyond the range of the vehicle's headlights.
- **“Sky glow”** refers to the brightening of the night sky that results from the reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gaseous molecules, aerosols, and particulate matter), in the direction of the observer.



- **“Street lighting”** is defined as lighting provided for major, collector, and local roads where pedestrians and cyclists are generally present. The primary purpose of street lighting is to help road users identify obstacles, provide adequate visibility of pedestrians and cyclists, and assist in visual search tasks, both on and adjacent to the roadway.
- **“Uplight”** refers to or the light directed above the horizontal plane of the luminaire.

Lighting Zone (LZ)

The IES defines the lighting zones shown in Table PD-32.0.A.

TABLE PD-32.0.A LIGHTING ZONES

| Lighting Zone (LZ) | Zoning Considerations | Recommended Uses or Areas |
|--------------------|--|---|
| LZ0 | Undeveloped areas within national parks, state parks, forest land, rural areas, and other undeveloped areas | Should be applied to areas in which permanent lighting is not expected and when used, is limited in the amount of lighting and the period of operation. LZ0 typically includes undeveloped areas of open space, wilderness parks and preserves, areas near astronomical observatories, or any other area where the protection of a dark environment is critical. Special review should be required for any permanent lighting in this zone. Some rural communities may choose to adopt LZ0 for residential areas. |
| LZ1 | Developed areas of national parks, state parks, forest land, and rural areas. | Pertains to areas that desire low ambient lighting levels. These typically include single and two family residential communities, rural town centers, business parks, and other commercial or industrial/ storage areas typically with limited nighttime activity. May also include the developed areas in parks and other natural settings. |
| LZ2 | Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use, and residential mixed-use areas. | Pertains to areas with moderate ambient lighting levels. These typically include multifamily residential uses, institutional residential uses, schools, churches, hospitals, hotels/motels, commercial and/or businesses areas with evening activities embedded in predominately residential areas, neighborhood serving recreational and playing fields and/or mixed use development with a predominance of residential uses. Can be used to accommodate a district of outdoor sales or industry in an area otherwise zoned LZ1. |
| LZ3 | All areas not included in LZ0, LZ1, LZ2, or LZ4. | Pertains to areas with moderately high lighting levels. These typically include commercial corridors, high intensity suburban commercial areas, town centers, mixed use areas, industrial uses and shipping and rail yards with high night time activity, high use recreational and playing fields, regional shopping malls, car dealerships, gas stations, and other nighttime active exterior retail areas. |

| Lighting Zone (LZ) | Zoning Considerations | Recommended Uses or Areas |
|--------------------|---|--|
| LZ4 | High activity commercial districts in major metropolitan areas as designated by the local jurisdiction. | Pertains to areas of very high ambient lighting levels. LZ4 should only be used for special cases and is not appropriate for most cities. LZ4 may be used for extremely unusual installations such as high density entertainment districts, and heavy industrial uses. |

Source: IES

BUG Rating System

*Fundamentals of Lighting – Addenda #1 BUG Ratings – Backlight, Uplight, and Glare (ref. TM-15 and addenda)*¹, published by IES, makes the evaluation and selection of outdoor luminaires fast, easy and complete. Added to TM-15 as an addenda, the BUG stands for “Backlight”, “Uplight” and “Glare”, each describing one of the three types of stray light that escape from a lighting fixture as defined above.

The BUG Rating System divides the sphere around a luminaire into zones, assigning B, U, and G values according to expected environmental impact for each type of light trespass. It takes into account uplight shielding, glare shielding and backlight shielding as well as limiting lamp lumens to values appropriate for the lighting zone. Once the lowest BUG Ratings have been established, the System provides tables of acceptable values against which any luminaire having photometric data can be evaluated.

Scoring Requirements

The following scoring requirements are cumulative.

Requirement PD-32.1

1 point. Uplight Design

Do not exceed the luminaire uplight ratings shown in Table PD-32.1.A, based on the specific light source installed in the luminaire, as defined in *IES TM-15-11, Addendum A*².

TABLE PD-32.1.A. MAXIMUM UPLIGHT RATINGS

| | Lighting Zone | | | | |
|-------------------------|---------------|-----|-----|-----|-----|
| | LZ0 | LZ1 | LZ2 | LZ3 | LZ4 |
| Allowed uplight ratings | U0 | U1 | U2 | U3 | U4 |

Requirement PD-32.2

1 point. Backlight Design

Do not exceed the luminaire backlight ratings shown in Table PD-32.2.A (based on the specific light source installed in the luminaire), as defined in *IES TM-15-11, Addendum A*², based on the mounting location and distance from the lighting boundary.

TABLE PD-32.2.A. MAXIMUM BACKLIGHT RATINGS

| Luminaire Mounting | Lighting Zone | | | | |
|--|---------------|-----|-----|-----|-----|
| | LZ0 | LZ1 | LZ2 | LZ3 | LZ4 |
| > 2 mounting heights from lighting boundary | B1 | B3 | B4 | B5 | B5 |
| 1 to 2 mounting heights from lighting boundary and properly oriented | B1 | B2 | B3 | B4 | B4 |
| 0.5 to 1 mounting height to lighting boundary and properly oriented | B0 | B1 | B2 | B3 | B3 |
| < 0.5 mounting height to lighting boundary and properly oriented | B0 | B0 | B0 | B1 | B2 |

Requirement PD-32.3

1 point. Glare Design

Do not exceed the glare ratings shown in Table PD-32.3.A, based on the specific light source installed in the luminaire, as defined in *IES TM-15-11, Addendum A*².

TABLE PD-32.3.A. MAXIMUM GLARE RATINGS

| | Lighting Zone | | | | |
|-----------------------|---------------|-----|-----|-----|-----|
| | LZ0 | LZ1 | LZ2 | LZ3 | LZ4 |
| Allowed glare ratings | G0 | G1 | G2 | G3 | G4 |

Resources

Above-Referenced Resources

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

1. IES, *Fundamentals of Lighting – Addenda #1 BUG Ratings – Backlight, Uplight, and Glare (ref. TM-15 and addenda)*, <https://www.ies.org/pdf/education/ies-fo1-addenda-1-%20bug-ratings.pdf>
2. IES, *TM-15-11 Addendum A*, <https://www.ies.org/PDF/Erratas/TM-15-11BUGRatingsAddendum.pdf>

Additional Resources

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

3. International Dark Sky Association, *Specifier Bulletin for Dark Sky Applications* (2009), Volume 2: Issue 1, http://www.aal.net/content/resources/files/BUG_rating.pdf
4. LEED, *REQSS8o1-0: Bug rating method*, <http://www.usgbc.org/credits/reqss8o1-0>
5. U.S. Department of Energy, *LED Application Series: Outdoor Area Lighting* (June 2008), http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/outdoor_area_lighting.pdf
6. IES, *TM-15-11: Luminaire Classification System for Outdoor Luminaires + Addendum A*, <https://www.ies.org/store/product/luminaire-classification-system-for-outdoor-luminaires-1103.cfm>

Scoring Sources

The project 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. Contract documents showing the plans and specifications required BUG compliant or equivalent fixtures.
2. Illumination design documentation showing that lighting was required for this project to meet safety requirements, that the types of lighting fit the context of the roadway and that, if the illumination levels were reduced, that safety was not compromised.

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PD-33: Noise Abatement

1-5 points

Goal: Reduce traffic noise impacts to surrounding communities and environments.

Sustainability Linkage

The reduction of noise benefits both the human and natural environment. Therefore, this criterion supports the environmental and social principles of the triple bottom line.



Background and Scoring Requirements

Background

The objective of this criterion is to consider options for reducing traffic noise. Evaluating noise impacts is required per the Agency's governing Noise Study and Abatement Policy, however, there are elements of noise management that can provide opportunities for sustainable practices. Noise levels can be reduced by altering the source of the noise (engine and exhaust and tire/pavement interaction) or by protecting the receptors. The most common method of reducing noise, and the only method eligible for Federal-aid highway funding as a noise abatement measure, is compliance with 23 CFR 772 and the highway agency's noise policy/procedures. Compliance with 23 CFR 772 and the highway agency's noise policy/procedure typically results in the construction of a noise barrier, but can also include traffic management measures, alteration of horizontal and vertical alignments by suppressing or moving the roadway further away from the noise receptors, acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise, or noise insulation of Activity Category D land use facilities. Another methods to reduce noise levels is by altering pavement type or surface characteristics. While the pavement itself may be Federal-aid reimbursable, the pavement as a noise abatement measure is not Federal-aid reimbursable.

Scoring Requirements

Implement one or more of the methods listed below. **Points for different scoring requirements are cumulative; however, this criterion shall not exceed a total of five points.**

Requirement PD-33.1

2 points. Specialized Noise Barrier Construction

Construct one or more of the following specialized noise barriers on the project to provide noise abatement. Noise barriers must comply with the Agency's governing Noise Study and Abatement Policy.

- Construct a new noise barrier using recycled materials.
- Re-use an existing noise wall previously constructed within the project limits. Over 75% of the existing noise wall material needs to be re-used to be considered.
- Construct an earthen berm using over 80% of excavated soils generated from within the project limits and/or corridor.

Requirement PD-33.2

2 points. Incorporate Traffic System Management Techniques to Reduce Existing Noise Levels

On projects where noise sensitive receptors have been identified, reduce traffic noise by implementing one or more of the following traffic management options:

- Roadway geometry design or traffic control elements that develop free-flow traffic
- Speed limit reductions
- Signage for prohibiting air braking
- Coordinated signals
- Use of roundabouts

Requirement PD-33.3

2 points. Provide a Buffer Zone for Adjacent Noise Sensitive Receptors

Utilize one of the following approaches to provide a noise buffer zone:

- Selection of an alternative that is not within close proximity to noise sensitive receptors or compared to other alternatives has the least amount of noise impacts.
- Shift of the alignment within the right-of-way or adjustment of right-of-way to move the roadway away from noise sensitive receptors.
- Coordination with local officials to create or preserve compatible land uses adjacent to the roadway."

Requirement PD-33.4

1-3 points. Design Quiet Pavements

Design and specify the total new or reconstructed pavement surface area for regularly trafficked lanes of pavement with a pavement type or surface characteristics designed to reduce the noise from the tire/pavement interaction. The On-board Sound Intensity (OBSI) measurement for the pavement type or surface characteristic should not exceed the maximum noise levels listed in Table PD-41d.A for each posted speed limit range. Credit earned for each posted speed range varies based on the percentage of trafficked pavement area that is designed to meet the corresponding maximum noise level. When calculating the trafficked area, do not include shoulders, medians, sidewalks, maintenance and access roads, or other paved areas outside of the travelled way.

TABLE PD-33.4.A. TESTING SPEEDS AND MAXIMUM AVERAGE OBSI NOISE LEVELS

| Posted Speed Limit | Maximum Noise Level | Minimum Percentage Trafficked Area | | |
|--------------------|---------------------|------------------------------------|----------|----------|
| | | 1 point | 2 points | 3 points |
| 55 mph or more | 98 dBA | 20% | 40% | 60% |
| 30 to 54 mph | 90 dBA | 40% | 60% | 80% |

Pavement sections with posted speeds less than 30 mph do not qualify for this criterion.

Requirement PD-33.5

1 point. Provide Plantings or Sight Screen to Separate Receptors from Roadway

Construct a vegetative barrier a minimum of 100 feet thick, a minimum of 20 feet high with 100% density.

Resources

None referenced.

Scoring Sources

The project 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. Pavement design documentation showing pavement sections to be constructed or reconstructed and their associated surface material type, surface areas, demonstrating that the design was intended to be quiet in accordance with the requirements of this criterion.
2. A calculation to indicate the total percentage of trafficked lane pavement surface areas surfaced with quiet pavement.
3. Design documentation and construction documents showing implemented features.
4. Design studies, including Noise and/or Traffic; and alternatives analysis documentation.

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PD-50T: Alignment Selection



(Customized for Illinois Tollway)

1-6 points

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: Avoid or minimize impacts to, and/or enhance environmental and socioeconomic resources by selecting new and widened alignments that consider and address such impacts, where practical.



Sustainability Linkage

Developing projects that are consistent with the sustainable design principles incorporated into regional plans and local managed growth-based Master or Comprehensive Plans and establishing alignments that minimize or avoid impacts to environmental, social and socioeconomic resources supports all three principles of the triple bottom line.

Background and Scoring Requirements

Background

The purpose of this criterion is to incorporate best practices from the *Illinois Livable and Sustainable Transportation (I-LAST) Rating System and Guide*, version 2.02. Specifically, it is intended to incorporate details of the I-LAST practice D-1: Alignment Selection that were not included in the FHWA INVEST Version 1.2 criteria.

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

- **“Alignment”** or **“cross-section”** in this sub-category considers the horizontal and vertical roadway alignment center line and the general location of all cross-sectional features in the project footprint (e.g., shoulder, ditch, slopes, and right-of-way). The objective is to minimize impacts due to highway project alignment selection, for both new projects and for existing routes, such as shoulder and ditch realignments. In evaluating this category, consideration will be given to what was possible given the particular project’s scale and context; choices made during alignment selection, both on the macro and micro level, can have a substantial effect on wetlands, forest preservation, historic resources, avoidance of impacts to open spaces and wildlife, social resources, socioeconomic resources and other sustainable issues.
- **“Traditional alternative”** in this criterion is defined as the lowest cost and least effort approach to defining or expanding an alignment. For restoration projects, this is typically achieved by simply widening the existing alignment.
- **“Forested tract”** is defined in this criterion as an area of at least 10 acres dominated by one or more woody native species.

This criterion is similar to the following criteria and is intended to provide credit for actions that reduce alignment impacts not already considered in INVEST v1.2 and specifically within the following criteria:

- PD-07: Habitat Restoration
- PD-09: Ecological Connectivity
- PD-15: Historic, Archeological, and Cultural Preservation
- PD-16: Scenic, Natural, or Recreational Qualities

Prerequisites

In order to achieve points for this criterion, the following two prerequisites must be met:

Prerequisite PD-50T.P1

This criterion applies only to new construction and major reconstruction projects that significantly define or redefine the alignment of a roadway.

Prerequisite PD-50T.P2

The project must be consistent with sustainable design principles included in regional plans and local managed growth-based Master or Comprehensive Plans.

Sustainable transportation alternatives can emphasize the relationship between land use and transportation planning. Local and Regional planners are incorporating sustainable design principles into their development plans, thus reflecting the diverse goals and interests of communities. Social and environmental issues, such as congestion, greenhouse gas emissions, and energy consumption, can be addressed through consideration of managed growth planning initiatives.

Scoring Requirements

Implement one or more of the methods listed below. Points for different methods are cumulative; however, this criterion shall not exceed a total of six points.

Requirement PD-50T.1

1-3 points. Minimize or Avoid Impacts to Forested Tracts

Select an alignment that minimizes or avoids impacts to forested tracts via alignment selection decisions above and beyond typical considerations, such as selection of an alternate which skirts the edge of a resource, rather than bisecting the resource. Points shall be achieved per the following table. Points are **not** cumulative; rather the highest point value should be used.

TABLE PD-50T.1.A. POINTS AND METHODS TO MINIMIZE IMPACTS TO FORESTED TRACTS

| Points | Method |
|--------|---|
| 1 | Minimize Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize impacts to forested tracts over 10 acres in size as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alternative. |
| 2 | Avoid Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly avoid impacts to forested tracts over 10 acres in size as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 75% or more as compared to the traditional alternative. |
| 3 | Enhance features. For projects not required to mitigate or restore impacts to forested tracts, implement an enhancement and/or restoration effort that expands the forested tract by 10% or more, or improves vegetative diversity or removes invasive species. To qualify, the resulting forested area or enhanced forest must be at least 10 acres in size. |

Requirement PD-50T.2

1-2 points. Minimize or Avoid Impacts to Prime Farmland

Select an alignment that minimizes or avoids impacts to existing prime farmland as defined by the United States Department of Agriculture in 7 CFR 657.5. Points shall be achieved per the following table. Points are **not** cumulative; rather the highest point value should be used.

TABLE PD-50T.2.A. POINTS AND METHODS TO MINIMIZE IMPACTS TO PRIME FARMLAND

| Points | Method |
|--------|--|
| 1 | Minimize Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize impacts to prime farmland as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alternative. |
| 2 | Avoid Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly avoid impacts to prime farmland as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 75% or more as compared to the traditional alternative. |

Requirement PD-50T.3

1-3 points. Minimize or Avoid Impacts to Socioeconomic Resources

Select an alignment that minimizes or avoids impacts to identified socioeconomic resources such as parks, recreational areas, houses of worship, historic sites (including structures listed on local historic registers), residential buildings and commercial buildings providing employment. Points shall be achieved per the following table. Points are **not** cumulative; rather the highest point value should be used.

TABLE PD-50T.3.A. POINTS AND METHODS TO MINIMIZE IMPACTS TO SOCIOECONOMIC RESOURCES

| Points | Method |
|--------|---|
| 1 | Minimize Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly minimize impacts to socioeconomic resources as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alternative. |
| 2 | Avoid Impacts. Show that an effort has been made to modify the alignment and/or project cross-sections to significantly avoid impacts to socioeconomic resources as compared to a traditional alternative and above and beyond what was required by regulations. To qualify, the area of impact must be reduced by 75% or more as compared to the traditional alternative. |
| 3 | Enhance features. For projects not required to mitigate or restore impacts to socioeconomic resources, implement an enhancement and/or restoration effort that significantly improves the quantity and/or quality of the resource. To qualify for credit, the resource size must be increased by a minimum 10% and/or the quality must be measurably and significantly improved. |

Requirement PD-50T.4

2 points. Minimize Right-of-Way Takes

Select a cross-section that minimizes overall construction “footprint” to eliminate right-of-way (ROW) takes through profile selection decisions above and beyond typical considerations, such as the construction of retaining structures. To qualify, the area of impact must be reduced by 50% or more as compared to a traditional alignment.

Requirement PD-50T.5

2 points. Utilize Brownfield Locations

Two points will be credited to projects that utilize significant portions of brownfield sites in lieu of other resources. To qualify, the brownfield utilization must account for 50% or more of the new or widened project footprint area as compared to a traditional alignment.

Scoring Sources

The project 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. Contract documents showing the baseline conditions of the site and improvements to be constructed.
2. Technical reports or permitting documentation that describes the alignment and cross-sectional design decisions made to minimize or avoid impacts to resources satisfying this criterion.
3. Technical report that describes minimization that occurred throughout the project development process.

PD-51T: Visual Aesthetics



(Customized for Illinois Tollway)

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: Consider design flexibility that responds to the project area's unique character, including design features and aesthetics.

Sustainability Linkage

Incorporating Visual Aesthetics supports Social and Economic sustainability principles by providing a pleasing environment that improves the quality of experience of the traveling public and local community, and may serve to attract the public.



Affected Triple Bottom Line Principles

This Criterion has been Retired

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PD-52T: Noise Abatement



(Customized for Illinois Tollway)

1-5 points

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: Reduce traffic noise impacts to surrounding communities and environments.

Sustainability Linkage

The reduction of noise benefits both the human and natural environment. Therefore, this criterion supports the environmental and social principles of the triple bottom line.



Affected Triple Bottom Line Principles

This Criterion has been Retired

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PD-53T: Reduce, Reuse and Recycle Materials (Design)



(Customized for Illinois Tollway)

1-12 points

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: Reduce lifecycle impacts from extraction and production of virgin materials by reducing, reusing, and recycling materials.



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

The purpose of this criterion is to incorporate best practices from the *Illinois Livable and Sustainable Transportation (I-LAST) Rating System and Guide*, version 2.0. Specifically, it is intended to incorporate details of the I-LAST practice M-1: Materials that were not included in the FHWA INVEST Version 1.2 criteria.

I-LAST practice M-1 focuses on designs that allow the contractor to choose methods and materials to reduce, reuse and recycle materials during construction. I-LAST version 2.02 adds practice CM-1: Construction Materials to provide credit for the contractor's use of those methods and materials. INVEST has two criteria that address the use of methods and materials to reduce, reuse and recycle materials (similar to I-LAST CM-1), but does not have a complimentary criterion to provide credit for allowing the contractor to choose methods and materials to reduce, reuse and recycle materials during construction.

This criterion is similar to the following criteria and is intended to provide credit for actions that allow the contractor to choose from specified options to use materials and methods that reduce, reuse and recycle materials as defined in the following two criteria. Limits, options, and approvals shall be dictated in the special provisions.

- PD-19: Reduce, Reuse and Repurpose Materials
- PD-20: Recycle Materials

Programs for waste reduction in the United States have generally taken on the concept of the 3Rs: reduce, reuse, and recycle. For the purposes of this criterion, as well as to PD-19: Reduce and Reuse Materials and PD-20: Recycle Materials, the following definitions apply:

- **“Reducing”** is used in this tool to refer to processes that reduce the need for virgin paving and structural materials. Examples include soil stabilization methods to reduce the need for structural backfill or to reduce the required thickness of a new pavement or overlay; pavement preservation technologies that extend the life of existing pavements and reduce the need for new materials; bridge preservation technologies that extend the life of existing bridges and reduce the need for new structures and materials; retrofitting existing bridge

structures to reduce the need for new structures and materials; or processes that incorporate existing pavement structures into new pavement structures (such as crack-and-seat and rubblization) to reduce the need for new materials and avoid the transportation of the existing used materials which would otherwise be removed from a project.

- **“Reusing”** is the reuse of a material or by-product from another industry for a new function in a transportation application. Examples of the beneficial use of industrial by-products include the incorporation of materials such as coal ash, fly ash, foundry sand, slag, asphalt shingles, construction and demolition materials, or other materials into a transportation project. These reused materials replace traditional materials with similar properties in specific applications. The reuse of these materials should assure that the engineering properties of the final product or mixture are equal to or better than obtained from using traditional materials, and that their economic value is demonstrated in accordance with the FHWA Recycling Policy. Reused materials provide environmental benefit by reducing the unnecessary landfilling of these materials. With proper engineering, these materials can be successfully incorporated into transportation applications and provide economic value to our projects.
- **“Recycling”** is the use of old materials for a new and similar use in a transportation application, or the salvaging and reprocessing of previously used materials from other transportation applications into a new transportation project. See PD-20: Recycle Materials for examples.
- **“Retrofit”** is defined as the addition of new features or technology to an older or existing facility. A project would include retrofit components in order to reinforce structures to become more resistant and resilient to the forces of natural hazards and other environmental factors such as aging and weathering. It involves the consideration of changes in the mass, stiffness, damping, load path, and ductility of materials, as well as radical changes such as the introduction of energy absorbing dampers and base isolation systems.
- **“Existing pavement material”** is defined as all material within the project limits in the existing pavement structure (including surfacing and base material). This includes travelled lanes and shoulders, and pavement structures for physically separated bicycle and pedestrian pathways.
- **“Existing structural material”** is defined as all material within the project limits in existing non-pavement structures such as bridges (including overpasses), retaining walls, and stormwater infrastructure, such as vaults, pipes, and culverts. All existing structural materials include their foundations, for which volumes may be difficult to estimate. Where actual weights are not available, reasonable estimates may be used or volume may be estimated. To compute volume of hollow structural sections such as prefabricated members or corrugated steel, estimate the mass of the material and adjust for material density to determine volume. Note that for typical reinforced concrete sections, the steel does not need to be separated from the composite section for purposes of volume calculations and a composite density may be used.

Scoring Requirements

Implement one or more of the methods listed below. Points for different methods are cumulative; however, this criterion shall not exceed a total of 12 points.

Requirement PD-53T.1

2 points. Allow Contractor to Reduce Pavement Materials

In the specifications, allow for the Contractor to choose options that reduce the amount of new pavement materials needed through soil stabilization methods to reduce the required thickness of a new pavement, or processes that incorporate existing pavement structures into new pavement structures (such as fractured slab techniques, including crack-and-seat and rubblization). See PD-19: Reduce, Reuse and Repurpose Materials.

Requirement PD-53T.2

2 points. Allow Contractor to Repurpose Pavements or Structures

In design, incorporate methods that would allow for the Contractor to choose options to reuse existing pavements, structures, or structural elements for a new use by repurposing them for a use that requires equal or less loading. The purpose of this scoring requirement is to maintain and leverage existing pavements, structures, and structural elements for new uses where possible instead of using new materials. One method is to maintain existing pavements when new alignments are proposed and use the existing pavement for a new use, such as realigning a highway but maintaining the old one as a frontage road or multiuse path. Another method is to convert existing pavement to a different use, such as converting parking to travelled lanes (or vice versa) or converting pavement to multiuse paths or plazas. See PD-19: Reduce, Reuse and Repurpose Materials.

Requirement PD-53T.3

1-3 points. Allow Contractor to Reuse Industrial By-Products

In design, allow the Contractor to specify the reuse of:

- **1 point.** By-product sand or other industrial by-products in pipe bedding and backfill.
- **2 points.** Industrial by-products in pavement materials, ancillary structures, and other roadway elements. These could include one or more of the following: coal ash, fly ash, by-product sand, slag, tires, asphalt shingles, and construction and demolition materials.

See PD-19: Reduce, Reuse and Repurpose Materials.

Requirement PD-53T.4

2 points. Allow Contractor to Use Recycled Asphalt Pavement or Recycled Concrete Aggregate

In design, allow the Contractor to specify the use of recycled asphalt pavement (RAP) as embankment or as an aggregate substitute in asphalt concrete pavements and/or allow the use of recycled concrete aggregate (RCA) in new pavement lifts or granular base course or embankments. The recycled materials can originate on the project or from an offsite source, but no points are awarded for removing paving materials from the project and sending them offsite to be recycled. See PD-20: Recycle Materials.

If RCA is used, it must be in conformance with the Tollway's *Drainage Design Manual*, Sections 5.2 and 10.7.2.

Requirement PD-53T.5

2 points. Allow the Contractor to Recycle Asphalt Pavement In-Place

In design, allow the Contractor to recycle asphalt pavement materials in place using cold-in-place recycling, hot-in-place recycling, and/or full depth reclamation methods. See PD-20: Recycle Materials.

Requirement PD-53T.6

1 point. Allow the Contractor to Recycle Structural Elements

In design, allow or require the Contractor to relocate and reuse structural elements, including existing luminaires, signal poles, and sign structures that are required to be removed and/or relocated onsite. This may also include salvaging the same materials and providing them to the Tollway's Maintenance and Operations Division for future reuse. Signs mounted on posts are not included in this criterion. See PD-20: Recycle Materials.

Requirement PD-53T.7:

1 point. Consider Local Materials

This scoring element may only be used on projects that have no federal funding.

In design, encourage the use of more local materials by providing special provisions that allow contractors to use more available local materials compared to material source requirements through standard specifications. Local materials for this score do not include recycled or reused items. The standard specifications that are already in place are not to be considered for this point. An example of this would be if a designer has a roadway element that would specify alternate property requirements that allow for aggregates that are closer to the jobsite to be used compared to sources that would be required under the standard specification.

Scoring Sources

The project 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. Contract documents showing the methods and materials allowed on the project for temporary and permanent construction.

PD-54T: Light Pollution



(Customized for Illinois Tollway)

1-3 points

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: To safely illuminate roadways while minimizing unnecessary and potentially harmful illumination of the surrounding sky, communities, and habitat.

Sustainability Linkage

Reducing lighting pollution benefits both the natural and human environment.



Affected Triple Bottom Line Principles

This Criterion has been Retired

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PD-55T: Regional Employment



(Customized for Illinois Tollway)

1-3 points

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: Promote local economies, reduce travel times and emissions, and employ those who are familiar with local practices, regulations, and businesses.



Affected Triple Bottom Line Principles

Sustainability Linkage

Emphasizing regional employment provides benefits to all three principles of the triple bottom line.

Background and Scoring Requirements

Background

Local hiring stimulates the local economy and is often important to stakeholders. The practice can indirectly reduce the impacts of traffic emissions on the environment (and resulting from the project), and may help the project proceed more smoothly because of more efficient commutes and vested labor.

Scoring Requirements

2-3 points. Implement a program to encourage the hiring of local labor for the construction of the project. **DBE requirements specified by Tollway contract does not qualify for this criterion.**

Prerequisite PD-55T.P

This criterion only applies to projects that have NO federal funding in the respective budgets (i.e., no federal money in the design budget, construction budget, etc.). It is very important to note that incorporating a requirement to use local labor may forfeit any current or future federal funds and is a decision that should be made solely by the owner of the project.

Requirement PD-55T.1

1-3 points. Construction Labor

Hire construction laborers who live within ZIP codes that are located within a certain radius of the project location/corridor, as defined below. Note, where a portion of a ZIP code lies within the designated radius and a portion lies outside of the radius, the entire ZIP code is qualified.

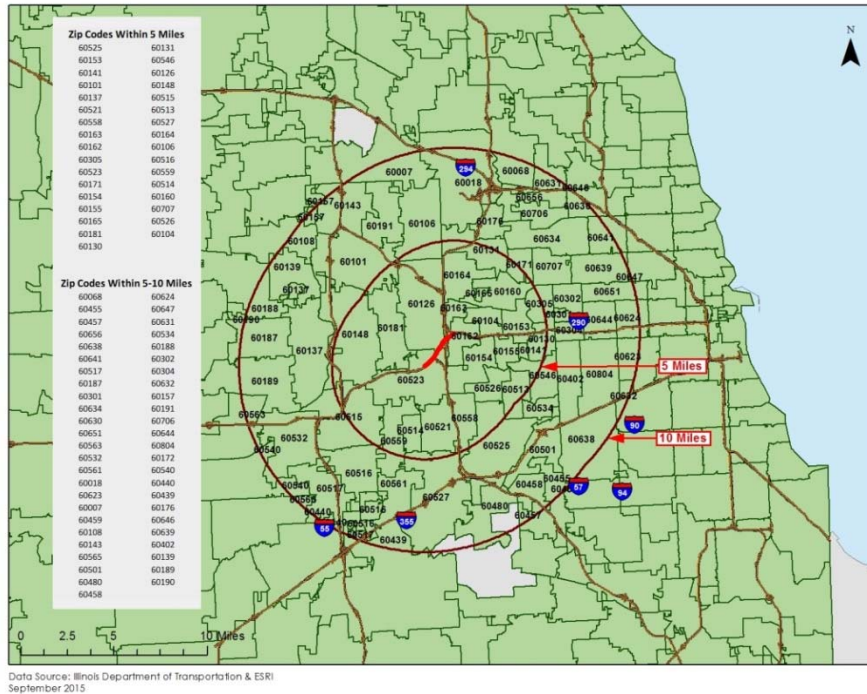
- **PD-55T.1a: 2 points.** Document that 20% of the construction labor resides within ZIP codes located within a five-mile radius of the project location/corridor.
- **PD-55T.1b: 1 point.** Document that 30% of the construction labor resides within ZIP codes located within a 10-mile radius of the project location/corridor. This point can be earned as an additional point if PD-55T.1a applies to the project, or can be earned separately if PD-55T.1a is not applicable.

ZIP Code Identification Instructions

Develop a map of the project location or corridor inclusive of beginning and ending mile markers (i.e., east-west or north-south origin and terminus). Using this map, locate a five-mile and 10-mile radius around the

location/corridor. Identify all ZIP codes within the five-mile and 10-mile corridor. (If requested, the Tollway GIS department can assist in developing this ZIP code map.) Generate a list of employee residential ZIP codes indicating the total number of employees per ZIP code. Compare this list to those within the five-mile radius and within the 10-mile radius, and calculate the percentages of employees within the qualifying areas.

In the example below, the project corridor is identified. Two circles are drawn around the project corridor identifying the five-mile and 10-mile distances from the project. ZIP codes located within the two qualified areas are identified.



OR

Requirement PD-55T.2

1-2 points. Construction Labor

Utilize a process or program that promotes the hiring of workers from disadvantaged populations (e.g., minority, veterans, woman, disabled, etc.) for construction labor. Project teams can utilize an existing program (e.g., Employ Illinois) or develop their own process that accounts for the unique attributes of the project or location. A project may apply for up to two points; the Tollway will determine the number of points to be awarded based on the sustainability benefits of the proposed hiring program.

Scoring Sources

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

1. Contractors must supply a list of the total employees residing per ZIP code within the qualified ZIP codes identified for this project, and the total employees for the project as a whole.

OR

2. Contractors must document their compliance with the program/process approved by the Tollway.

PD-56T: Permeable Pavement



(Customized for Illinois Tollway)

1-2 points

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: Improve flow control and quality of stormwater runoff through use of permeable pavement technologies.

Sustainability Linkage

Permeable pavements primarily have environmental benefits to the natural and built environment.



Affected Triple Bottom Line Principles

This Criterion has been Retired

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PD-57T: Innovations



(Customized for Illinois Tollway)

SCORECARDS: Paving Rural Basic Rural Extended Urban Basic Urban Extended

Goal: The objective of this section is to recognize innovative sustainable roadway design and construction practices such as the use of materials, processes, methods, equipment items, traffic operational devices, or other features which have not yet been sufficiently tested under actual field and operational conditions to merit standard use in normal highway construction.



Affected Triple Bottom Line Principles

Sustainability Linkage

Innovative ideas have the potential of supporting any or all three principles of the triple bottom line.

Background and Scoring Requirements

The scoring elements in this criterion replace the FHWA's Innovation Criteria, i.e., FHWA PD-IN-01 through PD-IN-03. Requirements of Tollway PD-57T: Innovations mirror requirements of FHWA's PD-IN-01 through 03. The issuance of Tollway-specific PD-57T allows for easier tracking within the Tollway Project Invest Scorecard (PINS) and comparisons to INVEST v1.1.

Background

There is ongoing research in all fields of transportation that relate to the field of sustainability; it is important that the Tollway be aware of new methods and materials that provide environmental, economic, and/or social benefits.

Typically these will be items for which the Tollway does not have a standard specification or special provision, or is not addressed in the current Illinois Tollway's Manuals.

The Tollway must use unproven materials and methods carefully to protect public safety and investment. Where an existing process does not exist to approve innovative methods or materials at the Tollway, it is recommended that FHWA's Experimental Feature process be followed to review and regulate the introduction of new materials and methods. Ultimately, the Tollway must approve any unproven methods and materials.

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

- **"Above and Beyond"** refers to best practices that are in addition to what is typically required by standard or regulation, or by conventional practice for similar projects.
- **"Best Practices"** are sustainable techniques, methods, practice, processes, or materials.
- **"Emerging Technology"** is a best practice that has not yet been tested and proven effective or feasible for wide-spread adoption or application.
- **"Innovative"** refers to a new and unique method, practice, or solution that is not already addressed in INVEST. If the points earned by employing the best practice can earn points elsewhere within the existing INVEST criteria, this does not satisfy the definition of "innovative" and points cannot be earned utilizing PD-57T.
- **"Sustainable"** means contributing to one or more of the triple bottom line principles.

A Best Practice selected to be submitted as an innovation criterion should be considered an innovative or an emerging technology AND should also be above and beyond regulatory requirements, standards, and conventional

practice. Many criteria within INVEST are results-based, meaning the results are measured rather than the method itself. This is intentional as to allow practitioners ample leeway for obtaining sustainable results. Keep this in mind when determining whether a best practice is indeed innovative.

Scoring Requirements

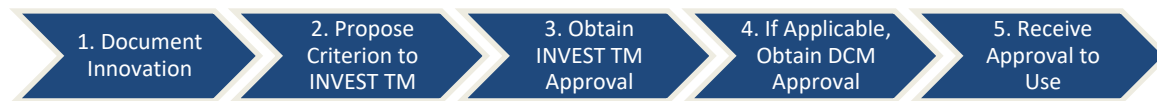
A project may apply for up to three innovative criterion applications with credit ranging from 1-3 points per sustainable method or material. Points for different methods are cumulative; however, this criterion shall not exceed a total of six points.

1-3 points. Use of Experimental Methods or Materials to Improve the Sustainability of a Project

Analyze, propose, and use experimental methods or materials to design and construct a project per the process outlined herein.

The number of points should be relative to both the sustainability benefits and the level of effort to research and support the incorporation of the innovative feature in the project. The following process must be followed to receive approval to use an innovative criterion on a project.

Innovative Practice Approval Process



1. Identify an idea for a method or material best practice for roadways that is not currently included in INVEST or the Illinois Tollway INVEST Manual, and that is more sustainable than standard or conventional practices.

Document innovation, including:

- a) Proposed criterion name;
 - b) Goal;
 - c) Description of the primary sustainability linkage(s) to three triple bottom line principles;
 - d) Description of how the proposed practice goes above and beyond requirements or standard and/or conventional practices;
 - e) Description of innovation;
 - f) Proposed scoring methodology for innovation;
 - g) Recommended points to be credited (with justification based on significance and duration of sustainable impact);
 - h) Location of documentation sources; and
 - i) References.
2. Propose the innovation to the INVEST Technical Manager (INVEST TM) using the documentation from step 1.
 3. Obtain approval from the INVEST TM to get credit for the innovation.
 4. If applicable, the INVEST TM will coordinate approval of innovation with the DCM.
 5. Add the criterion to project's INVEST evaluation and score accordingly.

Potential Innovative Criteria

The following are examples of possible innovative criteria. This list is not intended to be all inclusive, the DSE is encouraged to consider any innovations deemed appropriate and of value. The process described above is required to obtain approval to use innovative techniques on the project and add to the INVEST evaluation.

1-2 points. Innovative Intersection/ Interchange Design

At locations where unusual traffic patterns or a constrained site would cause achieving a high level of service difficult, the use of an innovative intersection or interchange form may provide improved operations.

The number, type, and location of access points and traffic signals can have a direct impact on the capacity, speed, and safety of a roadway. Arterial or interchange access points create conflict points and turning vehicles can interfere with through traffic, potentially reducing the capacity of the through lanes or affecting safety.

Incorporate an innovative intersection or interchange design where traffic operational analysis shows it can provide a substantial operational improvement over conventional designs. For the purposes of this credit, designs will be considered innovative when they are not included in the current Tollway Design Section Engineer's Manual or the Illinois Department of Transportation (IDOT) Bureau of Design & Environment (BDE) manuals, but are acceptable to the Tollway, IDOT, and FHWA, as appropriate.

1 point. Use of Precast Pavements

Construct concrete pavements using precast panels to reduce traffic congestion during construction.

1-3 points. Accelerated Bridge Construction

Leverage methods to construct bridges that reduce impacts and schedule duration such as segmental or modular construction or parallel construction and roll-in of new structures.

1 point. Reduce Rolling Resistance

Construct sustainable pavements using materials that are able to resist the influence of mechanical and environmental wear and provide low rolling resistance without compromising safety, strength, or durability.

1-2 points. Solar Powered Pavement Markings/Signs

Install illuminated roadway markings or signage powered by solar energy. For example, a project may install solar powered raised pavement markings (SRPM). SRPMs contain a small photovoltaic cell that stores energy and are brighter than passive reflective markers and striping, which provides drivers with longer sight distance and more advanced warning at night and during inclement weather. SRPMs have multiple uses, including crosswalks, lane delineation, curves, shoulders, guard rails and jersey barriers, temporary traffic pattern changes, and speed bumps.

Scoring Sources

The project 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. List possible documentation sources, such as calculations and reports.
2. Documentation of techniques and underlying assumptions.
3. Contract documents showing the plans and specifications for innovative methods and/or materials used on the project.
4. Documentation of innovation and approval by the INVEST TM and DCM (if applicable) per the process described herein.

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**APPENDIX 3 PROJECT INVEST SCORECARD (PINS)
EXAMPLE**



PINS-30D

| | |
|----------------------------------|---|
| Project No.: | RR-14-4224 |
| Description: | Tri-State Tollway, Design Corridor Management |
| Corridor: | I-294 Central Tri-State |
| Section: | 95th St to Balmoral Ave |
| MP Limits: | 17.5 to 40.0 |
| Planning Lead: | JGEMHS_TM (Jacobs/EFK Moen/Hanson) |
| DCM & DSE: | JGEMHS_TM (Jacobs/EFK Moen/Hanson) |
| CCM & CM: | N/A |
| INVEST Technical Manager: | Michelle Ross & Cheryl Nash |
| INVEST Tollway Version: | v1.2 |
| Scorecard: | Urban Extended |
| Lead Evaluator: | Beth Norton - Parsons |
| Submittal: | 30% Design |
| Date: | 9/6/2018 |
| Use corridor score? | Yes |
| Corridor Includes: | Reconstruction |

Key Project Features:

The proposed improvements would include reconstructing mainline pavement, except from Wolf Road to Balmoral Avenue and Toll Plazas 35, 36, and 39. The reconstruction would include widening along congested sections, shifting the alignment at several locations, correcting existing deficiencies where practical, and adding a widened inside shoulder to be used as a flex lane. The I-290/I-294/I-88 system interchange would be reconstructed. Replacement or rehabilitation of bridges, major box culverts, and retaining walls. A new westbound to northbound entrance ramp from Archer Avenue is included in conjunction with a locally led project to provide other new access to and from I-294 at Cork Avenue/88th Street. Tollway mainline bridges will either be fully replaced or have superstructure replacement along with substructure widening. The current Hinsdale Oasis overhead structure will be removed, and the Oasis areas will be repurposed. New truck parking areas are planned to be accommodated within the corridor. Existing storm sewer and drainage structures within the pavement reconstruction limits would be removed and replaced with new infrastructure designed to current Illinois Tollway Standards, and infrastructure within rehabilitated sections would be improved as required to address existing identified issues. Intelligent Transportation System (ITS) infrastructure including cameras, traffic sensors, weather stations, and the supporting equipment such as fiber optic cables, electric cable, conduits, devices, poles, gantries, IPDC facilities are proposed for inclusion. New LED roadway lighting would also be installed.

Project Development Criteria

| Criteria | Title | Available Points | Project Score | Corridor Score |
|----------|--|------------------|---------------|----------------|
| PD-01 | Economic Analyses | 5 | 0 | 0 |
| PD-02 | Life-Cycle Cost Analyses | 3 | 0 | 2 |
| PD-03 | Context Sensitive Project Development | 10 | 0 | 8 |
| PD-04 | Highway and Traffic Safety | 10 | 0 | 4 |
| PD-05 | Educational Outreach | 2 | 0 | 2 |
| PD-06 | Tracking Environmental Commitments | 5 | 0 | 0 |
| PD-07 | Habitat Restoration** | 7 | 0 | 3 |
| PD-08 | Stormwater Quality and Flow Control** | 6 | 0 | 0 |
| PD-09 | Ecological Connectivity | 4 | 0 | 1 |
| PD-10 | Pedestrian Facilities | 3 | 0 | 2 |
| PD-11 | Bicycle Facilities | 3 | 0 | 3 |
| PD-12 | Transit and HOV Facilities | 5 | 0 | 3 |
| PD-13 | Freight Mobility | 7 | 0 | 7 |
| PD-14 | ITS for System Operations | 5 | 0 | 5 |
| PD-15 | Historic, Archaeological and Cultural Preservation | 3 | 0 | 0 |
| PD-16 | Scenic, Natural, or Recreational Qualities | 3 | 0 | 0 |
| PD-17 | Energy Efficiency | 8 | 0 | 4 |
| PD-18 | Site Vegetation, Maintenance and Irrigation** | 6 | 0 | 5 |
| PD-19 | Reduce, Reuse and Repurpose Materials | 12 | 0 | 7 |
| PD-20 | Recycle Materials** | 10 | 0 | 7 |
| PD-21 | Earthwork Balance | 5 | 0 | 1 |
| PD-22 | Long-Life Pavement | 7 | 0 | 2 |
| PD-23 | Reduced Energy and Emissions in Pavement Materials | 3 | 0 | 0 |
| PD-24 | Permeable Pavement | 2 | 0 | 0 |
| PD-25 | Construction Environmental Training | 1 | 0 | 0 |
| PD-26 | Construction Equipment Emission Reduction | 2 | 0 | 2 |
| PD-27 | Construction Noise Mitigation | 2 | 0 | 0 |



PINS-30D

| | |
|----------------------------------|---|
| Project No.: | RR-14-4224 |
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| Corridor: | I-294 Central Tri-State |
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| MP Limits: | 17.5 to 40.0 |
| Planning Lead: | JGEMHS_TM (Jacobs/EFK Moen/Hanson) |
| DCM & DSE: | JGEMHS_TM (Jacobs/EFK Moen/Hanson) |
| CCM & CM: | N/A |
| INVEST Technical Manager: | Michelle Ross & Cheryl Nash |
| INVEST Tollway Version: | v1.2 |
| Scorecard: | Urban Extended |
| Lead Evaluator: | Beth Norton - Parsons |
| Submittal: | 30% Design |
| Date: | 9/6/2018 |
| Use corridor score? | Yes |
| Corridor Includes: | Reconstruction |

Key Project Features: The proposed improvements would include reconstructing mainline pavement, except from Wolf Road to Balmoral Avenue and Toll Plazas 35, 36, and 39. The reconstruction would include widening along congested sections, shifting the alignment at several locations, correcting existing deficiencies where practical, and adding a widened inside shoulder to be used as a flex lane. The I-290/I-294/I-88 system interchange would be reconstructed. Replacement or rehabilitation of bridges, major box culverts, and retaining walls. A new westbound to northbound entrance ramp from Archer Avenue is included in conjunction with a locally led project to provide other new access to and from I-294 at Cork Avenue/88th Street. Tollway mainline bridges will either be fully replaced or have superstructure replacement along with substructure widening. The current Hinsdale Oasis overhead structure will be removed, and the Oasis areas will be repurposed. New truck parking areas are planned to be accommodated within the corridor. Existing storm sewer and drainage structures within the pavement reconstruction limits would be removed and replaced with new infrastructure designed to current Illinois Tollway Standards, and infrastructure within rehabilitated sections would be improved as required to address existing identified issues. Intelligent Transportation System (ITS) infrastructure including cameras, traffic sensors, weather stations, and the supporting equipment such as fiber optic cables, electric cable, conduits, devices, poles, gantries, IPDC facilities are proposed for inclusion. New LED roadway lighting would also be installed.

Project Development Criteria

| Criteria | Title | Available Points | Project Score | Corridor Score |
|-----------------------------------|---|------------------|---------------|----------------|
| PD-28 | Construction Quality Control Plan | 5 | 0 | 5 |
| PD-29 | Construction Waste Management | 4 | 0 | 2 |
| PD-30 | Low Impact Development** | 3 | 0 | 1 |
| PD-31 | Infrastructure Resiliency Planning and Design | 12 | 0 | 4 |
| PD-32 | Light Pollution | 3 | 0 | 1 |
| PD-33 | Noise Abatement | 5 | 0 | 2 |
| PD-50T | Alignment Selection (Tollway-Specific) | 6 | 0 | 0 |
| PD-53T | Reduce, Reuse and Recycle Materials (Design) (Tollway-Specific) | 12 | 0 | 7 |
| PD-55T | Regional Employment (Tollway-Specific) | 3 | 0 | 0 |
| PD-57T | Innovations (Tollway-Specific)* | 6 | 0 | 6 |
| Project Development Score: | | 192 | 0 | 96 |
| Rating: | | | NONE | GOLD |

* Not included in total available points because these are considered a bonus.

** See Illinois Tollway Supplement to this criterion.



| INVEST v1.2 Criteria with Tollway-Specific Supplements and Criteria Scorecard for: Urban Extended | | | | | | Corridor Score | | | Project Score and Notes | | | Comments C Why Project Scored this Way | Comments D Available Documentation |
|---|---------------------------------------|--|------------------|--|----------|-----------------|-----------------------|--|---|----------|-----------------|---|---------------------------------------|
| Criterion | Title | Goal | Available Points | Point Basis | Response | Achieved Points | Total Criterion Score | Comments A Why Corridor Scored this Way | Comments B How Corridor Relates to Sections | Response | Achieved Points | | |
| PD-01 | Economic Analyses | Using the principles of benefit-cost analysis (BCA) or economic impact analysis (EIA), provide evidence that the benefits, including environmental, economic, and social benefits, justify the full life-cycle costs. | 2 | PD-01.1a: Benefit-Cost Analysis: Was a benefit-cost analysis (BCA) for the project completed using minimum acceptable industry practices? | No | | | A BCA will not be completed for this project. | | | | | |
| | | | 3 | PD-01.1b: Was an Economic Impact Analysis (EIA) completed that meets all the listed requirements? | No | | | An EIA is not likely to be performed on this project. Full NEPA work would qualify as an EIA, but this would be an out of scope task for this project. The team does not feel that this would be meaningful because the project is already moving forward. | | | | | |
| PD-02 | Life-Cycle Cost Analyses | Reduce life-cycle costs and resource consumption through the informed use of life-cycle cost analyses of key project features during the decision-making process for the project. | 1 | PD-02.1a: Was an LCCA performed for all pavement structure alternatives in accordance with the method described in the FHWA's Technical Bulletin for Life-Cycle Cost Analysis? | Yes | 1 | 2 | ARA will perform this analysis. The Tollway will provide the documentation when its complete. | | | | | |
| | | | 1 | PD-02.1b: Was an LCCA performed for all stormwater infrastructure alternatives considered? | No | | | An LCCA for stormwater infrastructure is not included in the scope. However, if the BMPs being used are atypical and may impose some burden on the Tollway maintenance staff, then an LCCA may be useful. | | | | | |
| | | | 1 | PD-02.1c: Was an LCCA performed for the project's major feature (bridges, tunnels, retaining walls, or other items not listed in the preceding options) for each of the alternatives considered? | Yes | 1 | | An LCCA was performed for the bridge structure. | Per INVEST Team, sounded as though an LCCA is being conducted for all bridges, so all contracts should take these points. | | | | |
| PD-03 | Context Sensitive Project Development | Deliver projects that harmonize transportation requirements and community values through effective decision-making and thoughtful design. | 2 | PD-03.1: Did the project development process generally follow the six-step CSS framework described in NCHRP report 480 and NCHRP report 642, or an equivalent process? | Yes | 2 | 8 | The I-294 team is not generally scoped to do these things, and our role is to support the Tollway public outreach staff. The CSS process is not a formal one, but the Tollway process includes a lot of stakeholder outreach including many one-on-one meetings with the communities. | | | | | |
| | | | 1 | PD-03.2: Did the project development process feature a "cradle-to-grave" project team that included planners, traffic engineers, public involvement specialists, design engineers, environmental experts, safety specialists, landscape architects, right-of-way staff, freight experts, construction engineers, and others to work on projects who worked together to achieve the desired CSS-based vision for the project? | Yes | 1 | | | | | | | |
| | | | 1 | PD-03.3: As a result of CSS-influenced project development process, were external "champions" for the project created in the affected community who were engaged and proactive in supporting it? | Yes | 1 | | There are communities in support of the project. The team is working through one-on-one meetings and the CPC (Corridor Planning Council) | | | | | |
| | | | 1 | PD-03.4: Did the project use visualization tools to assist in the decision making process? | Yes | 1 | | Visualization tools will be used, including photo simulations prepared for the bridge, noise walls, aesthetics, and VISSIM models. | | | | | |
| | | | 1 | PD-03.5: Do project features consider the appropriate scale of the project? | Yes | 1 | | Considering that this is a large scale highway project, points are awarded based on a cohesive landscaping plan and incorporation of features for pedestrians on bridges. | | | | | |
| | | | 1 | PD-03.6a: The project removed objectionable or distracting views during construction only. | No | | | Consider the use of sight screens during construction. | | | | | |
| | | | 2 | PD-03.6b: Did the project remove objectionable or distracting views permanently? | No | | | This criterion will need further discussion. There is potential for implementation of noise walls constructed within the corridor. On other projects, in places where noise abatement is not necessary visual barriers have been installed, but it is not common. | | | | | |
| | | | 1 | PD-03.7: Did the project integrate context sensitive aesthetic treatments? | Yes | 1 | | A corridor aesthetic theme has been established for abutments and other bridge design elements; a corridor-wide noise wall aesthetics have been developed. | | | | | |
| | | | 1 | PD-03.8: Were aesthetics for bridges and other structural items incorporated into the design of the project? | Yes | 1 | | A corridor aesthetic theme has been incorporated into design through the use of form liners on bridges and abutments. | | | | | |
| PD-04 | Highway and Traffic Safety | Safeguard human health and reduce social and economic impacts from crashes by incorporating science-based quantitative safety analysis processes within project development that will reduce serious injuries and fatalities within the project footprint. | | PD-04.1a: Were human factors incorporated that relied solely on published design and operational performance standards during the project development process. | Yes | | 4 | | | | | | |
| | | | 2 | PD-04.1b: Were human factors incorporated that considered interactions between road users and the roadway using fundamentals captured in Chapter 2 of the Highway Safety Manual and the Human Factors Guideline for Road Systems (NCHRP Report 600 series) were evaluated, documented, and incorporated. | No | | | An HSM evaluation will not be completed for this project. | | | | | |
| | | | 1 | PD-04.2: Was awareness built among the public regarding contributing factors to crashes? | Yes | 1 | | This point was included for this criterion because of the safety messages that are displayed on the Tollway ITS system. | | | | | |
| | | | 1 | PD-04.3a: Was an explicit consideration of safety using quantitative and statistically reliable approach used to establish the project type, as defined in the HSM? | No | | | An HSM evaluation will not be completed for this project. | | | | | |
| | | | 2 | PD-04.3b: Was a quantitative and statistically reliable method used to develop and evaluate project design and/or operational alternatives? | No | | | A traffic analysis to improve operations that results in "nominal" safety improvements does not seem to qualify. | | | | | |
| | | | 3 | PD-04.3c: Was a quantitative and statistically reliable method used to assess substantive safety performance in the development of preliminary and final design details, including design exceptions (if any)? | Yes | 3 | | The corridor team has identified many design deviations during the Master Plan and Advanced Engineering Studies that are likely to remain through design and construction. For 4224, these deviations are listed in a table in the latest IDS for the Interchange at I-294/I-88/I-290 interchange submittal. The team feels that the following design deviations will not be eliminated as the design further develops in Phase II: #1 Flex Lane width <=16', #2 Superelevation cross slopes not met at Cermak plaza, #3 Stopping Sight Distance at Inside Shoulder through Cermak Plaza (within the flex lane) and #10 Taper Rates at Ramp E and J. For 4223, two deviations have already been submitted and approved are 4293-3 (mainline profile grade less than 0.5%) and 4298-4 (length of profile tangent less than 500 feet). The Tollway requires a quantitative safety analysis for all design deviations, therefore safety analyses were conducted for these deviations. | | | | | |



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| | | | 1 | PD-04.4a: Was no post safety evaluation performed was done after project implementation, or if one was done, did the evaluation rely on crash data? | No | | | This is an O&M activity that is not a standard practice at the Tollway. | | | | | | | |
| | | | 1 | PD-04.4b: Was a statistically reliable, science based method used to evaluate the effectiveness of the safety after project implementation? | No | | | This is an O&M activity that is not a standard practice at the Tollway. | | | | | | | |
| PD-05 | Educational Outreach | Increase public, agency, and stakeholder awareness of the integration of the principles of sustainability into roadway planning, design, and construction. | 2 | PD-05.1: Did this project incorporate public educational outreach that promotes and educates the public about sustainability by installing or performing a minimum of two different elements from Table PD-05.1.A? | Yes | 2 | 2 | Included: 5.1a -this project meeting; 5.1b -Tollway includes sustainability in stakeholder meetings; 5.1d provide sustainability information on the website(website checked 6/25/2018 - CTS webpage specifically mentions environmental responsibility and sustainability to be included in CTS); 5.1g - if sustainability/INVEST info is included in CPC meeting presentations. | | | | | | | |
| PD-06 | Tracking Environmental Commitments | Ensure that environmental commitments made by the project are completed and documented in accordance with all applicable laws, regulations, and issued permits. | 2 | PD-06.1a: Was a comprehensive environmental compliance tracking system used for the project and related facilities? | No | | | This scorecard and the associated sustainable tracking form does not count for receiving credits for this criteria. | | | | | | | |
| | | | 1 | PD-06.1b: If a comprehensive environmental compliance tracking system was used, does it have a formal mechanism to communicate commitments from planning through construction, and handed off to O&M? | No | | | | | | | | | | |
| | | | 2 | PD-06.2: Has the principal project constructor assigned an independent environmental compliance monitor who will provide quality assurance services and report directly to and make recommendations to the regulatory and Lead Agencies? | No | | | The Tollway is not currently considering this requirement. They have independent inspectors, but they do not report directly to the regulatory and lead agencies. | | | | | | | |
| PD-07 | Habitat Restoration | Avoid, minimize, rectify, reduce, and compensate the loss and alteration of natural (stream and terrestrial) habitat caused by project construction and/or restore, preserve, and protect natural habitat beyond regulatory requirements. | 3 | PD-07.1: Was project-specific habitat restoration used on this project? Use Table PD-07.1.A (including Tollway supplement) to determine the points earned. | Yes - 3 | 3 | 3 | There will be habitat restoration in the form of wetland mitigation and tree replacement. If there are environmentally sensitive areas, the project footprint will be minimized. If avoidance is not possible, impacts will be minimized to the extent practicable. Points awarded based on 7.1d for large scale off-site mitigation. Tollway is pursuing off-site mitigation for impacts to WOUS and wetlands with the Forest Preserve District of DuPage County, which includes 2nd phase of water mitigation project along Spring Brook No. 1 within Blackwell Forest Preserve. | | | | | | | |
| | | | 2 | PD-07.2: Were high quality aquatic resources (HQAR) avoided or were the impacts minimized on this project? Use Table PD-07.2.A to determine the points earned. | No | | | No points are given at this time for avoidance of HQAR since HQAR are very limited in the corridor. | | | | | | | |
| | | | 2 | PD-07.3: Were high quality environmental resources avoided or were the impacts minimized on this project? Use Table PD-07.3.A to determine the points earned. | No | | | This point could potentially be achieved if HQARs are identified and by minimizing (or possibly avoiding) impacts to the Forest Preserve property in the corridor. | | | | | | | |
| PD-08 | Stormwater Quality and Flow Control | Improve stormwater quality from the impacts of the project and control flow to minimize their erosive effects on receiving water bodies and related water resources, using management methods and practices that reduce the impacts associated with development and redevelopment. | 3 | PD-08.1: Is runoff for the 50-year storm event being controlled. Use Table PD-08.1 (in Tollway Supplement) to determine points. | No | | | On this project, there are opportunities at a handful of outlets where the release rate has been reduced to either 1/3 allowable or 1/3 to 2/3 allowable. These areas are locations that have know flooding issues that are being mitigated (most notable Buck Road and Berkeley). | | | | | | | |
| | | | 3 | PD-08.2: Is runoff volume being controlled. Use Table PD-08.2 to determine points. | Yes-0 | | | Pond configurations have not been finalized. DSEs to revisit during Phase II. | | | | | | | |
| PD-09 | Ecological Connectivity | Avoid, minimize, or enhance wildlife, amphibian, and aquatic species passage access, and mobility, and reduce vehicle-wildlife collisions and related accidents. | 3 | Prerequisite: Was a site-specific ecological assessment of the roadway project using GIS data or regional expertise conducted? | Yes | | 1 | Yes, this project is using EcoCAT, NWI maps, and topo maps for information related to the endangered species and wildlife issues. The INHS also conducted bat, fish, and mussel surveys along the CTS. | | | | | | | |
| | | | 3 | PD-09.1: Were methods used to minimize impacts to ecological connectivity? Use Table PD-09.1.A to determine points. | No | | | We will need to revisit 9.1 to further analyze types/location of habitats and wildlife. | | | | | | | |
| | | | 1 | PD-09.2: Did the project team engage natural resource and regulatory agencies throughout the planning process and ensure consistency with broader planning goals and objectives? | Yes | 1 | | The team did engage with USFWS & IDNR during the early planning process. Any issues of wildlife passages will have to be coordinated with DNR and Fish and Wildlife. | | | | | | | |
| PD-10 | Pedestrian Facilities | Provide safe, comfortable, convenient, and connected pedestrian facilities for people of all ages and abilities within the project footprint. | 1 | Prerequisite: Were all facilities upgraded to meet ADA standards and do responses below exclude any projects to upgrade facilities to ADA standards? | Yes | | 2 | Pedestrian bridge is being upgraded to meet ADA requirements. | | | | | | | |
| | | | 1 | PD-10.1: Were missing pedestrian connections installed per master plan or other relevant documents? | Yes | 1 | | Added pedestrian connection on Plainfield Road over I-294. | | | | | | | |
| | | | 1 | PD-10.2a: Were existing pedestrian features enhanced that are safe, comfortable, convenient and connected? | Yes | 1 | | On Butterfield Road under I-294 there is existing sidewalk that will be replaced and enhanced per this project. Also, on St. Charles over I-294 Bridge there is an existing sidewalk on both sides of the road that will be replaced and enhanced. | | | | | | | |
| | | | 2 | PD-10.2b: Were new pedestrian features developed that are safe, comfortable, convenient and connected? | No | | | | | | | | | | |
| PD-11 | Bicycle Facilities | Provide safe, comfortable, convenient, and connected bicycling facilities within the project footprint. | 1 | Prerequisite: Were bicycle facilities context sensitive and appropriate, and include features that are safe, comfortable, convenient, and connected? | Yes | | 3 | | | | | | | | |
| | | | 1 | PD-11.1: Were missing bicycle connections installed per master plan or other relevant documents? | Yes | 1 | | | | | | | | | |
| | | | 1 | PD-11.2a: Were existing bicycle features enhanced in a manner that provided safe, comfortable, convenient, and connected pathways? | Yes | | | Bicycle features reestablished under I-294 at Salt Creek. | | | | | | | |
| | | | 2 | PD-11.2b: Were new bicycle facilities developed in a manner that provided safe, comfortable, convenient, and connected pathways? | Yes | 2 | | According to Complete Streets Policy, new bicycle facilities will be added on Butterfield Road under I-294, St. Charles over I-294, and Plainfield Road over I-294. | | | | | | | |



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| Criterion | Title | Goal | Available Points | Point Basis | Response | Achieved Points | Total Criterion Score | Comments A Why Corridor Scored this Way | Comments B How Corridor Relates to Sections | Response | | | Achieved Points |
| PD-12 | Transit and HOV Facilities | Promote use of public transit and carpools in communities by providing new transit and high occupancy vehicle (HOV) facilities, or by upgrading existing facilities within the project footprint. | 5 | PD-12.1: Were Transit and HOV facilities installed on this project that are consistent with the need, purpose, and appropriateness for transit and HOV access within the project footprint? Use Table PD-12.1.A to determine points. | Yes - 3 | 3 | 3 | The Preferred Alternative includes a flex line to provide for future transit options including shoulder running buses. There are Pace routes in the area, specifically the 895 which runs from Chicago Ridge Mall to Schaumburg. | | | | | |
| PD-13 | Freight Mobility | Enhance mobility of freight movements, decrease fuel consumption and emissions impacts, and reduce freight-related noise. | 7 | PD-13.1: Were freight facilities installed on this project consistent with the need, purpose, and appropriateness for freight mobility within the project footprint? Use Table PD-13.1.A to determine points. | Yes - 7 | 7 | 7 | It appears that the I-294 corridor could achieve all 7 points, for the following criteria 13.1b (1), 13.1c (2), 13.1d (2), 13.1f (3) | | | | | |
| PD-14 | ITS for System Operations | Improve the efficiency of transportation systems through deployment of technology and without adding infrastructure capacity in order to reduce emissions and energy use, and improve economic and social needs. | 5 | PD-14.1: Were one or more allowable ITS applications installed? Use Table PD-14.1.A to determine points. | Yes - 5 | 5 | 5 | All 5 points are achieved in this criteria based on the scope of the project including: electronic toll collection; speed enforcement; dynamic messagesigns; data archiving; traffic surveillance; incident management; traveler information, etc.) | | | | | |
| PD-15 | Historic, Archaeological and Cultural Preservation | Preserve, protect, or enhance cultural and historic assets, and/or feature National Scenic Byways Program (NSBP) historic, archaeological, or cultural intrinsic qualities in a roadway. | 3 | Prerequisite: Is any part of the project or resource listed in the NRHP, been determined eligible for the NRHP, is along one of America's Byways, other route officially recognized, or recognized by a community as having historic, cultural and/or archaeological significance to the community? | No | | | The project corridor does not occur within the APE of any NRHP facilities, it is not along an American Byway, there are no recognized historic/culturally significant resources in the project corridor. | | | | | |
| | | | | PD-15.1: Has an effort been made to minimize impacts, avoid impacts, or enhance features? Use Table PD-15.1.A to determine points. | No | | | Minimal or no impacts are anticipated to cultural and archeological resources. | | | | | |
| PD-16 | Scenic, Natural, or Recreational Qualities | Preserve, protect, and/or enhance routes designated with significant scenic, natural, and/or recreational qualities in order to enhance the public enjoyment of facilities. | 3 | Prerequisite: Is any portion of the project along one of America's Byways*, a State Scenic Byway, an Indian Tribe Scenic Byway, or other route that was recognized as such? AND Existing access to scenic, natural, or recreational qualities has not been removed unless it is to protect this resource. | No | | | There are no Scenic Byways identified. | | | | | |
| | | | | PD-16.1: Were efforts made to avoid or minimize impacts, or enhance features, of the scenic, natural, and/or recreational qualities? Use Table PD-16.1.A to determine points. | | | | | | | | | |
| PD-17 | Energy Efficiency | Reduce energy consumption of lighting systems through the installation of efficient fixtures and the creation and use of renewable energy. | 1 | PD-17.1: Were energy needs evaluated and alternatives implemented to reduce power consumption while still meeting lighting and safety standards? | Yes | 1 | 4 | | | | | | |
| | | | | 6 | PD-17.2: Was the energy consumption on the project reduced through the installation of energy efficient lighting and signal fixtures and through the installation of autonomous, on-site, renewable power sources? Use Table PD-17.2.A to determine points. | Yes - 2 | 2 | | | | | | |
| | | | | 1 | PD-17.3: Was a plan established for auditing energy use after project completion as part of operations and maintenance? | Yes | 1 | | Tollway guidance says this is not common, and it does not appear to be included in our scope currently. The Phase II DCM will work with the PMO to implement a plan that considers energy use from roadway lighting, toll facilities, IPDC buildings, and plazas. | | | | |
| PD-18 | Site Vegetation, Maintenance and Irrigation | Promote sustainable site vegetation within the project footprint by selecting plants and maintenance methods that benefit the ecosystem. | 3 | Prerequisite: Does all site vegetation use non-invasive species only, use non-noxious species only, use seeding that does not require consistent mowing for a viable stand of grass, and minimize disturbance of native species? | Yes | | 5 | Tollway guidance that the points for this criteria are typically achieved. The corridor will have an overall landscaping plan. | | | | | |
| | | | | 3 | PD-18.1: Have one or more features from Table PD-18.1.A (including Tollway Supplement) been incorporated into the project. Use Table PD-18.1.A to determine points. | Yes - 3 | 3 | | | | | | |
| | | | | 3 | PD-18.2: Have one or more features from Table PD-18.2.B been incorporated into the project. Use Table PD-18.2.B to determine points. | Yes - 2 | 2 | The points are awarded for this criteria for implementing the following: no long term irrigation and reduction in use of fertilizers, insecticides, and herbicides. | | | | | |
| PD-19 | Reduce, Reuse and Repurpose Materials | Reduce lifecycle impacts from extraction and production of virgin materials by recycling materials. | 4 | PD-19.1: Was remaining service life increased through pavement preservation activities? Points are awarded per Table PD-19.1.A. | No | | 7 | This part of the design is still to be determined. | | | | | |
| | | | | 3 | PD-19.2: Was the amount of new pavement materials needed reduced? Points are awarded per Table PD-19.2.A. | No | | | This part of the design is still to be determined. | | | | |
| | | | | 4 | PD-19.3: Was remaining service life increased through bridge preservation activities? Points are awarded per Table PD-19.3.A. | Yes - 4 | 4 | Substructure life is being increased at 87th/Roberts, Wolf, and Joliet Road. Also, at I-290 Ramp J over I-88 (209CD) with a deck overlay. Per FHWA bridge preservation guide is an increase in service life by 10 years. | | | | | |
| | | | | 3 | PD-19.4: Was remaining service life increased through retrofitting existing bridge structures? Points are awarded per Table PD-19.3.A. | No | | | This part of the design is still to be determined. | | | | |
| | | | | 3 | PD-19.5: Were existing pavements, structures, or structural elements reused for a new use? Points are awarded per Table PD-19.5.A. | No | | | This part of the design is still to be determined. | | | | |
| | | | | 1 | PD-19.6a: Were industrial by-products used in pipe bedding and backfill? | No | | | The Tollway specification allows for this, but does not require it. This project will most likely use lime and fly ash for backfilling. | | | | |
| | | | | 2 | PD-19.6b: Were industrial by-products used in pavement materials, ancillary structures, and other roadway elements? | Yes | 2 | | The Tollway specification allows for this, but does not require it. | | | | |
| 1 | PD-19.7: Was a project-specific plan for the recycling and reuse plan developed as described? | Yes | 1 | | There will likely be a plan implemented on this project, and it should be included in the corridor/project specifications. | | | | | | | | |



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| PD-20 | Recycle Materials | Reduce lifecycle impacts from extraction, production, and transportation of virgin materials by recycling materials. | 5 | PD-20.1: Was RAP or RCA used in new pavement lifts, granular base course, or embankments? Points are awarded per Tables PD-20.1.A or PD-20.1.B. | Yes - 5 | 5 | 7 | The project team expects the project to score well here. Based on IDOT standard, there will be 60% of RAC in pavements. | | | | | | |
| | | | 6 | PD-20.2: Were pavement materials recycled in place using cold-in-place recycling, hot-in-place recycling, and full depth reclamation methods? Points are awarded per Table PD-20.2.A. | No | | | | | | | | | |
| | | | 2 | PD-20.3: Did the project reuse subbase granular material as subgrade embankment or as part of the new subbase? Points are awarded per Table PD-20.3.A. | Yes - 1 | 1 | | | | | | | | The points are achieved based on granular base course. |
| | | | 1 | PD-20.4: Did the project relocate and reuse at least 90 percent of the minor structural elements, including existing luminaires, signal poles, and sign structures that are required to be removed and/or relocated onsite? | No | | | | | | | | | The percentage to achieve points is too high for this corridor project. |
| | | | 2 | PD-20.5: Did the project salvage or relocate existing buildings? | No | | | | | | | | | There are no buildings in the project to salvage or relocate. |
| | | | 1 | PD-20.6: Was FRAP used at a higher percentage than RAP in the manufacturing of hot mix asphalt? | Yes | 1 | | | | | | | | % of FRAP and RAP are outlined in the Tollway specification. |
| PD-21 | Earthwork Balance | Reduce the need for transport of earthen materials by balancing cut and fill quantities. | 3 | PD-21.1a: Are the design cut and fill volumes or the actual construction cut and fill volumes balanced to within 10% without Construction Banking? | No | | 1 | The points on this criterion will be determined as the corridor plan progresses further. | | | | | | |
| | | | 1 | PD-21.1b: Are the design cut and fill volumes or the actual construction cut and fill volumes balanced to within 10% using Construction Banking? | No | | | | | | | | | The team feels that over the entire corridor there is a good possibility of balancing the earthwork. Cannot be verified until construction. |
| | | | 1 | PD-21.2: Has an earthwork management plan been established, implemented and actively managed on this project? | Yes | 1 | | | | | | | | |
| | | | 1 | PD-21.3: Has topsoil been preserved or reused on this project? | No | | | | | | | | | The quality of the topsoil is still to be determined, and therefore cannot take these points at this stage in the design process. |
| PD-22 | Long-Life Pavement | Minimize life-cycle costs by designing long-lasting pavement structures. | 5 | PD-22.1: Long-life pavement was used as described in PD-22. Points awarded as indicated. | No | | 2 | This criteria will be further developed as the corridor plan progresses. There are no plans to use Long Life pavement on this project. | | | | | | |
| | | | 5 | PD-22.2: Was the asphalt density of 100 percent of the total new or reconstructed pavement increased to a minimum of 94 percent? | No | | | | | | | | | |
| | | | 2 | PD-22.3: Was a performance-based pay incentive for pavement smoothness used on this project? | Yes | 2 | | | | | | | | This is typically done. The project team will need to verify as the specifications are written. |
| PD-23 | Reduced Energy and Emissions in Pavement Materials | Reduce energy use in the production of pavement materials. | 3 | PD-23.1a: Was at least 50 percent of the total project pavement material (by weight) a warm mix asphalt. Points awarded based on temperature reduction, see criterion. | No | | 3 | The base layer of the pavement is only 4" high it is unlikely that this point will be achieved. The project team will need the final pavement design to verify. | | | | | | |
| | | | 3 | PD-23.1b: Was asphalt used from a plant utilizing the energy and fuel savings described. | No | | | | | | | | | |
| | | | 3 | PD-23.2a: Was at least 50 percent of the total project pavement material (by weight) a low-energy material from cement production from an Energy Star Certified Plant? | No | | | | | | | | | |
| | | | 3 | PD-23.2b: Was at least 50 percent of the total project pavement material (by weight) a low-energy material from cement production from a facility using fuel saving technologies? | No | | | | | | | | | |
| | | | 3 | PD-23.2c: Was at least 50 percent of the total project pavement material (by weight) composed of a blended cement that used a minimum of 3% ground limestone additive? | No | | | | | | | | | |
| | | | 3 | PD-23.3a: Was at least 50 percent of the total project pavement material (by weight) a low-energy material from a concrete plant that can demonstrate a reduced carbon footprint? | No | | | | | | | | | |
| | | | 3 | PD-23.3b: Was at least 50 percent of the total project pavement material (by weight) a low-energy material from a concrete plant that is NRMCA certified? | No | | | | | | | | | |
| PD-24 | Permeable Pavement | Improve flow control and quality of stormwater runoff through use of permeable pavement technologies. | | Prerequisite: The project must include a maintenance plan for the permeable pavements, and the permeable pavement must not be placed in areas where sand will be used for snow/ice control, and the permeable pavements must not be placed where the pavement will be sealed. | No | | 1 | The achievement of the thresholds is highly unlikely. There are not enough surfaces throughout the project corridor where permeable pavement could be used. | | | | | | |
| | | | 1 | PD-24.1a: Is permeable pavement used to treat 50% of the secondary pavement areas on the project? | No | | | | | | | | | |
| | | | 2 | PD-24.1b: Is permeable pavement used to treat 75% of the secondary pavement areas on the project? | No | | | | | | | | | |
| PD-25 | Construction Environmental Training | Provide construction personnel with the knowledge to identify environmental issues and best practice methods to minimize impacts to the human and natural environment. | 1 | PD-25.1: Did the owner require the Contractor to plan and implement a formal environmental awareness training program during construction to ensure the project stays in compliance with environmental laws, regulations, and policies? | No | | | The Tollway does not have an environmental awareness training program in place. This could be implemented during construction. | | | | | | |
| PD-26 | Construction Equipment Emission Reduction | Reduce air emissions from non-road construction equipment. | 2 | PD-26.1: Were one or more methods implemented to reduce non-road emissions? Points are awarded per Table PD-26.1.A. | Yes - 2 | 2 | 2 | This is included in the Tollway Spec Section 107.37. | | | | | | |



| INVEST v1.2 Criteria with Tollway-Specific Supplements and Criteria Scorecard for: Urban Extended | | | | | Corridor Score | | | Project Score and Notes | | | Comments C Why Project Scored this Way | Comments D Available Documentation |
|---|---|---|------------------|---|----------------|-----------------|-----------------------|--|--|----------|---|---------------------------------------|
| Criterion | Title | Goal | Available Points | Point Basis | Response | Achieved Points | Total Criterion Score | Comments A Why Corridor Scored this Way | Comments B How Corridor Relates to Sections | Response | | |
| PD-27 | Construction Noise Mitigation | Reduce annoyance or disturbance to surrounding neighborhoods and environments from road construction noise. | 1 | PD-27.1a: Is the contractor required to establish, implement, and maintain a formal Noise Mitigation Plan (NMP) during roadway construction? | No | | | Construction noise restrictions are included in 107.35 of the Tollway Supplemental specification, but this does not qualify for points because it is so specific. This activity will be tracked as the community engagement progresses. | | | | |
| | | | 1 | PD-27.1b: Has the contractor monitored noise and the effectiveness of mitigation measures at the receptors throughout construction to ensure compliance with the NMP? | No | | | | | | | |
| PD-28 | Construction Quality Control Plan | Improve quality by requiring the contractor to have a formal Quality Control Plan (QCP). | 3 | PD-28.1: Is the Contractor required to plan and implement quality control measures throughout construction with care and for materials above and beyond what is typically required by specifications and regulations? | Yes | 3 | 5 | The Tollway Quality Control Program Manual specifies this. | | | | |
| | | | 2 | PD-28.2: Does the contract leverage the use of Quality Price Adjustment Clauses to link payment and performance of the constructed products? | Yes | 2 | | This is still to be determined. Further discussion is needed, and there is likely a need to develop further in the project. | | | | |
| PD-29 | Construction Waste Management | Utilize a management plan for road construction waste materials to minimize the amount of construction-related waste destined for landfill. | 1 | PD-29.1: Is the contractor required to establish, implement, and maintain a formal Construction and Demolition Waste Management Plan (CWMP) during roadway construction, or its functional equivalent? | No | | 2 | Tollway is developing a specification for this. | | | | |
| | | | 1 | PD-29.2a: Can the owner demonstrate that at least 50% of the construction waste has been diverted from landfills? | Yes | 1 | | Will need to be confirmed at CSC | | | | |
| | | | 2 | PD-29.2b: Can the owner demonstrate that at least 75% of the construction waste has been diverted from landfills? | No | | | The contractors seem to already be doing this, and the Tollway is developing a specification to require them to collect documentation. | | | | |
| | | | 1 | PD-29.3: Were excess materials hauled directly to other project sites for recycling on those projects? | Yes | 1 | | This point was earned because it is likely that excess materials will be hauled between different projects in the corridor. | | | | |
| PD-30 | Low Impact Development | Use low impact development stormwater management methods that reduce the impacts associated with development and redevelopment and that mimic natural hydrology. | 3 | PD-30.1: Did the project use a variety of low impact development practices to treat runoff pollutants? Use Table PD-30.B (in Tollway Supplement) to determine points. | Yes - 1 | 1 | 1 | BMP's are still being developed and, as such, the number of points is still to be determined. BMP's will definitely be implemented on this project including: vegetated ditches; furrows, etc. (at least 5 types are anticipated). BMP guidance is included in the CTS Corridor Manual. | | | | |
| PD-31 | Infrastructure Resiliency Planning and Design | Respond to vulnerabilities and risks associated with current and future hazards (including those associated with climate change) to ensure transportation system reliability and resiliency | 2 | PD-31.1: Did the project incorporate consideration of climate change at a project-specific level in project development and environmental reviews? | No | | 4 | | | | | |
| | | | 1 | PD-31.2ai: Did the project incorporate future consideration of climate change effects qualitatively in the design process? | No | | | | | | | |
| | | | 3 | PD-31.2aii: Did the project incorporate future consideration of climate change effects quantitatively in the design process? | No | | | | | | | |
| | | | 4 | PD-31.2bi: Did the project incorporate future consideration of climate change effects in the design process for one design discipline? | No | | | There may be an opportunity for points here when the pavement design is finalized. | | | | |
| | | | 6 | PD-31.2bii: Did the project incorporate future consideration of climate change effects in the design process for more than one design discipline? | No | | | | | | | |
| | | | 4 | PD-31.3: Did the project mitigate the effects of GHG emissions through design efforts above and beyond requirements and regulations? | Yes | 4 | | The team feels that we can get points for this project based on the likely implementation of: congestion pricing; shoulder running buses. | | | | |
| PD-32 | Light Pollution | To safely illuminate roadways while minimizing unnecessary and potentially harmful illumination of the surrounding sky, communities, and habitat. | 1 | PD-32.1: Were the uplighting ratings met on this project per Table PD-32.1.A? | Yes | 1 | 1 | The lighting design team feels that we can achieve all 3 criteria using Tollway luminaries, which appear to comply with all the criteria. House side shields can be added, as needed (this is not uncommon) in residential areas. There are locations along the Tollway that already have shields. There is dense residential development throughout the corridor. | | | | |
| | | | 1 | PD-32.2: Were the backlighting ratings met on this project per Table PD-32.2.A? | No | | | Although this is not a standard Tollway procedure, the lighting design team feels that the points can be achieved on this corridor. | | | | |
| | | | 1 | PD-32.3: Were the glare ratings met on this project per Table PD-32.3.A? | No | | | Although this is not a standard Tollway procedure, the lighting design team feels that the points can be achieved on this corridor. | | | | |
| PD-33 | Noise Abatement | Reduce traffic noise impacts to surrounding communities and environments. | 2 | PD-33.1: Was a specialized noise barrier used on this project? | No | | 2 | The earthen berm is not likely. The team feels that it is unlikely that we could re-use 75% of an existing wall at one location within the corridor. | | | | |
| | | | 2 | PD-33.2: Were traffic system management techniques used to reduce existing noise levels? | Yes | 2 | | The team feels that this could be achieved in some way with one of the following solutions: no-air braking; better traffic flow; and open road tolling. | | | | |
| | | | 2 | PD-33.3: Were buffer zones provided for adjacent noise sensitive receptors? | No | | | Although Ramp J for 290 over 88 alignment is being moved further away from the homes, this will not count towards this criteria because the decision was based on better geometry and not to provide noise relief. | | | | |
| | | | 3 | PD-33.4: Were quiet pavements used on the project? Use Table PD-33.4.A to determine the points earned. | No | | | | | | | |
| | | | 1 | PD-33.5: Were plantings used as a sight screen to separate noise receptors from the project? | No | | | | | | | |



| INVEST v1.2 Criteria with Tollway-Specific Supplements and Criteria Scorecard for: Urban Extended | | | | | | Corridor Score | | | Project Score and Notes | | | Comments C Why Project Scored this Way | Comments D Available Documentation | |
|---|---|---|------------------|---|----------|-----------------|-----------------------|---|--|----------|-----------------|---|---------------------------------------|-----------------------|
| Criterion | Title | Goal | Available Points | Point Basis | Response | Achieved Points | Total Criterion Score | Comments A Why Corridor Scored this Way | Comments B How Corridor Relates to Sections | Response | Achieved Points | | | Total Criterion Score |
| PD-50T | Alignment Selection (Tollway-Specific) | Avoid, minimize, and/or enhance impacts to environmental and socioeconomic resources by selecting new and widened alignments that consider and address such impacts, where practical. | 3 | PD-50T.P1: Prerequisite 1. This criterion applies only to new construction and major reconstruction projects that significantly define or redefine the alignment of a roadway. | No | | | The project team does not think that we are "significantly realigning" the corridor and therefore at this time the criterion does not appear to be applicable. | | | | | | |
| | | | | PD-50T.P2: Prerequisite 2. The project must be consistent with sustainable design principles included in regional plans and local growth-based Master or Comprehensive Plans. | No | | | | | | | | | |
| | | | | PD-50T.1: Minimize or Avoid Impacts to Forested Tracts: Select an alignment that minimizes or avoids impacts to forested tracts via alignment selection decisions above and beyond typical considerations. Use the Table PD-50T.1.A to determine the points earned. (1-3 points) | | | | | | | | | | |
| | | | | PD-50T.2: Minimize or Avoid Impacts to Prime Farmland. Select an alignment that minimizes or avoids impacts to existing prime farmland as defined by the United States Department of Agriculture in 7 CFR 657.5. Use the Table PD-50T.2.A to determine the points earned. (1-2 points) | | | | | | | | | | |
| | | | | PD-50T.3: Select an alignment that minimizes or avoids impacts to identified socioeconomic resources such as parks, recreational areas, houses of worship, historic sites (including structures listed on local historic registers), residential buildings and commercial buildings providing employment. Use the Table PD-50T.3.A to determine the points earned. (1-3 points) | | | | | | | | | | |
| | | | | PD-50T.4: Minimize Right-of-Way Takes. Does the design select a cross-section that minimizes overall construction "footprint" to eliminate right-of-way (ROW) takes through profile selection decisions above and beyond typical considerations, such as the construction of retaining structures? To qualify, the area of impact must be reduced by 50% or more as compared to the traditional alignment. (2 points) | | | | | | | | | | |
| | | | | PD-50T.5: Utilize Brownfield Locations. Does the project utilize significant portions of brownfield sites in lieu of other resources? To qualify, the brownfield utilization must account for 50% or more of the new or widened project footprint area. (2 points) | | | | | | | | | | |
| PD-53T | Reduce, Reuse and Recycle Materials (Design) (Tollway-Specific) | Reduce lifecycle impacts from extraction and production of virgin materials by reducing, reusing, and recycling materials. | 2 | PD-53T.1: Allow Contractor to Reduce Pavement Materials. Do the Specifications allow the Contractor to choose options that reduce the amount of new pavement materials needed through soil stabilization methods or processes that incorporate existing pavement structures into new pavement structures? (2 points) | Yes | 2 | 7 | The pavement cross-section will ultimately be selected by the Tollway, and when it is determined the project team will verify that the terms of this criterion are included in the corridor/project specifications. | | | | | | |
| | | | | PD-53T.2: Allow Contractor to Repurpose Pavements or Structures. Do the Specifications allow the Contractor to choose options to reuse existing pavements, structures, or structural elements? (2 points) | No | | | | | | | | | |
| | | | | PD-53T.3a: Reuse Industrial By-Products. Do the Specifications allow foundry sand or other industrial by-products used in pipe bedding and backfill? (1 point) | Yes | 1 | | | | | | | | |
| | | | | PD-53T.3b: Reuse Industrial By-Products. Do the Specifications allow industrial by-products to be reused in pavement materials, ancillary structures, and other roadway elements? (2 points) | Yes | 2 | | | | | | | | |
| | | | | PD-53T.4: Allow Contractor to Use Recycled Asphalt Pavement or Recycled Concrete Aggregate. Do the Specifications allow the Contractor to specify the use of RAP or RCA? (2 points) | Yes | 2 | | | | | | | | |
| | | | | PD-53T.5: Allow the Contractor to Recycle Asphalt Pavement In-Place. Do the Specifications allow the Contractor to recycle pavement materials in place using cold-in-place recycling, hot-in-place recycling, and/or full depth reclamation methods? (2 points) | No | | | | | | | | | |
| | | | | PD-53T.6: Allow the Contractor to Recycle Structural Elements. Do the Specifications allow or require the Contractor to relocate and reuse structural elements to be removed or relocated onsite, including existing luminaires, signal poles, and sign structures? (1 point) | No | | | | | | | | | |
| | | | | PD-53T.7: Consider Local Materials. Do the Specifications allow and/or encourage contractors to use available local materials? (1 point) | No | | | | | | | | | |
| PD-55T | Regional Employment (Tollway-Specific) | Promote local economies, reduce travel times and emissions, and employ those who are familiar with local practices, regulations, and businesses. | 2 | PD-55T.1a: Does 20% of construction labor reside within a 5-mile radius of the project? | | | | The team feels that this would be difficult to achieve and document. We are not included this point at this time. The Tollway may provide a specification for it in the future. | | | | | | |
| | | | | PD-55T.1b: Does 30% of construction labor reside within a 10-mile radius of the project? | | | | | | | | | | |
| | | | | PD-55T.2: Has a process been included that promotes the hiring of construction labor from disadvantaged populations? | No | | | | | | | | | |



| INVEST v1.2 Criteria with Tollway-Specific Supplements and Criteria Scorecard for: Urban Extended | | | | | | Corridor Score | | | | Project Score and Notes | | | Comments C | Comments D | | | |
|---|-----------------------------------|---|------------------|--|----------|-----------------|-----------------------|---|--|---|--|----------|-----------------|-----------------------|------------------------------------|--------------------------------|--|
| Criterion | Title | Goal | Available Points | Point Basis | Response | Achieved Points | Total Criterion Score | Comments A <i>Why Corridor Scored this Way</i> | | Comments B <i>How Corridor Relates to Sections</i> | | Response | Achieved Points | Total Criterion Score | <i>Why Project Scored this Way</i> | <i>Available Documentation</i> | |
| PD-57T | Innovations (Tollway-Specific) | The objective of this section is to recognize innovative sustainable roadway design and construction practices such as the use of materials, processes, methods, equipment items, traffic operational devices, or other features which have not yet been sufficiently tested under actual field and operational conditions to merit acceptance without reservations in normal highway construction. | 3 | PD-57T.1: Innovation 1. Was an innovative method or material incorporated into this project AND approved by the INVEST Technical Manager for scoring? (1-3 points) | Yes - 1 | 1 | 6 | Flex Lane - The proposed design includes a wider inside shoulder which provides Tollway the ability to use an additional travel lane during traffic congestion if desired. | | | | | | | | | |
| | | | 3 | PD-57T.2: Innovation 2. Was a second innovative method or material incorporated into this project AND approved by the INVEST Technical Manager for scoring? (1-3 points) | Yes - 3 | 3 | | Active Traffic Management - Purpose of the system is improve safety (warn of incidents, thus reducing secondary accidents and allow faster emergency response) and reduce congestion. The system will improve safety with overhead signs closing lanes well ahead of the incident, dynamic message signs every miles to warn motorists. | | | | | | | | | |
| | | | 3 | PD-57T.3: Innovation 3. Was a third innovative method or material incorporated into this project AND approved by the INVEST Technical Manager for scoring? (1-3 points) | Yes - 3 | 3 | | Chloride Reduction - Develop corridor master plan to reduce annual chloride in watershed; providing adjacent communities with training and equipment, reduced Tollway deicing. | | | | | | | | | |

| Sustainable Practices Tracking | | | |
|--------------------------------|---------------------------------------|--|----------------------|
| Criterion | Title | Sustainable Practices Considered | Outcome ¹ |
| PD-01 | Economic Analyses | | |
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| PD-02 | Life-Cycle Cost Analyses | PD-02.1b: May consider a stormwater infrastructure LCCA if there are atypical or labor intensive BMPs. | |
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| PD-03 | Context Sensitive Project Development | PD-03.4: Visualization tools to be used including photo simulations prepared for the bridge, noise walls, aesthetics, and VISSIM models. | |
| | | PD-03.6: There is potential for implementation of noise walls and sight screens constructed within the corridor. | |
| | | PD-03.7: A corridor aesthetic theme for abutments and other bridge design elements, landscaping, and noise walls. | |
| | | PD-03.8: A corridor aesthetic theme for abutments and other bridge design elements. | |
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| PD-04 | Highway and Traffic Safety | PD-04.3: Verify Design Deviations | |
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| PD-05 | Educational Outreach | Verify with the Tollway Public Outreach staff that these activities have been completed: 5.1a (this project meeting); 5.1b (Tollway includes sustainability in stakeholder meetings); 5.1d CTS website includes reference to environmental responsibility and sustainability (provide sustainability information on the website); 5.1g (if sustainability/INVEST info is included in CPC meeting presentations). | |
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| PD-06 | Tracking Environmental Commitments | | |
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| PD-07 | Habitat Restoration | | |
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| PD-08 | Stormwater Quality and Flow Control | Verify the stormwater design and how it related to the INVEST criteria. Document the areas where these outlets exist in a more formal way for construction in order to achieve points here. | |
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| PD-09 | Ecological Connectivity | PD 9.1: There may be an opportunity to achieve points on this criteria based on the potential to buy parcels from the Forest Service, and enhance features. | |
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| PD-10 | Pedestrian Facilities | PD10.2a: Verify that existing pedestrian facilities are present, and confirm that new facilities are built. | |
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| PD-11 | Bicycle Facilities | PD11.2a: Verify that existing bicycle facilities are present, and confirm that new facilities are built. | |
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| PD-12 | Transit and HOV Facilities | The design of Lane Zero incorporates shoulder-running buses. | |
| | | | |

1 Examples: incorporated into plans/provisions, used to score in PD-02.1c, dropped from further consideration due to high costs.
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| Sustainable Practices Tracking | | | |
|--------------------------------|--|---|----------------------|
| Criterion | Title | Sustainable Practices Considered | Outcome ¹ |
| PD-13 | Freight Mobility | The design of the new truck parking will determine the number of points. The following are being considered at this time: additional truck parking; policies that reduce fuel consumption; weigh-in motion stations; toll-pricing structure to encourage off-peak travel. | |
| PD-14 | ITS for System Operations | | |
| PD-15 | Historic, Archaeological and Cultural Preservation | | |
| PD-16 | Scenic, Natural, or Recreational Qualities | | |
| PD-17 | Energy Efficiency | High-efficiency roadway and bridge lighting are likely. PD-17.3: Phase II DCM to work with the Tollway to implement a process to isolate and track energy use compared to the calculation for PD-17.2 | |
| PD-18 | Site Vegetation, Maintenance and Irrigation | | |
| PD-19 | Reduce, Reuse and Repurpose Materials | PD-19.5: Specific spots identified for the reuse or repurposing of pavement are: where the alignment is modified that pavement could be repurposed as a local road, or the oasis pavement could be modified into a truck parking lot. PD-19.7: Plan implemented on this project should be included in the specification. | |
| PD-20 | Recycle Materials | | |
| PD-21 | Earthwork Balance | PD 21.1: Track the Earthwork balance. | |
| PD-22 | Long-Life Pavement | PD-22: Verify the use of a pavement smoothness incentive in the specifications. | |
| PD-23 | Reduced Energy and Emissions in Pavement Materials | Verify that the pavement design does not meet any of these criteria. | |
| PD-24 | Permeable Pavement | | |
| PD-25 | Construction Environmental Training | Need to have future discussions with the Tollway on how to implement this plan. | |
| PD-26 | Construction Equipment Emission Reduction | | |
| PD-27 | Construction Noise Mitigation | Verify with the Tollway Public Outreach team that there were no project stakeholders that had concerns with noise and vibration during construction. | |

¹ Examples: incorporated into plans/provisions, used to score in PD-02.1c, dropped from further consideration due to high costs.
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| Sustainable Practices Tracking | | | |
|--------------------------------|---|--|----------------------|
| Criterion | Title | Sustainable Practices Considered | Outcome ¹ |
| PD-28 | Construction Quality Control Plan | PD-28.2 - Verify the need for the use of Quality Price Adjustment Clauses. | |
| PD-29 | Construction Waste Management | PD-29.2 - Verify that the Tollway develops a specification to require documentation from the Contractor on the amount of materials that are recycled. PD-29.3 - Verify that excess materials are shared between the different projects in the corridor. | |
| PD-30 | Low Impact Development | Verify that at least 5 BMPs are used in the final drainage design. | |
| PD-31 | Infrastructure Resiliency Planning and Design | PD 31.1: Provide documentation that climate change was addressed in project development. PD 31.2: Verify that future considerations of climate change effects were incorporated in the design. | |
| PD-32 | Light Pollution | Verify that the final Lighting design accounts for uplight, backlight, and glare in their design. | |
| PD-33 | Noise Abatement | | |
| PD-50T | Alignment Selection (Tollway-Specific) | | |
| PD-53T | Reduce, Reuse and Recycle Materials (Design) (Tollway-Specific) | PD-53T.7: The team will need to write the specification to earn the points on this criteria. Similar specs have been written on other projects. Look at Tollway projects 5660, 5661, 5662. | |
| PD-55T | Regional Employment (Tollway-Specific) | | |
| PD-57T | Innovations (Tollway-Specific) | 57T.1: Confirm the design and use of lane zero. 57T.2: Confirm the design and use of ATMS. 57T.3: Confirm the design and use of Chloride Reduction practices. | |

¹ Examples: incorporated into plans/provisions, used to score in PD-02.1c, dropped from further consideration due to high costs.
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