THE PORT AUTHORITY OF NY & NJ

Sustainable Infrastructure Guidelines

Microtunneling under Route 1&9 at Newark Liberty International Airport, New Jersey

Last updated

March 23, 2011

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BACKGROUND

On July 13, 2006, The Port Authority of New York and New Jersey (PANYNJ) issued Administrative Instruction 45-2 (AI 45-2) "to reduce adverse environmental impacts of the design, construction, operation and maintenance and occupancy or leasing of new or substantially renovated buildings and facilities, reconstruction projects, and programs". AI 45-2 referenced creation of sustainable design guidelines and an accompanying compliance framework, which were incorporated into the *Sustainable Design Guidelines* (formerly the *Sustainable Design Project Manual*, August 2007).

As part of a regular update process, the *Sustainable Design Guidelines* have been revised in an Authority-wide collaboration with representatives from each Line Department, led by the Engineering Department. As part of this update, a new section, the Sustainable Infrastructure Guidelines, has been developed to complement the Sustainable Building Guidelines section.

Each project will be determined as a "Building" or "Infrastructure" project at the time of the Project Definition Statement development. The project types listed below will use the associated section of the *Sustainable Design Guidelines*. The Sustainable Building Guidelines are required for both Port Authority and tenant capital projects. The Sustainable Infrastructure Guidelines are required only for Port Authority capital projects and are not required for tenant capital projects.

Building Project Types

(Uses Sustainable Building Guidelines)

- Foundation
- Indoor Signage
- Mechanical/Electrical or Fire Suppression System Replacement/Upgrade
- Office Facility
- Parking Garage
- Roof
- Substation
- Storage Facility
- Terminal (Airport, Rail, Port, Bus, etc.)
- Toll Plaza
- Ventilation Building

Associated Building Scopes

- Building Demolition
- Electronics Systems
- Communication Systems
- Indoor Lighting
- Security Systems

Infrastructure Project Types*

(Uses Sustainable Infrastructure Guidelines)

- Airfield New Construction/Reconstruction
- Airfield Rehabilitation
- Bridges New Construction/Reconstruction
- Bridge and Tunnel Rehabilitation
- Civil Work Orders
- Intelligent Transportation Systems
- Marine Structures (Docks, Wharves, Bulkheads, etc.)
- Roadway New Construction/Reconstruction
- Roadway Pavement Rehabilitation
- Parking Lot New Construction/Reconstruction
- Parking Lot Rehabilitation
- Port Site Work
- Utility New Construction
- Utility Rehabilitation
- Trackwork

Associated Infrastructure Scopes of Work

- Exterior Lighting
- Landscaping
- Mechanical/Electrical/Fire Suppression Systems
- Traffic Safety and Public Environments

*See Appendix XX for Infrastructure Project Type Definition

INTRODUCTION

The Sustainable Infrastructure Guidelines are used for projects outside the building envelope. It aims to optimize infrastructure project design through sustainable engineering practice, with the goal of cost savings, extending the lifecycle of a project and in some cases a reduction in operational costs. Existing industry sustainable design guidelines applicable to infrastructure projects were used to identify strategies that were applicable to the types of projects at the PANYNJ. The Engineering Department has designed and built projects that utilize many of the strategies outlined in these existing guidelines; these projects are detailed in the guidelines as case studies.

Generally the project types include Airfield Rehabilitation and New Construction/Reconstruction, Roadway New Construction/Reconstruction and Pavement Rehabilitation, Parking Lot New Construction and Rehabilitation, Utility New Construction and Rehabilitation, Trackwork, Intelligent Transportation Systems projects, New Bridges, Bridge and Tunnel Rehabilitation, Port Site Work, Marine Structures and associated Landscaping, Exterior Lighting and Mechanical/Electrical/Fire Suppression Systems.

An interactive Excel checklist will determine the project type, credits associated with that project type and the corresponding levels of credit achievement, allowing for flexibility of applying the guidelines depending on the project type. Each credit has required and where applicable, recommended strategies with an associated range of points that can be achieved. The rating system used to determine project achievement is similar to other industry guidelines and the achievement levels were developed by rating past projects with the new point system. This historical project data was used to establish the baseline achievement level (See Appendix 07). Documentation is required for each credit achieved and can range from noting a specification to providing a specific plan. This workflow process is outlined in the Implementation Process Section of the manual.

These guidelines will be utilized on all PANYNJ infrastructure project types identified above with the exception of dredging and standpipe replacement projects, which offer limited opportunities for sustainable design strategies. At this time, capital projects by tenants that exist only outside of the building envelope are unusual and therefore, tenants are required to utilize the Sustainable Building Guidelines in the Tenant Alteration Application only.

GUIDELINE DEVELOPMENT TEAM

PANYNJ Engineering Department

Ilonka Angalet, Principal Architect
Joseph Chu, Senior Engineer
Danny Cobourne, Senior Engineer
Phil Cremin, Assistant Chief Civil
Susanne DesRoches, Sustainable Design Manager
Donald Fram, Chief Architect
Helen Gucwa, Senior Engineer
Tony Marino, Principal Engineer
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Ed Peralta, Engineer
Janice Pessar, Senior Architect
Marco Pirozzi, Engineer
Om Sehgal, Principal Engineer
Dale Serventi, Principal Architect
Tony Vero, Senior Resident Engineer
Bruce Walch, Principal Engineer
Mike Wallace, Senior Resident Engineer

PANYNJ Office of Environmental & Energy Programs

Rubi Rajbanshi, Sustainability Program Specialist

PANYNJ Aviation Department

Jim Heitmann, Manager, Physical Plant & Redevelopment
Edward Knoesel, Manager of Environmental and Noise Programs
Arlyn Purcell, Supervisor, Environmental Programs

PANYNJ PATH

Jean Backes, Assistant Superintendent Way & Structures
Martha Gulick, Manager, System Safety & Environmental Management Division
Alfonse Panepinto, Senior Environmental Program Specialist

PANYNJ Port Commerce

Atef Ahmed, Manager, Environmental Programs

PANYNJ Tunnels, Bridges & Terminals

Kathy Kovach, Environmental Coordinator

Croxton Collaborative Architects (Sustainable Design Consultants)

Randolph R. Croxton, FAIA, LEED AP / President
Michael J. Gulich, AIA, LEED AP / Vice President
Max Driscoll, LEED AP, Designer

Reference Materials

In addition to PANYNJ current sustainable design best practices, these guidelines were developed with reference materials from the following agency and industry guidelines: AASHTO Center for Environmental Excellence, ASLA The Sustainable Sites Initiative™, Canada National Guide to Sustainable Municipal Infrastructure (InfraGuide), LEED® for Neighborhood Development Rating System, LEED® Canada New Construction, Los Angeles World Airports Sustainable Airport Planning, Design and Construction Guidelines, Massport Sustainable Design Standards and Guidelines, NYC DDC High Performance Infrastructure Guidelines and NYSDOT GreenLITES.

For Questions Contact:

Susanne DesRoches, Sustainable Design Manager, sdesroches@panynj.gov

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IMPLEMENTATION PROCESS

Step 1: Determining Project Type

Infrastructure projects at PANYNJ are categorized into the typical project types listed below with three additional associated scopes of work. Upon receipt of the project definition statement the Lead Engineer/Architect (LEA) will make a determination as to whether the project is infrastructure, based on the definition provided on page 5. The LEA will then determine the type of infrastructure based on the list below. The project type and any associated scopes should be clearly identified in the project proposal at each design stage. Below is a list of the project types and the typical lead discipline or disciplines (see Appendix 08 for detailed definitions).

Project Type	**Lead Discipline(s)**
Airfield New Construction/Reconstruction	Civil, Electrical
Airfield Pavement Rehabilitation	Civil, Electrical
Bridges New Construction/Reconstruction	Structural
Bridge and Tunnel Rehabilitation	Structural, Civil, Electrical, Mechanical
Civil Work Orders	Civil
Intelligent Transportation Systems	Traffic
Marine Structures (Docks, Wharves, Bulkheads, etc.)	Structural, Geotechnical
Parking Lot New Construction/Reconstruction	Civil
Parking Lot Rehabilitation	Civil
Port Site Work	Civil
Roadway New Construction/Reconstruction	Civil
Roadway Pavement Rehabilitation	Civil
Utility New Construction	Civil, Electrical
Utility Rehabilitation	Civil, Electrical
Trackwork	Civil

Associated scopes of work are to be included if applicable to the project scope. Below is a list of the associated scopes of work and the typical lead discipline or disciplines.

Associated Scopes of Work	**Lead Discipline(s)**
Exterior Lighting	Electrical
Landscaping	Landscape Architecture
Mechanical/Electrical/Fire Suppression Systems	Electrical, Mechanical
Traffic Safety and Public Environments	Traffic

Note that two additional project types are exempt from use of these guidelines:

- Dredging
- Standpipe Replacement
- Cathodic Protection

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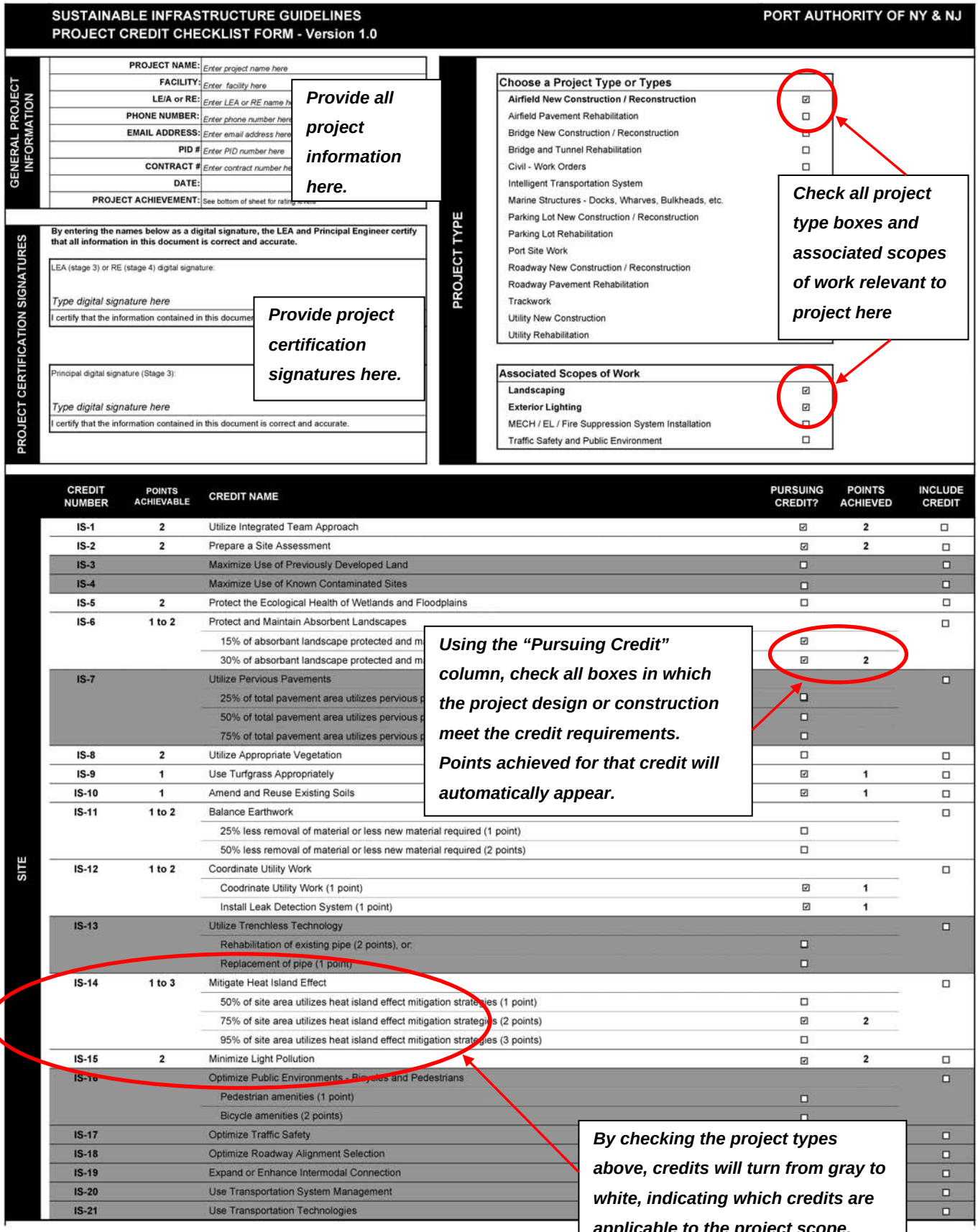
IMPLEMENTATION PROCESS

Step 2: Generating a Project Credit Checklist

After the infrastructure project type has been determined, a credit checklist is generated for use throughout the design process. Using the interactive excel file, the LEA will create a credit checklist by selecting the project type and any supplemental categories apply. On the following pages, the interactive Excel checklist is shown with instructional notes. This form is located on the first tab of the excel file named "SDInfrastructureChecklist.xls" and is available on Engineering Online (EOL).

At the proposal kick off meeting, the LEA will provide the checklist for review and request input from appropriate discipline task leaders on which credits will apply to the project scope. The interactive checklist will be reviewed throughout the design stages of the project. The final checklist is submitted digitally at the end of each stage to the appropriate party as shown in the Project Workflow section (see page xiv).



SUSTAINABLE INFRASTRUCTURE GUIDELINES
PROJECT CREDIT CHECKLIST FORM - Version 1.0

PORT AUTHORITY OF NY & NJ

GENERAL PROJECT INFORMATION

PROJECT NAME:	Enter project name here
FACILITY:	Enter facility here
LE/A or RE:	Enter LEA or RE name h
PHONE NUMBER:	Enter phone number here
EMAIL ADDRESS:	Enter email address here
PID #	Enter PID number here
CONTRACT #	Enter contract number he
DATE:	
PROJECT ACHIEVEMENT:	See bottom of sheet for rating

Provide all project information here.

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

Type digital signature here

I certify that the information contained in this docume

Principal digital signature (Stage 3):

Type digital signature here

I certify that the information contained in this document is correct and accurate.

Provide project certification signatures here.

PROJECT TYPE

Choose a Project Type or Types	
Airfield New Construction / Reconstruction	☑
Airfield Pavement Rehabilitation	☐
Bridge New Construction / Reconstruction	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent Transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Associated Scopes of Work	
Landscaping	☑
Exterior Lighting	☑
MECH / EL / Fire Suppression System Installation	☐
Traffic Safety and Public Environment	☐

Check all project type boxes and associated scopes of work relevant to project here

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	2	Utilize Integrated Team Approach	☑	2	☐
IS-2	2	Prepare a Site Assessment	☑	2	☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5	2	Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6	1 to 2	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and m	☑		
		30% of absorbant landscape protected and m	☑	2	
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious p	☐		
		50% of total pavement area utilizes pervious p	☐		
		75% of total pavement area utilizes pervious p	☐		
IS-8	2	Utilize Appropriate Vegetation	☐		☐
IS-9	1	Use Turfgrass Appropriately	☑	1	☐
IS-10	1	Amend and Reuse Existing Soils	☑	1	☐
IS-11	1 to 2	Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
IS-12	1 to 2	Coordinate Utility Work			☐
		Coodrinate Utility Work (1 point)	☑	1	
		Install Leak Detection System (1 point)	☑	1	
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points), or:	☐		
		Replacement of pipe (1 point)	☐		
IS-14	1 to 3	Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☑	2	
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15	2	Minimize Light Pollution	☑	2	☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety			☐
IS-18		Optimize Roadway Alignment Selection			☐
IS-19		Expand or Enhance Intermodal Connection			☐
IS-20		Use Transportation System Management			☐
IS-21		Use Transportation Technologies			☐

Using the "Pursuing Credit" column, check all boxes in which the project design or construction meet the credit requirements. Points achieved for that credit will automatically appear.

By checking the project types above, credits will turn from gray to white, indicating which credits are applicable to the project scope.

WATER	IW-1	1 to 3	Implement Stormwater Best Management Practices			☐
			> 1/4 NJ (new imperv surface) ***or*** >1 arce NY (soil erosion) (1 point)	☐		
			< 1/4 NJ (new imperv. surface) ***or*** <1 arce NY (soil erosion) (3 points)	☐		
	IW-2	3	Implement Rainwater Neutrality	☐		☐
	IW-3	2	Reduce Use of Potable Water for Irrigation			☐
			Use harvested storm water for 50% of irrigation requirments (1 point)	☑	1	
			Use harvested storm water for 75% of irrigation requirments (2 points)	☐		
	IW-4	2	Utilize End Use Metering - Water	☑	2	☐
ENERGY	IE-1	2 to 6	Optimize Energy Performance			☐
			10% reduction (2 point)	☑	2	
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☐		☐
	IE-4	3	Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☐		☐
	IM-3	1	Reuse Materials	☑	1	☐
	IM-4	1	Use Durable Materials	☐		☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6	2	Minimize Use of Toxic and / or Hazardous Materials	☑	2	☑
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☐
	IM-8		Utilize Thin Surface Paving	☐		☐
	IM-9	2	Utilize Warm Mix Asphalt Technology	☑	2	☑
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☐
	IC-2	2	Protect Existing Natural Systems	☐		☐
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☐		☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1 point)	☑	1	
			75% diversion - all recommended materials (1 point)	☑	1	
	IC-7		Implement Integrated Pest Management During Construction	☐		☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☑	2	☐
	IO-2	2	Maintain Soil Quality	☑	2	☐

Projects can achieve credits that are not designated as applicable to that project type. By checking the box in the "Include Credit" column, the points and credit turn white are included into the total points.

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **65**

RATING	POINTS		
CERTIFIED	29	to	38
GOLD	39	to	48
PLATINUM	49	to	65

POINTS ACHIEVED: **35**

RATING ACHIEVED: **CERTIFIED**

Total points achievable will automatically appear when the project type has been checked.

Project achievement target levels are automatically calculated based on the project type.

Final project points and level of achievement are shown at the bottom of the form.

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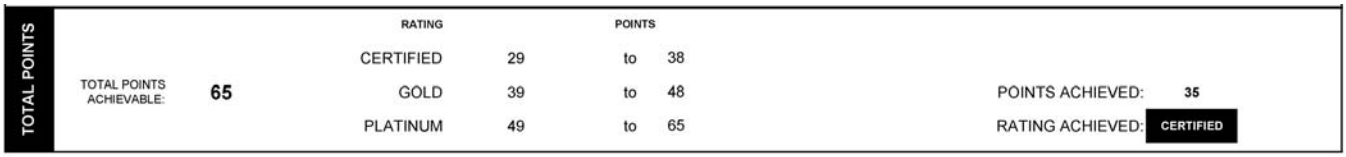
IMPLEMENTATION PROCESS

Step 3: Project Achievement

Each project type has a pre-determined number of credits as identified in the credit checklist. The credits have a range of associated points that allows for levels of project achievement. The three levels of achievement based on a percentage of the total points allocated for any project type are:

CERTIFIED (45% of total point allocation)
GOLD (60% of total point allocation)
PLATINUM (75% of total point allocation)

The interactive excel checklist will automatically calculate the project's achievement level based on the percentage of possible points. The points achieved by a specific project as seen in this example below:



All project types are to achieve a Certified or greater level which has been based on the performance of past projects (for past project checklist and achievement, see Appendix 07). Currently, the Agency has used many of these strategies and these guidelines are intended facilitate awareness of these initiatives and expand or add new strategies where possible.

Rehabilitation project types are limited in scope and credit achievement, and therefore are expected to achieve a Certified level only. The following is a list of project types achieving the Certified level only:

- Airfield Rehabilitation
- Roadway Pavement Rehabilitation
- Parking Lot Rehabilitation
- Utility Rehabilitation
- Bridge and Tunnel Rehabilitation
- Marine Structures

IMPLEMENTATION PROCESS

Step 4: Credit Documentation

Using the Project Credit Documentation Form, provide the drawing number, specification and/or narrative description of how each credit was achieved. This form should be submitted digitally to the Sustainable Design Manager at the end of Stages 3 (by LEA) and 4 (by Resident Engineer) as indicated on the form. This form is located on the second tab of the excel file named “SDInfrastructureChecklist.xls”

SUSTAINABLE INFRASTRUCTURE GUIDELINES
PROJECT CREDIT DOCUMENTATION FORM

PORT AUTHORITY OF NY & NJ

INSTRUCTIONS

For each credit, provide applicable documentation type (drawing #, specification # or narrative) as indicated in project manual.

All documentation is required at the end of Stage 3 and/or 4 as indicated below.

GENERAL PROJECT INFORMATION

PROJECT NAME:	*Enter project name here*
FACILITY:	*Enter facility here*
LE/A or RE:	*Enter LEA or RE name here*
PHONE:	*Enter phone number here*
EMAIL:	*Enter email address here*
PID #	*Enter PID number here*
CONTRACT #	*Enter contract number here*
DATE:	

Credit Number	Credit Title	Document-ation Stage	Contract Drawing Number	Reference Specification Number	Narrative Description
SITE SECTION					
IS-1	UTILIZE AN INTEGRATED TEAM APPROACH	1, 2, & 3			
IS-2	PREPARE A SITE ASSESSMENT	1, 2, & 3			
IS-3	MAXIMIZE USE OF PREVIOUSLY DEVELOPED SITES	3			
IS-4	MAXIMIZE USE OF KNOWN CONTAMINATED SITES	3, 4			
IS-5	PROTECT ECOLOGICAL HEALTH OF WETLAND, FLOODPLAINS & RIPARIAN BUFFERS	3			
IS-6	PROTECT AND MAINTAIN ABSORBENT LANDSCAPES	3			
IS-7	UTILIZE PERVIOUS PAVEMENT	3			
IS-8	UTILIZE APPROPRIATE VEGETATION	3, 4			
IS-9	USE TURFGRASS APPROPRIATELY	3, 4			
IS-10	AMEND AND REUSE EXISTING SOILS	3, 4			
IS-11	BALANCE EARTHWORK	3			
IS-12	COORDINATE UTILITY WORK	3			
IS-13	UTILIZE TRENCHLESS TECHNOLOGY	3			
IS-14	MITIGATE HEAT ISLAND EFFECT	3			
IS-15	MINIMIZE LIGHT POLLUTION	3			
IS-16	OPTIMIZE PUBLIC ENVIRONMENTS - BICYCLES AND PEDESTRIANS	3			
IS-17	OPTIMIZE TRAFFIC SAFETY	3			
IS-18	OPTIMIZE ROADWAY ALIGNMENT SECTION	3			
IS-19	EXPAND OR ENHANCE INTERMODAL CONNECTIVITY	3			
IS-20	USE TRANSPORTATION SYSTEM MANAGEMENT	3			
IS-21	USE TRANSPORTATION TECHNOLOGIES	3			
WATER SECTION					
IW-1	IMPLEMENT STORMWATER BEST MANAGEMENT PRACTICES STRATEGIES	3			
IW-2	IMPLEMENT RAINWATER NEUTRALITY	3			
IW-3	REDUCE USE OF POTABLE WATER FOR IRRIGATION	3			
IW-4	UTILIZE END USE METERING - WATER	3			
ENERGY SECTION					
IE-1	OPTIMIZE ENERGY PERFORMANCE	3			
IE-2	COMMISSION ELECTRICAL AND MECHANICAL SYSTEMS	3, 4			
IE-3	UTILIZE END USE METERING - ENERGY	3			

(Documentation form continues in excel file)

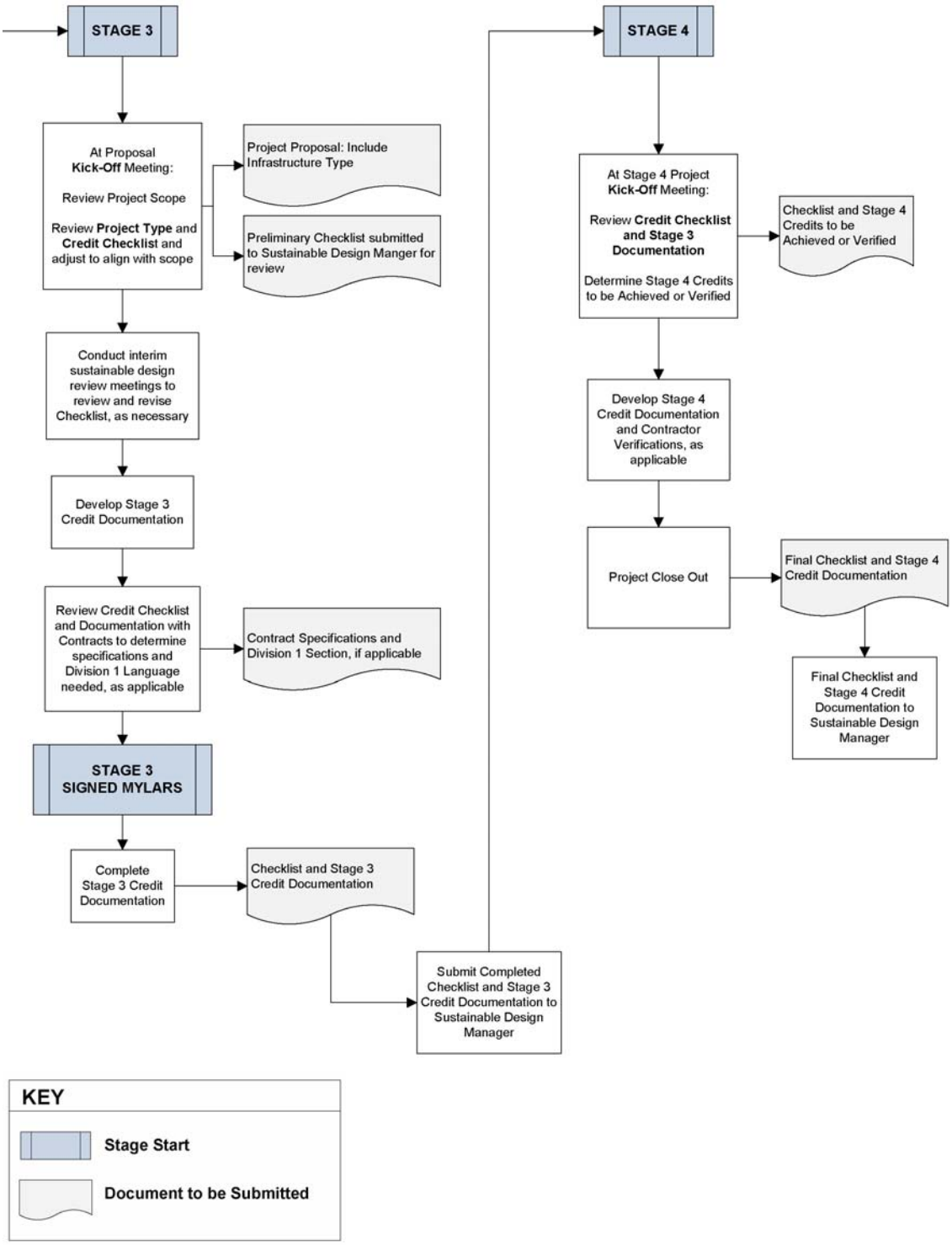
IMPLEMENTATION PROCESS

Sustainable Design Workflow - Stages 1 and 2

Use of these guidelines is integrated into the current project delivery methods, as shown in this workflow diagram. The project proposal and credit checklist are used in Stages 1, 2 and 3 to inform the team of the project's intended and final achievement.

IMPLEMENTATION PROCESS (con't)

Sustainable Design Workflow – Stages 3 and 4



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PROJECT ACHIEVEMENT CERTIFICATE

After review of the final credit documentation submitted by the LEA and Resident Engineer, the Sustainable Design Manager will issue a certificate to each member of the project team. Each project achieving a Gold or Platinum level of achievement will receive a Sustainable Design Achievement Certificate upon construction completion.

CREDIT LIST

SITE SECTION		LEAD DISCIPLINE(S)
IS-1	Utilize an Integrated Team Approach	LE/A
IS-2	Prepare a Site Assessment	LE/A
IS-3	Maximize Use of Previously Developed Sites	LE/A, N
IS-4	Maximize Use of Known Contaminated Sites	N, RE
IS-5	Protect the Ecological Health of Wetlands and Floodplains	A, C
IS-6	Protect and Maintain Absorbent Landscapes	A, C
IS-7	Utilize Pervious Pavement	C
IS-8	Utilize Appropriate Vegetation	A, RE
IS-9	Use Turfgrass Appropriately	A, RE
IS-10	Amend and Reuse Existing Soils	A, C, RE
IS-11	Balance Earthwork	C
IS-12	Coordinate Utility Work	C
IS-13	Utilize Trenchless Technology	C
IS-14	Mitigate Heat Island Effect	A, C
IS-15	Minimize Light Pollution	E
IS-16	Optimize Public Environments – Bicycles and Pedestrians	T, E
IS-17	Optimize Traffic Safety	T, RE
IS-18	Optimize Roadway Alignment Selection	C
IS-19	Expand or Enhance Intermodal Connectivity	T
IS-20	Use Transportation System Management	T
IS-21	Use Transportation Technologies	T

WATER SECTION		
IW-1	Implement Stormwater Best Management Practice Strategies	C
IW-2	Implement Rainwater Neutrality	C
IW-3	Reduce Use of Potable Water for Irrigation	A, M
IW-4	Utilize End Use Metering – Water	M

ENERGY SECTION		
IE-1	Optimize Energy Performance	E, M
IE-2	Commission Electrical and Mechanical Systems	E, M, RE
IE-3	Utilize End Use Metering – Energy	E, M
IE-4	Use On-Site Renewable Energy	E, M
IE-5	Protect Ozone Layer	M
IE-6	Provide Alternative Fueling Stations	E, M

MATERIAL SECTION		LEAD DISCIPLINE(S)
IM-1	Use Recycled Materials	C, S
IM-2	Use Local / Regional Materials	A, C, RE
IM-3	Reuse Materials	A, C, T
IM-4	Use Durable Materials	C, S
IM-5	Use Sustainably Harvested Wood	A, C, G, RE
IM-6	Minimize Use of Toxic and / or Hazardous Materials	LE/A
IM-7	Enhance Pavement Lifecycle	C
IM-8	Preventative Pavement Maintenance	C
IM-9	Utilize Warm-Mix Asphalt Technology	C

CONSTRUCTION SECTION		
IC-1	Minimize Pollution from Construction Activity	LE/A, RE
IC-2	Protect Existing Natural Systems	LE/A, RE
IC-3	Utilize Transportation Management During Construction	T, RE
IC-4	Utilize Green Construction Equipment	LE/A, RE
IC-5	Reduce Noise and Vibration During Construction	LE/A, RE
IC-6	Implement Construction Waste Management	LE/A, RE
IC-7	Implement Integrated Pest Management During Construction	LE/A, RE

OPERATIONS AND MAINTENANCE SECTION		
IO-1	Implement Sustainable Landscape Maintenance	A
IO-2	Maintain Soil Quality	A

INNOVATION SECTION		
IN-1	Innovation Credit	LE/A

Engineering Discipline Key

A – Landscape Architecture
C – Civil
E – Electrical
M – Mechanical
N – Environmental
RE – Resident Engineer
LE/A – Lead Engineer/Architect
S – Structural
T – Traffic

IS-1 UTILIZE AN INTEGRATED TEAM APPROACH

RELATED CREDITS

IS-2 Prepare a Site Assessment
IS-6 Protect and Maintain Absorbent Landscapes
IC-3 Utilize Transportation Management During Construction

PURPOSE

Engage in an integrated team approach to achieve sustainable design goals. An integrated team approach is one that encourages participation by professionals from multiple disciplines, Line Departments, agencies, local stake holders, and community groups in the planning and design of projects. An integrated design process is defined as an iterative process that requires various stakeholders and disciplines to interact and coordinate with one another as early as possible and throughout the life cycle of a project, to make the most effective use of resources to benefit the environment and the project.[1]

Plan View of Existing Redneck Avenue Roadway Alignment at Teterboro Airport, Teterboro, New Jersey

CASE STUDY

Teterboro Airport Runway, 1-19 Safety Area Improvements, Floodplain Analysis and Balancing Safety Improvements with Environmental Impacts, Teterboro, New Jersey

In order to comply with FAA safety requirements a foam arrestor bed needed to be built at the end of Runway 1-19 at Teterboro Airport. In order to make room for the arrestor bed an existing county road had to be relocated. The project was located in an environmentally sensitive area with significant wetland impacts. After the original design was rejected by the New Jersey Department of Environmental Protection, it was determined that an integrated team approach was needed to meet the needs of the various stakeholders. A meeting was held with all appropriate stakeholders including the FAA, the NJDEP, PSE&G, Bergen County,

[1] The Sustainable Sites Initiative, Guidelines and Performance Benchmarks, Draft 2008, Sustainable Sites Initiative, 2008, page 173.

the Army Corps of Engineers, and various PANYNJ staff. A consensus was reached on how to proceed to minimize environmental impacts while still meeting all safety requirements for the arrestor bed and the road design. Numerous meetings were held throughout the design process to keep everyone informed and identify issues. The final design cut the wetland impacts in half and met the needs of all other stakeholders.

CREDIT REQUIREMENTS (2 Points)

Implement the following required and recommended strategies during all stages of design:

- **Required ::** Identify team stakeholders including but not limited to multiple design disciplines, project managers, line department representatives, consultants, local stake holders and agencies, and community groups, as determined by the team, etc. Conduct a Sustainable Design Review using the sustainable infrastructure credit checklist at the project Kick-off Meeting and ensure participation of team stakeholders.
- **Required ::** A sustainable infrastructure credit checklist must be supplied in stage-end reports. The checklist is to be used throughout the design process to facilitate the achievement of all sustainable design goals.
- **Required ::** Review sustainability goals and evaluate progress towards those goals at regular team meetings. Provide updated sustainable infrastructure credit checklist as necessary throughout the design process.
- **Recommended ::** Lead Engineer or Architect (LEA) can appoint a Sustainability Coordinator at the Kick-off Meeting. The role of the Sustainability Coordinator is to coordinate the integrated design process and to maintain the sustainable infrastructure credit checklist throughout the design process.

CREDIT DOCUMENTATION

- Narrative description of integrated team approach which includes list of identified team stakeholders and tracks progress of sustainable design strategies through the design process through meeting minutes relating to sustainable design strategies from project meetings.
- Sustainable infrastructure credit checklists submitted at stage end of Stages 1-3 and interim working checklists.

REFERENCES

The Sustainable Sites Initiative, Prerequisite 2.2 - Use an Integrated Design Approach.

IS-2 PREPARE A SITE ASSESSMENT

RELATED CREDITS

IS-1 Utilize an Integrated Team Approach
IC-1 Minimize Pollution from Construction Activity
IC-2 Protect Existing Natural Systems

PURPOSE

Assess existing conditions prior to the planning (Pre-Stage I), design (Stages I, II, & III) or construction (Stage IV) of projects which may have an impact on the natural or cultural quality of the site in order to facilitate the realization of sustainable potentials and regulatory requirements. Use the information gathered to inform planning and design decisions and to determine opportunities for implementing high performance, best management practices (BMPs), which meet the objectives of the project while protecting or restoring existing resource values.

Plan View of Revised Redneck Avenue Roadway Alignment at Teterboro Airport, Teterboro, New Jersey

CASE STUDY

Teterboro Roadway Alignment, Teterboro, New Jersey

The PANYNJ was mandated by the FAA to make improvements to the Runway Safety areas at several of the PANYNJ airports for compliance with FAA safety criteria. At Teterboro Airport, an existing county road had to be relocated to allow for the construction of a foam arrestor bed at the end of Runway 1-19. The project site was in the floodplain and surrounded by wetlands. An initial alignment was developed which was the most cost effective, however it disturbed approximately 10 acres of wetlands and was rejected by the NJDEP. The Engineering Department undertook an extensive effort to redesign the alignment to meet FAA, Bergen County, NJDEP, and USACE requirements and minimize impacts to the environment. Extensive stormwater best management practices were used to minimize downstream impacts and remove suspended solids including underground detention. An earthen berm had to be removed to provide adequate detention and was replaced with a green wall; the first such application for the PANYNJ. The revised alignment design met all FAA and county criteria and reduced the wetland impact to 4.7 acres and was approved by the NJDEP.

CREDIT REQUIREMENTS (2 Points)

Site Assessment documentation to be utilized to identify high performance sustainable BMPs related to the project-specific work. To fulfill this credit, assessment must begin at the start of the project in Pre-Stage I or Stage I. If project begins in Stages II or III, site assessment must begin at project kick off.

Site Assessment Items		Lead Discipline
1	**Team stakeholders:** Indentify all stakeholders (see ISEQ-1 for list of stakeholders)	Project Lead
2	**Natural Features:** Document existing soils, flora and fauna including their current condition (thriving, damaged, threatened by invasive species, etc.) as applicable: Soils – indicate condition of soil, status as a known contaminated site, ability to support vegetation, compaction/percolation. Indicate any remedial action or soil amendments required. Flora – identify type of vegetation, current condition, native, invasive, habitat for animals. Fauna – endangered / threatened species on-site or habitat for endangered / threatened species.	Landscape
3	**Hydrology:** Document existing hydrology. Inventory nearby water bodies, floodplains and wetlands. Identify any potential flooding issues, direction of stormwater flow over site, receiving body, 100 year flood plain, water quality, and known groundwater contamination. Indicate height of water table. A full hydrological analysis may be required.	Civil
4	**Evaluate Climate Change Impacts** – Reference Project Design Evaluation - Climate Change Projections memo regarding climate change impact (see Appendix 02).	Civil
5	**Climate Information:** Document local and regional climate, temperature, humidity, rainfall, wind, etc.	Civil
6	**Utilities:** Conduct or obtain existing site survey to assess presence of existing underground utilities.	Civil
7	**Environmental Reviews:** Coordinate site assessment directly with Line Department Environmental Coordinator to help inform any possible environmental reviews. Provide possible permit and regulatory triggers.	Project Lead
8	**Air Quality** – Document site air quality. Indicate compliance with local requirements, sources of pollution, if any i.e. industrial, traffic, materials, etc.	Environmental
9	**Acoustics**: Indicate characteristics such as noise level, intermittent or constant noise, pitch / frequency, etc. and sources of noise. Identify all applicable codes, regulations, and required permits.	Environmental
10	**Soil Contamination:** Document any restrictions on property use including engineering and institutional controls because of contaminated soil or groundwater.	Environmental
11	**Transportation Options:** Document local transportation options and future plans (mass transit, bicycle, pedestrian and roadways)	Traffic
12	**Traffic Impact Assessment:** Conduct a Traffic Impact Assessment to assess existing and future traffic conditions. Determine the need for improvements to adjacent or nearby transportation systems to maintain satisfactory levels of service, safety, and access to a proposed development, and adjacent PANYNJ facilities, while seeking to reduce fuel consumption and traffic-related emissions (interagency coordination may be required).	Traffic
13	**Community:** Indentify current use of site and importance to community, if applicable. An urban design study including a site lighting study and considerations relating to social, environmental, historical, and archeological resources may be required.	Project Lead
14	**Unique Features:** Document other unique features on or near the site, if any, which could have an impact on development plans (including, but are not limited to, mature trees on the site, a popular cultural venue - a cinema, sports complex, school, or park - which would draw large numbers of pedestrians, or an historic building of concern to the surrounding community).	Project Lead

CREDIT DOCUMENTATION

- Provide site assessment documentation for all credit requirements listed above that are relevant to project scope.

REFERENCES

The Sustainable Sites Initiative, Prerequisite 2.1 - Conduct a Pre-Design Site Assessment.
High Performance Infrastructure Guidelines, SA.1 Assess Site and High Performance Opportunities.

IS-3 MAXIMIZE USE OF PREVIOUSLY DEVELOPED SITES

RELATED CREDITS

IS-4 Maximize Use of Known Contaminated Sites

PURPOSE

Construct on or through previously developed sites that are close to existing infrastructure to minimize impacts and maintain the environmental integrity of undeveloped land.

Pier A Park, Hoboken, New Jersey[2]

CASE STUDY

Pier A Park, Hoboken, New Jersey

The Port Authority of New York and New Jersey provided funding to the City of Hoboken to convert a former shipping pier into a waterfront park. Additionally, PANYNJ constructed this five acre park, with excellent views of the Manhattan skyline offers half a mile of walkways, groves of trees, extensive lawns, bike paths, a covered pavilion, and a performance area.[3]

[2] http://www.flickr.com/photos/moelynphotos/3049153722/

[3] http://www.hobokenparks.org/

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies:

- **Required ::** Give preference to development of previously developed sites which has been paved or built on. Using analysis of existing conditions, provide site alternative locations that support the use of previously developed sites over undeveloped sites.

CREDIT DOCUMENTATION

- Documentation of project utilizing previously developed site alternative location.

REFERENCES

LEED for Neighborhood Development (LEED-ND), SLL Credit 1: Preferred Locations.
The Sustainable Sites Initiative, Credit 1.6 – Select Sites within Existing Communities.

IS-4 MAXIMIZE USE OF KNOWN CONTAMINATED SITES

RELATED CREDITS

IS-3 Maximize Use of Previously Developed Sites

PURPOSE

Construct on or through known contaminated sites in order to rehabilitate degraded sites and to minimize pressure on undeveloped land. This rehabilitation will reduce the risk to human health and the environment from known contaminated sites. A known contaminated site is defined as a site classified as a Brownfield or contaminated site by a federal, state, or local agency or a site documented as contaminated with a Phase II Environmental Site Assessment (as described in ASTM E1903-97).

Portfields Initiative: Development Opportunities for Warehousing & Distribution Centers[4]

CASE STUDY

Portfields Initiative: Development Opportunities for Warehousing & Distribution Centers

The Portfields Initiative is a project of the Port Authority of New York & New Jersey and the New Jersey Economic Development Authority (EDA). The program helps private developers, communities and others transform underutilized and brownfield sites into productive warehousing and distribution centers. These centers will support emerging market opportunities for new ocean and air freight-related warehousing and distribution operations.[5]

[4] http://www.panynj.gov/real-estate-development/portfields-initiative.html

[5] http://www.panynj.gov/real-estate-development/portfields-initiative.html

CREDIT REQUIREMENTS (3 Points)

Implement the following required strategies:

- **Required ::** Develop known contaminated sites that require remediation by a State or Federal remediation program.
- **Required ::** Describe appropriate remediation strategies for the development site to protect human health and the environment.
- **Required ::** Remediate project site and obtain a determination of no further action required from the regulating environmental agency for either the entire project site boundary or area of concern as determined by the regulatory agency.

CREDIT DOCUMENTATION

- Documentation of percentage of site remediated and remediation strategy
- Proof of determination of no further action.

REFERENCES

The Sustainable Sites Initiative, Credit 1.4 – Select Brownfields or Greyfields for Redevelopment.
LEED for Neighborhood Development (LEED-ND), SLL Credit 2 – Brownfields Redevelopment.

IS-5 PROTECT THE ECOLOGICAL HEALTH OF WETLANDS, FLOODPLAINS AND RIPARIAN BUFFERS

RELATED CREDITS

IS-8 Utilize Appropriate Vegetation
IS-18 Optimize Roadway Alignment Selection
IW-1 Implement Stormwater Best Management Practice Strategies
IW-2 Implement Rainwater Neutrality
IC-2 Protect Existing Natural Systems

PURPOSE

For sites that are adjacent to wetland, floodplain and riparian buffer zones, but outside the regulatory area, design measures to protect or enhance the ecological health of that wetland, floodplain, or riparian buffer. Prevent the transfer of pollutants, invasive species, etc. from the development site into the wetland or flood plain, and enhance ecological connectivity using green corridors.

Botany Wetlands at Sydney Airport, Sydney, Australia[6]

CASE STUDY

Botany Wetlands at Sydney Airport, Sydney, Australia

The Botany Wetlands are the largest freshwater wetland in the metropolitan area of Sydney, lying next to Sydney Airport's third runway. Despite the airport and its immediate surroundings having been highly modified over the last century or more, the wetlands are considered to be an environmentally significant area, providing important habitat for a range of native flora and fauna species including reptiles, fish and birds. To improve the quality and ecological function of the wetlands, the airport developed and is implementing a Wetland Enhancement Program, which includes:

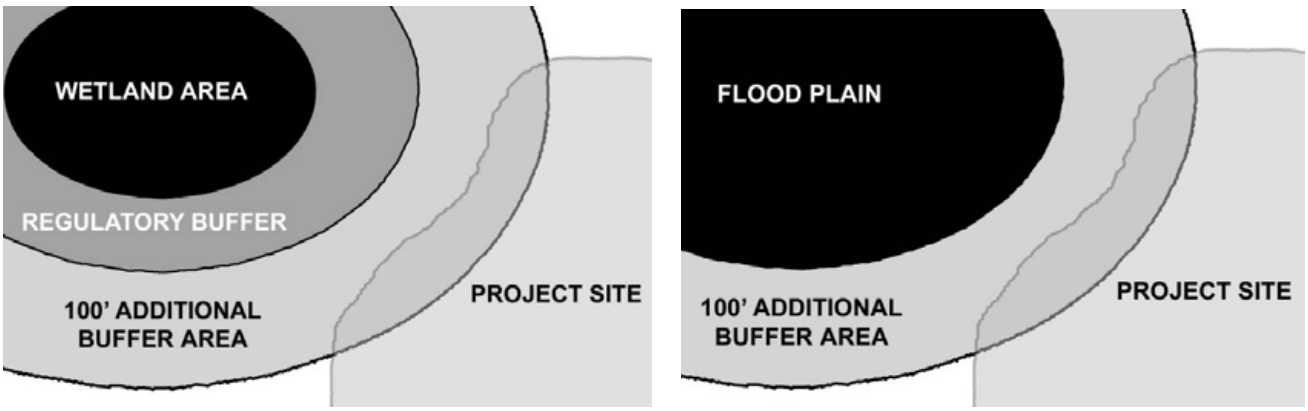
- Installation of a gross pollutant trap to remove litter from stormwater run-off into the wetlands
- Revegetation with native plant species
- Removal of aquatic and terrestrial weeds[7]

[6] http://www.bettersafe.com.au/Premiers%20Award_Botany%20Wetland_Final_22%20July%202003-an.pdf

CREDIT REQUIREMENTS (2 Points)

For projects with site boundaries located within 100' of the outer edge of a wetland, floodplain, or riparian regulatory buffer (or transition area) implement **2 of the 3** following recommended strategies. See diagram below for additional explanation of project site location in relationship to regulatory buffer.

- **Recommended ::** Manage stormwater on-site to prevent downstream wetland contamination from site run-off utilizing low impact development strategies in IW-1.
- **Recommended ::** Utilize vegetation suitable to the nature of existing site conditions including but not limited to the Soil Textural Triangle, % sand, silt and clay based on the Bouyoucous Hydrometer method, % organic matter, soluble salts, pH, N, P, K, micronutrients and soil hydrology.
- **Recommended ::** Where opportunities exist and where there are Green Corridors, connect wetland, floodplain, and riparian buffer areas to enhance and protect the health of ecologically sensitive areas.



Diagrams Showing the Additional Buffer Area and Relationship to the Project Site for Wetlands and Flood Plains

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of implemented strategies

REFERENCES

High Performance Infrastructure Guidelines, LA.2 Encourage Ecological Connectivity and Habitat.
Sustainable Design Guidelines for WTC Redevelopment Projects, Credit UEQ-5 – Green Infrastructure.

[7] http://www.sydneyairport.com.au/SACL/IgnitionSuite/uploads/docs/Fact%20Sheet_Sydney%20Airport%20Wetlands%20(low%20resolution).pdf

IS-6 PROTECT AND MAINTAIN ABSORBENT LANDSCAPES

RELATED CREDITS

IS-2 Prepare a Site Assessment
IS-7 Utilize Pervious Pavement
IS-8 Utilize Appropriate Vegetation
IS-10 Amend and Reuse Existing Soils
IS-14 Mitigate Heat Island Effect
IS-18 Optimize Roadway Alignment Selection
IW-1 Implement Stormwater Best Management Practice Strategies
IW-2 Implement Rainwater Neutrality
IC-2 Protect Existing Natural Systems
IO-1 Implement Sustainable Landscape Maintenance
IO-2 Maintain Soil Quality

PURPOSE

For infrastructure projects that will impact adjacent absorbent landscapes, develop measures to protect and maintain these areas so that they retain their natural ability to absorb, infiltrate and treat stormwater runoff. Create new absorbent landscapes to replace hardscape areas created for new development. Alternative strategies can include replacing existing impervious surfaces within the same watershed with new absorbent landscapes, providing erosion and sediment control, and planting trees and providing green roofs. Rehabilitate poorly performing existing absorbent landscapes within the same watershed by amending and rehabilitating the existing poorly functioning vegetated/soil systems.

Manhattan Avenue, Brooklyn, New York[8]

CASE STUDY

Manhattan Avenue, Brooklyn, NY

At the dead-end of Manhattan Avenue in Greenpoint, Brooklyn, adjacent to the Newtown Creek, a ¼ acre piece of land was converted into a small park with absorbent landscaping. The absorbent landscape materials help treat stormwater run-off before it enters the Newtown Creek, reducing the amount of pollutants

[8] The Sustainable Sites Initiative, Guidelines and Performance Benchmarks, Draft 2008, Sustainable Sites Initiative, 2008, page 156.

discharged into this already heavily polluted waterway. A small waterfront promenade, sitting areas, native plantings and a kayak launch also make this park a valuable community asset.

CREDIT REQUIREMENTS (1 Point + 1 Possible Additional Point)

- Protecting and maintaining absorbent landscapes will vary with the requirements of the total project site; therefore a combination of strategies may be used. For a total of **15%** of the combined hardscape and vegetated areas, implement the following required strategies and 1 or more of the following recommended strategies below. Additional points can be achieved for **30%** (1 additional point).

  Alternative strategies include: replacing existing impervious surfaces within the same watershed with new absorbent landscapes, providing erosion and sediment control, planting trees and providing green roofs. Rehabilitate poorly performing existing absorbent landscapes within the same watershed by amending and rehabilitating poorly functioning vegetated/soil systems.

- **Required ::** Identify existing absorbent landscape areas within the *project site boundary* that will be affected by the planned infrastructure project.
- **Required ::** Develop strategies to protect existing absorbent landscapes to minimize damage.
- **Recommended ::** Restore affected area with absorbent vegetation and where possible and practical, increase absorbent landscape area.
- **Recommended ::** Where opportunities exist, create new absorbent landscapes to replace hardscape areas or as links between existing or new hardscape areas to help manage run-off.
- **Recommended ::** Depending on the height of the water table and the down slope terrain, absorbent landscapes can be designed as 'rain gardens'. A 'rain garden' is composed of suitable, well-drained soil, vegetation suitable for both dry and wet soils and a berm that intercepts the natural down-slope condition by creating a shallow depression.

NOTE: Perform soil percolation tests, test the soil as *Recommended Soil Testing Procedures For The Northeastern United States, Current Edition, Northeastern Regional Publication No. 493* as provided by the Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia and identify the water table in order to determine applicability of this credit.

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of required percentage of absorbent area and description of implemented strategies

REFERENCES

High Performance Infrastructure Guidelines, LA.3 Create Absorbent Landscapes.

IS-7 UTILIZE PERVIOUS PAVEMENT

RELATED CREDITS

IS-6 Protect and Maintain Absorbent Landscapes
IS-18 Optimize Roadway Alignment Selection
IW-1 Implement Stormwater Best Management Practice Strategies
IW-2 Implement Rainwater Neutrality

PURPOSE

Maximize use of pervious pavement to reduce stormwater run-off and decrease pollution of local water bodies, increase ground water infiltration and lessen the potential for heat island impacts. Reduce combined sewer overflows through use of pervious pavement.

Use of Permeable Asphalt at the Stewart International Airport, Orange County, New York

CASE STUDY

PANYNJ used permeable asphalt for the first time at Stewart International Airport with the repaving of Airport Lot D (Contract NX-SWF25), completed in November 2007. This installation, totaling approximately 3 acres, was also the first time the PANYNJ managed 100% infiltration of site stormwater; there is no connection to any stormwater drainage system. This design enabled construction to proceed much faster since the permitting process was much simpler.

CREDIT REQUIREMENTS (1 Point + 2 Possible Additional Points)

Implement the following required strategy and, where possible, implement the recommended strategies:

- **Required :: ** Utilize pervious pavement for **25%** of the total hardscape area within the *project boundary*. Additional points can be achieved for **50%** (1 additional point) and **75%** (2 additional points).
- Pervious pavement materials include:
  - Pervious concrete
  - Pervious asphalt
  - Pervious Pavers:
    - Unitary concrete, stone or brick pavers
    - Pre-cast concrete block pavers
    - Open-joint Belgium block or stone block
    - Interlocking pavers
    - Open-grid pavers with gravel screenings
    - Salt splashes – pervious first three feet at edge of roadway
- **Recommended :: ** Enhance percolation rate by use of vegetated bioswales or ditches at edges of porous surface.
- **Recommended :: ** Utilize salt-splashes at roadway edge to protect vegetation.
- **Recommended :: ** Use structural soil to enhance percolation and dispense winter salt residue.

NOTE: Perform soil percolation tests, test the soil as *Recommended Soil Testing Procedures For The Northeastern United States, Current Edition, Northeastern Regional Publication No. 493* as provided by the Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia and identify the water table in order to determine applicability of this credit.

CREDIT DOCUMENTATION

- Documentation of percentage of pervious hardscape and description of strategies implemented

REFERENCES

High Performance Infrastructure Guidelines, Credit PA.4 - Use Pervious Pavements.

IS-8 UTILIZE APPROPRIATE VEGETATION

RELATED CREDITS

IS-5 Protect the Ecological Health of Wetlands, Floodplains and Riparian Buffers
IS-6 Protect and Maintain Absorbent Landscapes
IS-9 Use Turfgrass Appropriately
IS-14 Mitigate Heat Island Effect
IW-3 Reduce Use of Potable Water for Irrigation
IC-2 Protect Existing Natural Systems
IO-1 Implement Sustainable Landscape Maintenance
IO-2 Maintain Soil Quality

PURPOSE

- Utilize vegetation suitable to existing site conditions, specifically with regard to locale, climate, precipitation, solar radiation patterns, local species, soil conditions and operational conditions.

Appropriate Roadside Vegetation in Pennsylvania[9]

CASE STUDY

The Penn State Vegetation Management Project, Pennsylvania

The Penn State Vegetation Management Project was initiated in 1985 to assist the Pennsylvania Department of Transportation's Bureau of Maintenance and Operations in the ongoing development of its roadside vegetation management program. This program aims to preserve as much desirable vegetation as possible while minimizing inappropriate vegetation and maintaining an appealing aesthetic, within the confines of limited resources. Examples of some of the ongoing research and demonstrations include management of specific weed species such as Tree-of-Heaven (Ailanthus altissima), Japanese knotweed, and Canada thistle; evaluation of alternative plant materials for roadside conservation plantings such as native warm-season grasses and forbs; and evaluations of corridor management approaches, equipment, and herbicides.[10]

[9] http://www.fhwa.dot.gov/environment/wildlifeprotection/index.cfm?fuseaction=home.viewArticle&articleID=59 and http://vm.cas.psu.edu/Publications/FS_7_RoadsideGroundcovers.pdf

[10] http://vm.cas.psu.edu/

CREDIT REQUIREMENTS (2 Points)

Implement **4 of the 6** following recommended strategies:

- **Recommended ::** Utilize vegetation suitable to the nature of existing site conditions including but not limited to the Soil Textural Triangle, % sand, silt and clay based on the Bouyoucous Hydrometer method, % organic matter, soluble salts, pH, N, P, K, micronutrients and soil hydrology.
- **Recommended ::** When installing landscaping through capital investments provide maintenance. At a minimum provide six-months for lawn, two-years for trees shrubs and ground cover and five-years for wetland mitigations.
- **Recommended ::** Test the soil prior to landscaping as per *Recommended Soil Testing Procedures For The Northeastern United States, Current Edition, Northeastern Regional Publication No. 493* as provided by the Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia.
- **Recommended ::** Use bio-stimulants or mycorrhizae to enhance soil quality and contribute to the plants' ability to absorb water, based on soil tests.
- **Recommended ::** Typically add compost to prepared soil beds for new vegetation and do not fertilize while adding compost to soil beds.
- **Recommended ::** Restrict or eliminate use of pesticides and fertilizers during installation of vegetation.

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of implemented strategies

REFERENCES

High Performance Infrastructure Guidelines, LA.12 Use Low Maintenance, Salt Tolerant, Native or Naturalized Species.

The Sustainable Sites Initiative, Prerequisite 4.2 - Use Appropriate, Non-Invasive Plants.

IS-9 USE TURFGRASS APPROPRIATELY

RELATED CREDITS

IS-8 Utilize Appropriate Vegetation
IW-3 Reduce Use of Potable Water for Irrigation
IC-2 Protect Existing Natural Systems
IO-1 Implement Sustainable Landscape Maintenance
IO-2 Maintain Soil Quality

PURPOSE

Utilize resilient, pest resistant, low maintenance species of grass where lawn or low vegetation is required. Where alternative vegetation is acceptable, substitute ground covers or meadow grasses in place of turfgrass to reduce maintenance, including irrigation, mowing and fertilizer/pesticide treatments.

Tall Fescue turfgrass at JFK International Airport, New York, NY

CASE STUDY

The Federal Aviation Administration (FAA) Advisory Circular on Hazardous Wildlife Attractants On or Near Airports limits the kind of vegetation that can be planted on or near airport facilities. One of the FAA approved landscape measures is Tall Fescue turfgrass. John F. Kennedy International Airport (JFKIA) has a substantial investment in capital and maintenance operations in lawn (turfgrass) on over 1,500 Acres on its 5,000-Acre facility. Properly managed turfgrass (mowed, not let to go to seed) provides the airport with FAA approved vegetation which and the additional environmental benefit of sequestering carbon dioxide.

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies and where possible, the following recommended strategy:

- **Required ::** Utilize cool-season Tall Fescue grass where use of turfgrass is required. Tall Fescue requires less fertilizer and maintenance than other varieties of turfgrass. Select Tall fescue seed cultivars that are 90% non-pathogenic fungal endophyte enhanced. These Tall Fescue cultivars thrive on low nutrient, low water availability, or wet soil conditions. They offer higher overall vigor, drought tolerance and insect resistance than other turfgrass varieties.
- **Required ::** Test the soil prior to landscaping as per *Recommended Soil Testing Procedures For The Northeastern United States, Current Edition, Northeastern Regional Publication No. 493* as provided by the Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia.
- **Required ::** Incorporate 2" – 4" of compost that is free of viable weed seeds, humus in nature, does not contain any materials toxic to seed germination and plant growth and has no objectionable odors. Require compost testing in order to ensure compost conforms to the specifications.
- **Required ::** Require "seed immunoblot assay testing", "seed grow-out testing" and "tiller testing" in order to ensure specifications have been followed. Reject deliveries that do not meet the stringent requirements of these analyses.
- **Recommended ::** At facilities other than airports (see note below) and where possible, substitute non-essential turfgrass areas with native or well-adapted species, mulch, 'no mow' grasses, or ground covers.

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of implemented strategies

REFERENCES

The Sustainable Sites Initiative, Prerequisite 4.2 - Use Appropriate, Non-Invasive Plants.

IS-10 AMEND AND REUSE EXISTING SOILS

RELATED CREDITS

IO-2 Maintain Soil Quality
IS-11 Balance Earthwork

PURPOSE

Perform a soil analysis of existing materials at the site. Where necessary, amend the physical characteristics of existing soils to enhance storm water infiltration and storage and to support healthy plant communities. Use natural systems – bioremediation or phytoremediation – where possible, to restore soils in-situ and eliminate the need for transportation of additional soils to the site.

Shore Parkway Bike Path, Queens, New York[11]

CASE STUDY

Shore Parkway Bike Path, Queens, New York

A two-mile segment of the Shore Parkway Greenway in Bay Ridge, Brooklyn was reconstructed in 2007. The purpose of the rehabilitation project was to stabilize the Greenway path to correct existing safety hazards and to reconstruct the adjacent deteriorated seawall to prevent flooding. As part of the rehabilitation project, the soil on-site of the Shore Parkway Bike Path was amended using organic matter and new trees were planted along the bicycle trail.[12]

[11] High Performance Infrastructure Guidelines, New York City Department of Design + Construction, 2005, page 160.

[12] http://www.nycgovparks.org/sub_newsroom/press_releases/press_releases.php?id=19914

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies and **1 of the 3** following recommended strategies:

- **Required ::** Test the soil prior to seeding as per *Recommended Soil Testing Procedures For The Northeastern United States, Current Edition, Northeastern Regional Publication No. 493* as provided by the Agricultural Experiment Stations of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia. Testing shall include but not be limited to the 'Soil Textural Triangle' % sand, silt and clay based on the Bouyoucous Hydrometer method, % Organic Matter, Soluble Salts, pH, N, P, K, and Micronutrients.
- **Required ::** Require compost testing in order to ensure compost conforms to the specifications both at time of soil amendment and for later applications.
- **Recommended ::** Minimize disturbance to existing soil exhibiting healthy vegetation.
- **Recommended ::** Maximize on-site reuse of non-contaminated soil.
- **Recommended ::** For airfield rehabilitation projects, disturb no more than 10 feet beyond the edge of existing pavement.

NOTE: For lawn and ground cover amend with compost at a minimum the top 6" – 8" of soil. For shrubs and trees amend at a minimum the top 12" – 24" of soil.

CREDIT DOCUMENTATION

- Documentation of implemented strategies.

REFERENCES

High Performance Infrastructure Guidelines, Credit LA.5 Amend Existing Soils.
The Sustainable Sites Initiative, Credit 7.3 – Restore Soils Disturbed by Previous Development.

IS-11 BALANCE EARTHWORK

RELATED CREDITS

IC-2 Protect Existing Natural Systems
IS-10 Amend and Reuse Existing Soils
IS-18 Optimize Roadway Alignment Selection

PURPOSE

Perform grading evaluation of site to determine optimum finished grades so as to minimize the need of bringing new clean fill on-site and to minimize the need for off-site disposal of excess excavated material. This will result in cost savings, minimize the need for use of virgin material, minimize material going to landfills, and reduce the trucking to bring material on-site or to dispose of material off-site.

Rebuilding of Runway 13R-31L, JFK International Airport, Queens, New York

CASE STUDY

Rebuilding of Runway 13R-31L, JFK International Airport, Queens, New York

Contract JFK 1030 at John F. Kennedy International Airport involved the complete rebuilding of Runway 13R-31L which is almost three miles long. As part of this reconstruction, significant amounts of soil had to be regraded. The finished grade of the runway is approximately one foot higher than the existing grade. After the runway profile was set a three dimensional model was created of the site and this model was used to optimize the finished grades. This redesign of the grading resulted in a cost savings of $2 million and eliminated the need for 30,000 cubic yards of new material.

CREDIT REQUIREMENTS **(1 Point + 1 Possible Additional Point)**

Implement the following required strategy:

- **Required ::** Conduct a grading analysis of the site to determine the optimum finished grades so as to minimize the need to bring in off-site fill or dispose of excess excavated material. Document initial soil material quantities to be removed or added verses finished quantities to show a **25%** improvement. Base case for comparison should be the previous stage design. An additional point can be achieved for **50%** (1 additional point).

NOTE: For lawn and ground cover amend with compost at a minimum the top 6" – 8" of soil. For shrubs and trees amend at a minimum the top 12" – 24" of soil.

NOTE: Excludes unsuitable soil material.

CREDIT DOCUMENTATION

- Documentation of percentage improvement.

REFERENCES

The Sustainable Sites Initiative, Credit 4.4 –Minimize Soil Disturbance in Design and Construction.

IS-12 COORDINATE UTILITY WORK

RELATED CREDITS

IS-13 Utilize Trenchless Technology
IS-18 Optimize Roadway Alignment Selection
IC-2 Protect Existing Natural Resources

PURPOSE

Coordinate utility work with paving work for roads, runways, and parking areas in order to match pavement and utility life cycles.

Contract EWR 344.065 - Replacement of Storm Drainage System at Newark Liberty International Airport, New Jersey

CASE STUDY

Contract EWR 344.065 at Newark Liberty International Airport, New Jersey

In 2003, contract EWR 344.065 was issued at Newark Liberty International Airport. This project involved replacing the area where the old control tower and administration building used to be with airfield parking and taxiway pavement. In order to maximize pavement life cycle it was determined that concrete would be used for the vast majority of the area. As part of the project design an assessment of existing utility systems was conducted to evaluate their condition and remaining expected life. Based on this evaluation, it was determined that the electrical , storm drainage, sanitary, and water systems should be replaced as part of the project to correlate the utility design life with the pavement design life, and to minimize the risk of having to rip up new pavement to replace old utilities. Ductile iron pie was used for the water systems and Class V reinforced concrete was used for the drainage systems to maximize life cycle costs.

CREDIT REQUIREMENTS (1 Point + 1 Additional Point)

Implement the following required strategies for 1 point:

- **Required ::** Complete survey within project boundary and confirm sub-grade utilities.
- **Required ::** After identifying existing utilities, evaluate utility age against life expectancy, conduct condition assessment where appropriate and develop rehabilitation, replacement or relocation plan for those utilities whose remaining life is less than 50% of expected pavement life.
- **Required ::** Coordinate utility work with road, runway, and parking construction to minimize pavement deterioration and disruption.

For 1 Additional Point, implement the following strategy:

- **Required ::** For new construction projects, install a leak detection system for water utility. For existing rehabilitation projects, check system for leaks.

CREDIT DOCUMENTATION

- Description of project utility coordination using existing utilities survey.

REFERENCES

High Performance Infrastructure Guidelines, UI.1 Minimize Impact of Utility Work.
High Performance Infrastructure Guidelines, UI.3 Coordinate Utility Infrastructure for Easy Access and Maintenance.

IS-13 UTILIZE TRENCHLESS TECHNOLOGY

RELATED CREDITS

IS-12 Coordinate Utility Work
IC-2 Protect Existing Natural Resources

PURPOSE

Select the least disruptive, available technologies for replacement, repair or rehabilitation of existing stormwater, sanitary sewer or combined storm/sewer lines based on current best practice.

Microtunneling under Route 1&9 at Newark Liberty International Airport, New Jersey

CASE STUDY

Microtunneling under Route 1&9 at Newark Liberty International Airport, New Jersey

The PANYNJ Engineering Department has used microtunneling for various applications since 1991 including several microtunneling projects completed at JFK for electric, water and sanitary force mains which prevented disruption to the facility and included going under runways. A major microtunneling project was implemented at Newark Airport under Route 1&9, where a redundant water main was needed to ensure the facility would have a reliable supply if the existing single feed had a failure. The nearest connection point was on the other side of the Route 1&9 corridor. Conventional cut and cover methods would be very time consuming and cause major roadway disruptions. The new 20" water line was installed by microtunneling under the Route 1&9 corridor.

CREDIT REQUIREMENTS (1 or 2 Points)

Implement the following required strategy and, where possible, the following recommended strategies / trenchless technology best practices:

- **Required ::** Use the least disruptive of technologies available for maintenance or replacement, repair or rehabilitation of existing stormwater, sanitary sewer or combined storm/sewer lines. Utilize trenchless technology for a minimum of 50% of the pipe length in the project using the following best practices for rehabilitation / replacement:[13]

Rehabilitation of Existing Pipe (2 points achieved):

- Pipe Sliplining
- Diameter Reduction Sliplining
- Fold And Form Sliplining
- Cured-In-Place Pipe (CIPP)

OR

Replacement of Pipe (1 point achieved):

- Pipe Bursting
- Horizontal Drilling
- Internal Joint Seals
- Panel And Section Insert Linings
- Chemical Grouting
- Full Tunnelling And Micro-Tunnelling
- Pipe Eating

NOTE: Practices implemented should not restrict or reduce flow through existing pipes.

CREDIT DOCUMENTATION

- Documentation of use of trenchless technology for 50% of pipe length

REFERENCES

InfraGuide: The National Guide to Sustainable Infrastructure, Selection of Technologies for Sewer Rehabilitation and Replacement, page ix

[13] Selection of Technologies for Sewer Rehabilitation and Replacement; InfraGuide: The National Guide to Sustainable Infrastructure; 2003; page ix.

IS-14 MITIGATE HEAT ISLAND EFFECT

RELATED CREDITS

IS-6 Protect and Maintain Absorbent Landscapes
IS-8 Utilize Appropriate Vegetation

PURPOSE

Reduce heat island effect and smog through site design using vegetation in combination with light colored hardscape, porous materials, in place of dark, absorptive hardscape materials.

Aircraft Parking and Taxiway Modifications at Newark Liberty International Airport, New Jersey

CASE STUDY

Aircraft Parking and Taxiway Modifications at Newark Liberty International Airport, New Jersey

At Newark Liberty International Airport, approximately thirty acres of existing asphalt parking lot and taxiway pavement were removed and replaced with high strength concrete pavement. This new concrete pavement increased the solar reflectivity index of the area by a factor of three, mitigating the heat island effect of the overall airport.

CREDIT REQUIREMENTS (1 Point + 2 Possible Additional Points)

Heat island mitigation will vary with the requirements of each project; therefore a combination of strategies may be used. For a total of **50%** of the hardscape within the project site boundary, utilize any combination of the recommended strategies below. Additional points can be achieved for **75%** (1 point) and **100%** (2 points).

- **Recommended ::** Provide hardscape materials (roadways, parking lots, sidewalks, courtyards, plazas, etc.) which have **a minimum SRI of 29**. SRI values for common paving materials are as follows:
  - Typical new gray concrete SRI 35
  - Typical new white concrete SRI 86
  - Typical weathered white concrete SRI 45

- **Recommended ::** Provide for the shading of hardscape surfaces with plant material within five years of project completion and consider vegetated areas as a substitute for hardscape areas. (Provide sufficient healthy soil regime - sufficient soil/pore space, drainage, irrigation, nutrients - and volume to support vigorous and healthy tree growth for the life of the tree.)

- **Recommended ::** Include roofs for any out buildings within project site boundary. Roofing materials must have the following minimum SRI values:
  - Minimum for steep slope (>2:12) SRI 29
  - Minimum for low slope (<2`:12) SRI 78

NOTE: SRI, or Solar Reflectance Index, is a value that incorporates both solar reflectance and emittance in a single value to represent a material's temperature in the sun. SRI quantifies how hot a surface would get relative to standard black and standard white surfaces. It is calculated using equations based on previously measured values of solar reflectance and emittance as laid out in the American Society for Testing and Materials Standard E 1980. It is expressed as a fraction (0.0 to 1.0) or percentage (0% to 100%).[14]

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of percentage of mitigated hardscape including implemented strategies

REFERENCES

High Performance Infrastructure Guidelines, Credit LA.8 Plant Trees to Maximize Shading of Pavement.
The Sustainable Sites Initiative, Credit 4.12 – Reduce Urban Heat Island Effects.

[14] As defined by the United States Environmental Protection Agency - http://www.epa.gov/hiri/resources/glossary.htm.

IS-15 MINIMIZE LIGHT POLLUTION

RELATED CREDITS

IS-16 Optimize Public Environments – Bicycles and Pedestrians
IE-1 Optimize Energy Performance

PURPOSE

Select street light and other outdoor light fixtures which prevents night-sky pollution, enhance night-time visibility, and minimize light trespass and disturbance to nocturnal environments.

Parking Lot Lighting Retrofit at the University of Sherbrooke – Before (top image) and After (bottom image), Quebec, Canada[15]

CASE STUDY

Parking Lot Lighting Retrofit at University of Sherbrooke, Quebec, Canada

A parking lot lighting retrofit was performed at the University of Sherbrooke in which 21 pole mounted luminaires were replaced and power consumption was reduced by 75% while reducing light pollution. Each pole mounted fixture previously contained four high pressure bulbs and were replaced by a single floodlight. Illuminance measured at the ground was maintained while saving 120,000 kWh per year and reducing light pollution by proper fixture selection.[16]

[15] *Practical Guide for Lighting to Reduce Light Pollution and Save Energy*, Astrolab Du Mont-Megantic, p. 14.

[16] *Practical Guide for Lighting to Reduce Light Pollution and Save Energy*, Astrolab Du Mont-Megantic, p. 14.

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies and, where possible, the following recommended strategy:

- **Required ::** Select street light and park fixtures with full cut-off reflectors which prevents night-sky pollution. Select fixtures which are in compliance with the requirements in IESNA RP-33-99 – Lighting for Exterior Environments and IESNA RP-8-00 – Roadway Lighting.
- **Required ::** Do not exceed 80% of the lighting power densities for exterior areas and 50% landscape features as defined in ANSI/ASHRAE/IESNA Standard 90.1-2007, Exterior Lighting Section, without addenda.
- **Required ::** Where a range of illuminance is given (in IES Handbook) to satisfy security criteria, use the lower end of that footcandle range to provide optimum lighting while avoiding light trespass and night-sky pollution.
- **Recommended ::** Use discretion in the design of display / signage lighting - use only in populated areas and minimize impact on sensitive nocturnal environments.

NOTE: Coordinate outdoor lighting power densities with project security criteria.

CREDIT DOCUMENTATION

- Documentation of fixtures meeting IESNA requirements and power density calculations with any additional strategies as needed.

REFERENCES

The Sustainable Sites Initiative, Credit 6.9 – Reduce Light Pollution.
LEED for Neighborhood Development (LEED-ND), GIB Credit 16 – Light Pollution Reduction.

IS-16 OPTIMIZE PUBLIC ENVIRONMENTS – BICYCLES AND PEDESTRIANS

RELATED CREDITS

IS-15 Minimize Light Pollution
IS-17 Optimize Traffic Safety
IS-19 Expand or Enhance Intermodal Connectivity

PURPOSE

Improve public environmental quality, as well as pedestrian and bicyclist safety and health, by limiting vehicular traffic, providing dedicated pedestrian and bike zones and amenities, such as secure public bike racks and convenient access to mass transit.

New York City Bicycle Parking[17] *and Broadway Pedestrian Esplanade, New York, New York*[18]

CASE STUDY

New York City Department of Transportation (DOT)

The New York City DOT launched its Sustainable Streets plan in 2008. This plan lays out a vision for New York City of improved mobility, safer streets and reduced impact on global climate, all resulting in an improved quality of life. Some of the main goals of this plan related to pedestrian and bicyclists are:

- Doubling bicycle commuting by 2015.
- Initiating city-wide parking policies to manage curb space to reduce cruising and congestion.
- Adopting complete-street design templates for reconstruction projects.
- Launching a Main Street Initiative to develop people-friendly boulevards in key corridors.
- Adopting complete-street design templates for reconstruction projects.
- Maximizing energy efficiency throughout street lighting and office operations.[19]

[17] http://www.nyc.gov/html/dot/downloads/pdf/stratplan_compplan.pdf
[18] http://gothamist.com/2008/08/26/broadway_boulevard_open_for_relaxat.php?gallery0Pic=2#gallery
[19] http://www.nyc.gov/html/dot/downloads/pdf/stratplan_compplan.pdf

CREDIT REQUIREMENTS (1 Point + 2 Possible Additional Points)

PEDESTRIAN AMENITIES
Implement the following required strategies and **3 of the 6** following recommended strategies (1 point):

- **Required :: ** Provide enhanced pedestrian crossing treatment at signalized and unsignalized intersections, such as High Visibility Crosswalks.
- **Required :: ** Provide new sidewalks with universal access curb-cuts at corners.
- **Recommended :: ** Provide pedestrian signal indications and pedestrian detectors, such as pushbuttons, at signalized crosswalks.
- **Recommended :: ** Install universal access curb-cuts at older sidewalks where existing cuts are missing or inadequate.
- **Recommended :: ** Provide enhanced pedestrian amenities to further encourage reduced use of vehicles.
- **Recommended :: ** At busy, two-way traffic streets, provide center-street pedestrian islands or refuges.
- **Recommended :: ** Install high quality, energy efficient lighting along streets, to provide optimum lighting for the use and safety of pedestrians and cyclists.
- **Recommended :: ** Provide street amenities such as shelters at bus stops, bench seating, adequate waste receptacles and aesthetic enhancements, including shrubbery and planting, to further encourage use of streets by pedestrians and cyclists.

AND / OR

BICYCLE AMENITIES
Implement the following required strategies and **2 of the 6** following recommended strategies (2 points):

- **Required :: ** Review the PANYNJ Bicycle Policy (see Appendix 03).
- **Required :: ** Provide secure outdoor bike racks, and/or secure, convenient storage near transportation hubs and all commercial, retail, and cultural centers. Analyze quantity of racks needed based on current and projected usage of bicycle riders.
- **Recommended :: ** Provide dedicated bike lanes: where roadways are narrow, increase shoulder width to accommodate new bike lanes.
- **Recommended :: ** Separate bike lanes at intersections.
- **Recommended :: ** At bridges and underpasses, provide safe grade-separated bicycle and pedestrian crossings.
- **Recommended :: ** Install clear signage for cyclists.
- **Recommended :: ** Upgrade facilities to include employee showers to encourage use of bicycles.
- **Recommended :: ** Align the roadway and other highway features and structures within the ROW to allow for the development of future uses such as bicycle lanes or pedestrian walkways.

CREDIT DOCUMENTATION

- Documentation of required and additional recommended strategies.

REFERENCES

GreenLITES Project Design Certification Program, E-4: Improve Bicycle and Pedestrian Facilities.
High Performance Infrastructure Guidelines, SS.2: Improve Streetscape for Pedestrians.
High Performance Infrastructure Guidelines, SS.3: Improve Streetscape for Bicyclists.

IS-17 OPTIMIZE TRAFFIC SAFETY

RELATED CREDITS

IS-16 Optimize Public Environments – Bicycles and Pedestrians
IS-20 Use Transportation System Management
IE-1 Optimize Energy Performance
IC-3 Utilize Transportation Management During Construction

PURPOSE

Reduce the frequency and severity of motor vehicle, pedestrian and bicyclist crashes by addressing traffic safety. Examine the road network for vehicle, operations, pedestrian, and cyclist use.

Fletcher Avenue Underpass Improvements, New York and New Jersey

CASE STUDY

Fletcher Avenue Underpass, George Washington Bridge, New York and New Jersey

The Port Authority of NY & NJ recognized the need to upgrade safety at the Fletcher Avenue Underpass of the George Washington Bridge. These safety improvements included diamond grinding to improve pavement skid resistance, new guide signs and lane markings to reduce driver confusion, and new pavement markings, barrier and impact attenuator. These measures, in conjunction with increased speed enforcement, have enhanced safety and mobility through this area. In the two-year span before the improvements, a total of 49 crashes occurred with a crash cost of $554,000 (calculated using the FHWA Accident Severity Method). In the two-year span after the improvements were installed, 12 crashes occurred at a cost of $185,000. The safety improvements resulted in a crash reduction of 76% and a savings of $369,000.

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies and **1 of the 2** following recommended strategies:

- **Required :: ** Perform road safety audits during project planning and design stages.
- **Required :: ** Review traffic crash reports for each project location.
- **Recommended :: ** During design, include safety mitigations identified in traffic engineering safety audits.
- **Recommended :: ** Perform site crash analysis two years before project initiation. Two years after construction, perform site crash analysis consistent with PANYNJ Traffic Engineering best practices.

CREDIT DOCUMENTATION

- Documentation of required and additional strategies.

REFERENCES

High Performance Infrastructure Guidelines, SS.7: Optimize Streetlighting and Signaling.

IS-18 OPTIMIZE ROADWAY ALIGNMENT SELECTION

RELATED CREDITS

IS-5 Protect the Ecological Health of Wetlands, Floodplains and Riparian Buffers
IS-6 Protect and Maintain Absorbent Landscapes
IS-7 Maximize Use of Pervious Pavement
IS-11 Balance Earthwork
IS-12 Coordinate Utility Work
IC-2 Protect Existing Natural Systems
IW-1 Implement Stormwater Best Management Practice Strategies
IW-2 Implement Rainwater Neutrality

PURPOSE

Consider the impact of alignment selection to adjacent natural systems and existing utilities, and design the alignment to minimize any negative impact.

Slingerlands Bypass, Town of Bethlehem, New York[20]

CASE STUDY

Route 85 – Slingerlands Bypass, Town of Bethlehem, New York

In order to provide safe and efficient travel to the users of Route 85, several modifications were made to the existing roadway passing through the Town of Bethlehem. This included the construction of approximately 1.5 miles of a four lane divided highway, construction of roundabouts at three different points on the route and widening of the bridge over Normans Kill and Krum Kill. Several actions were taken during project development to achieve a balance between the desired transportation improvements and environmental compatibility. Apart from wetland mitigation at a 2:1 ratio to alleviate impacts to forested wetlands, use of local soil, native vegetation and storm water mitigation basins, the roadway's geometric horizontal and vertical alignment was developed to:

[20] http://en.wikipedia.org/wiki/File:Slingerlands_bypass.JPG

- Minimize the number of ravines crossed within the project site, diminishing the overall roadway's footprint.
- Minimize the effects on existing residences and businesses physically and visually by depressing the roadway.
- Minimize the effects on the natural water resources – specifically the wetlands.

CREDIT REQUIREMENTS (2 Points)

Develop a roadway alignment study which evaluates a minimum of 3 alternative roadway alignment options and assesses each option for traffic, utilities and environmental impact. Implement the following required strategies:

- **Required ::** Design the alignment to maintain a 50' buffer beyond regulatory buffer between the roadway and any of the following ecologically sensitive areas:
  - Previously undeveloped land whose elevation is lower than 2.5 feet above the FEMA 100-year flood level
  - Wetlands
  - Water bodies
  - Parklands
  - Historic sites
- **Required ::** Design or modify the alignment to:
  - Avoid disrupting existing utilities.
  - Protect natural site features such as mature trees and shrubbery.
  - Limit the alignment footprint to the minimum depth and length that meets the safety requirements and achieves the intent of the design.

CREDIT DOCUMENTATION

- Roadway alignment study showing 50' buffer and additional requirements.

REFERENCES

GreenLITES Project Design Certification Program, S-1: Alignment Selection.
GreenLITES Project Design Certification Program, S-2: Context Sensitive Solutions.

IS-19 EXPAND OR ENHANCE INTERMODAL CONNECTIVITY

RELATED CREDITS

IS-16 Optimize Public Environments – Bicycles and Pedestrians

PURPOSE

Improve intermodal connectivity of people and goods by enhancing public transportation systems and intermodal freight facilities to reduce traffic congestion, minimize fuel consumption, move freight faster, and reduce atmospheric pollution.

McLester Street Grade Crossing Separation at ExpressRail Elizabeth, Elizabeth, New Jersey

CASE STUDY

Lead Tracks and South Bay Avenue at EPAMT ExpressRail, Elizabeth, New Jersey

Construction of new rail lines for moving containers off ships and out of the port have been constructed to reduce the number of trucks needed to move containers, thereby reducing fuel use and emissions. This project added an ExpressRail-Elizabeth lead track and created a new access road, South Bay Avenue, to the Maher Chassis Depot. A second overpass across McLester Street and a new intersection with traffic signals on South Bay Avenue at McLester Street between Tripoli and Polaris Streets was also constructed. To accommodate the expected increase in activity of ExpressRail, the existing rail-highway grade crossing along Bay Ave will be removed.

CREDIT REQUIREMENTS (2 Points)

ENHANCE PUBLIC TRANSPORTATION
Implement **3 of the 6** following recommended strategies:

- **Recommended :: ** Adopt traffic and congestion management measures to improve access (i.e., BRT-Bus Rapid Transit)
- **Recommended :: ** Integrate wayfinding into the design to facilitate user orientation and site readability.
- **Recommended :: ** Provide enclosed or partially enclosed, covered shelters at bus stops designed to buffer wind and rain and enhance outdoor thermal comfort.
- **Recommended :: ** Provide optimum street and bus shelter lighting for safety and comfort while avoiding light trespass and night sky pollution.
- **Recommended :: ** Provide infrastructure - a kiosk or a secure, safety glass-fronted, fully enclosed display case - for transit information such as schedules and routes.
- **Recommended :: ** Provide sheltered seating in waiting areas and bus stops.

AND / OR

ENHANCE INTERMODAL FREIGHT CONNECTIVITY
Implement the following required strategy and **2 of the 3** following recommended strategies:

- **Recommended :: ** Conduct an interface/infrastructure assessment study.
- **Recommended :: ** Locate key connectivity points at or near major destinations and where there is land to accommodate the facility; allow for convenient interchange between different freight modes (ship, rail, truck).
- **Recommended :: ** Improve access to freight generating areas.

CREDIT DOCUMENTATION

- Narrative description and/or documentation of implemented strategies

REFERENCES

LEED for Neighborhood Development (LEED-ND), NPD Credit 7 – Transit Facilities.

IS-20 USE TRANSPORTATION SYSTEM MANAGEMENT

RELATED CREDITS

IS-17 Optimize Traffic Safety
IS-21 Optimize Transportation Technologies

PURPOSE

Apply Transportation System Management (TSM) strategies as a means of addressing congestion and/or safety problems on the roadway to reduce fuel consumption and traffic-related emissions. Maximize the efficiency of the existing roadway systems using relatively small-scale traffic control measures.

Lincoln Tunnel Exclusive Bus Lane, New Jersey

CASE STUDY

Lincoln Tunnel Exclusive Bus Lane, New Jersey

The Lincoln Tunnel Exclusive Bus Lane (XBL) connects the NJ Turnpike (Interchanges 16E and 17) and NJ Route 3, along NJ Route 495 and the Lincoln Tunnel, to the Port Authority Bus Terminal. Each weekday morning, a 2.5-mile segment of the inner westbound travel lane on NJ Route 495 is dedicated as an exclusive bus lane for buses traveling from New Jersey eastbound into New York City. The 'contra-flow' bus lane operates on weekdays from 6:15-10:00 AM, serving over 1,700 buses and carrying approximately 62,000 passengers to Midtown Manhattan every weekday morning. The XBL saves commuters to New York City an average of 15-20 minutes compared to the regular travel lanes.

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategy:

- **Required ::** Implement and document Transportation System Management strategies that in aggregate result in a **5%** reduction in average vehicle delay from the base condition OR a **10%** reduction in average vehicle travel time during the peak periods using one or more transportation improvement measures (see list below for possible measures / strategies). Possible measures / strategies to achieve this credit include:
  - One-way streets
  - Reversible lanes to accommodate peak hour traffic volumes
  - Turning prohibitions
  - High Occupancy Vehicle (HOV) lanes
  - Curb lane use control (i.e., parking prohibitions)
  - Driveway access management
  - Retiming and coordination of signal systems
  - Parking management strategies to limit congestion

CREDIT DOCUMENTATION

- Narrative description and/or documentation of implemented strategies including calculation of percentage reduction of average vehicle delay and /or average vehicle travel time

REFERENCES

LEED for Neighborhood Development (LEED-ND), NPD Credit 8 – Transportation Demand Management.
GreenLITES Project Design Certification Program, E-1: Improved Traffic Flow.

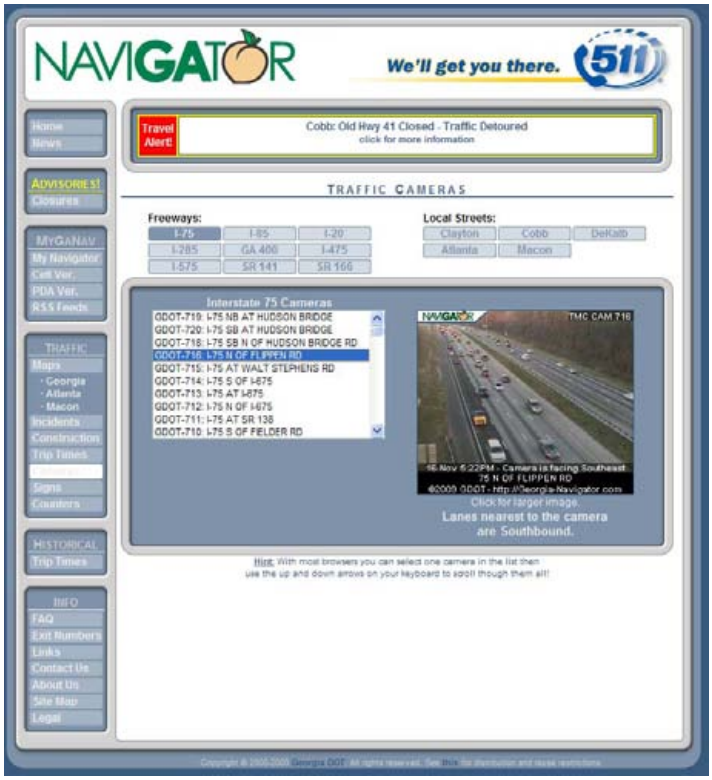
IS-21 USE TRANSPORTATION TECHNOLOGIES

RELATED CREDITS

IS-17 Optimize Traffic Safety
IS-20 Use Transportation System Management

PURPOSE

Optimize the use of the available surface transportation network capacity and increase the overall transportation system efficiency through the use of transportation technologies/Intelligent Transportation Systems (ITS) applications. ITS technologies support sustainability by improving operational efficiency and thereby reducing greenhouse gas emissions.



Internet Interface with NaviGAtor

CASE STUDY

The Georgia DOT Intelligent Transportation System

The Georgia DOT Intelligent Transportation System (NaviGAtor), covers 140 freeway miles in the Atlanta metropolitan area. The system includes a traffic management center (TMC), freeway management components, advanced traveler information systems, and an incident management program. TMC operators use vehicle detectors, closed circuit television (CCTV) cameras, dynamic message signs (DMS), and ramp meters to collect traffic data and manage incidents. When TMC operators identify an incident, they dispatch a Highway Emergency Response Operator (HERO) to provide motorist assistance or traffic control, and disseminate traveler information via DMS, the NaviGAtor web site, and a telephone information service. The benefits of NaviGAtor were determined in following four areas: safety, mobility, energy and environment, and productivity.

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies:

- **Required ::** Integrate transportation technologies / ITS into the planning process through the development and use of ITS master plans. See table below.
- **Required ::** Deploy transportation technologies / ITS strategies that in aggregate include at least 2 ITS subsystems elements or technology components and the functions they perform. See note below for suggested ITS subsystems / technology components.

ROADWAY INFRASTRUCTURE PROJECTS		
Function	**ITS Sub-systems/Components**	
Traffic Control	1. Advanced Signal Systems 2. Reversible Flow Lanes/Lane Control	3. Variable Speed Limits
Traffic/Infrastructure Surveillance and Detection	1. Vehicle Detection 2. Probe Vehicle Surveillance 3. Closed-Circuit Television Surveillance	4. Automated Vehicle Location 5. Weather Stations and Pavement Sensors
Information Dissemination	1. Dynamic Message Signs 2. Highway Advisory Radio	3. Internet/Wireless/Telephone/Radio
Roadway Geometry Warning	1. Overheight/Over-width Warning	
Electronic Screening	1. Weight Screening (Weigh-in-Motion)	
Electronic Payment and Pricing	1. Toll Collection	2. Parking Fee Payment
PUBLIC TRANSPORTATION PROJECTS		
Operations and Fleet Management	1. Automated Vehicle Location/ Computer-Aided Dispatch	2. Maintenance Management Systems
Information Dissemination	1. In-Vehicle Systems 2. In-Terminal/Wayside	3. Internet/Wireless/Phone
Safety and Security	1. In-Vehicle Surveillance 2. Facility Surveillance	3. Remote Disabling Systems
Electronic Payment and Pricing	1. Transit Fare Payment	2. Parking Fee Payment

NOTE: Possible ITS subsystems / technology components to achieve this credit include:

- Deploy transportation technologies/ITS subsystems that enable real-time traffic management and diversions to optimize traffic flow on the roadway network
- Facilitate modal shifts to optimize the use of the available surface transportation network capacity
- Support informed decision making and incident management by using traffic surveillance/control to improve operational efficiency
- Support regional real-time travel information dissemination to help customers make optimal travel decisions
- Enhance public transportation; facilitate intermodal operations
- Support dynamic pricing

CREDIT DOCUMENTATION

- Documentation of implemented ITS subsystems elements or technology components

REFERENCES

LEED for Neighborhood Development (LEED-ND), NPD Credit 8 – Transportation Demand Management.
GreenLITES Project Design Certification Program, E-1: Improved Traffic Flow.

IW-1 IMPLEMENT STORMWATER BEST MANAGEMENT PRACTICE STRATEGIES

RELATED CREDITS

IS-5 Protect the Ecological Health of Wetlands, Floodplains and Riparian Buffers
IS-6 Protect and Maintain Absorbent Landscapes
IS-7 Utilize Pervious Pavement
IS-18 Optimize Roadway Alignment Selection
IW-2 Implement Rainwater Neutrality
IW-3 Reduce Use of Potable Water for Irrigation

PURPOSE

Protect natural resources and adjacent waterways from the impact of high volumes of run-off and pollution, with the aim of decreasing the quantity of storm water and increasing its quality.

Drainage Structure and Fish Grates installed as part of the Extensive Stormwater Best Management Practices Incorporated at the Teterboro Airport, Teterboro, New Jersey

CASE STUDY

Stormwater Management at Teterboro Airport, Teterboro, New Jersey

At Teterboro Airport, The Port Authority of New York and New Jersey has installed extensive systems to capture suspended solids and prevent them from going into the stormwater drainage systems. For example, 20 stormcepters were installed at the Airport as part of a major replacement of the existing drainage system. Additionally, as part of roadway relocation in an environmentally sensitive area, vegetative filter strips and structural treatment devices were installed to meet the 80% total suspended solids (TSS), nitrogen and phosphorus removal requirement.

CREDIT REQUIREMENTS (1 Point or 3 Points)

Implement the required strategies below.

Project points:
NJ project >1/4 acre (new impervious surface regulations*) = 1 point
NY project > 1 acre (new impervious surface regulations*) = 1 point

NJ project < 1/4 acre = 3 points
NY project < 1 acre = 3 points

- **Required ::** Implement a stormwater management plan for project sites greater than ¼ acre to reduce the post-development flow of storm water and improve the quality of the remaining storm water.
- **Required ::** Storm Water Quantity: Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10, and 100-year storm events are 50%, 75%, and 80%, respectively, of the pre-construction runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.
- **Required ::** Storm Water Quality: Project includes treatment systems to remove 80% of the average annual post-development TSS. Any adjacent impervious pavement included in project site to be treated to 50% of the average annual post-development TSS.
- **Required ::** Installation of markers on all stormwater catch basins to alert people not to pour hazardous materials down drains.

NOTE: Recommended Low Impact Development strategies to be used singularly or in combination to reach quantity and quality metrics listed above[21]:

- Bioretention systems
- Constructed stormwater wetlands (not applicable at airports)
- Dry wells
- Extended detention basins (only covered detention systems are acceptable for airport 5-mile radius)
- Infiltration structures
- Manufactured treatment devices
- Pervious paving
- Sand filters
- Rain Garden (not applicable for airport 5-mile radius)

CREDIT DOCUMENTATION

- Documentation of stormwater calculations for pre-development and post-development conditions and description of implemented strategies.

REFERENCES

Sustainable Design Guidelines for World Trade Center Redevelopment Projects, Credit SEQ-2 - Stormwater Use.

**Please note that these credit requirements are based on state stormwater regulations and therefore may be mandatory. Projects meeting permit requirements receive less points as these requirements are mandatory in the respective state.*

[21] New Jersey Stormwater Best Management Practices Manual, 2002

IW-2 IMPLEMENT RAINWATER NEUTRALITY[22]

RELATED CREDITS

IS-5 Protect the Ecological Health of Wetlands, Floodplains and Riparian Buffers
IS-6 Protect and Maintain Absorbent Landscapes
IS-7 Utilize Pervious Pavement
IS-18 Optimize Roadway Alignment Selection
IW-1 Implement Stormwater Best Management Practice Strategies
IW-3 Reduce Use of Potable Water for Irrigation

PURPOSE

Incorporate multifunctional natural and manmade stormwater strategies to reduce run-off volumes, peak flows, promote groundwater recharge and enhance downstream water quality. Implement a stormwater management plan for 100% infiltration resulting in a 'zero' contribution to existing stormwater systems.

Stewart International Airport - Parking lot under construction showing porous large void stone base with infiltration trenches and rain tanks wrapped in filter fabric, Orange County, New York

CASE STUDY

Stewart International Airport, Orange County, New York

Contract SWF 164.007 involved a major expansion of the existing parking lot at Stewart International Airport. The parking lot was designed with pervious pavement and an extensive subsurface storm drainage collection and infiltration system consisting of infiltration trenches, a subbase with large voids, extensive use of rain tanks and filter fabric as well as an extensive subdrain system. The final system allowed for the collection and infiltration of the 100 year stormwater from a paved area exceeding six acres, without connecting to the existing stormwater system.

[22] Benz, Stephen, *Sustainable Design: A Balancing Act*, Stormwater Solutions

CREDIT REQUIREMENTS (3 Points)

Implement the following required strategies using best management practices listed below:

- **Required ::** Implement a stormwater management plan for 100% infiltration of runoff resulting in a 'zero' contribution to existing stormwater systems.
  - Where applicable, choose a Best Management Practice (BMP) bio-infiltration system.
  - Design infiltration system to maximize pervious / semi-pervious areas in place of impervious areas.
  - Integrate stormwater drainage with site topography and natural drainage systems.
  - Encourage stormwater reuse for irrigation.
- **Required ::** Installation of markers on all stormwater catch basins to alert people not to pour hazardous materials down drains.

NOTE: Recommended Stormwater Management Strategies to be used singularly or in combination to reach quantity and quality metrics listed above[23]:

- Pervious paving
- Bioretention systems such as bioswales and infiltration structures
- Dry wells
- Extended detention basins (only covered detention systems are acceptable for airport 5-mile radius)
- Manufactured treatment devices
- Sand filters
- Constructed stormwater wetlands (not applicable at airports)
- Rain Garden (not applicable for airport 5-mile radius)

CREDIT DOCUMENTATION

- Narrative description of implemented strategies achieving 100% infiltration of runoff resulting in a 'zero' contribution to existing stormwater systems.

REFERENCES

GreenLITES Project Design Certification Program, W-2: Best Management Practices.

[23] New Jersey Stormwater Best Management Practices Manual, 2002

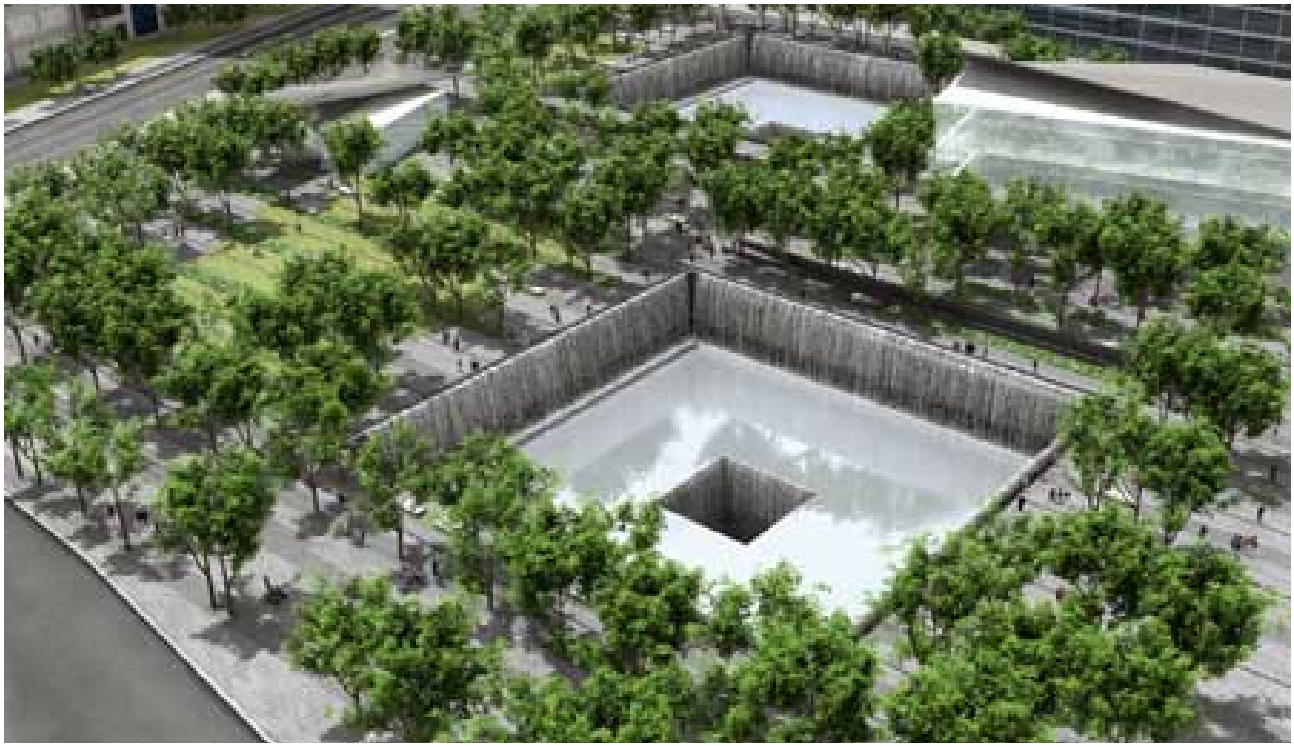
IW-3 REDUCE USE OF POTABLE WATER FOR IRRIGATION

RELATED CREDITS

IS-8 Utilize Appropriate Vegetation
IS-9 Use Turfgrass Appropriately
IW-1 Implement Stormwater Best Management Practice Strategies
IW-2 Implement Rainwater Neutrality
IO-1 Implement Sustainable Landscape Maintenance

PURPOSE

Reduce use of potable water for irrigation.



World Trade Center Memorial, New York, New York

CASE STUDY

World Trade Center Memorial, New York, New York

At the World Trade Center Memorial site, rainwater will be captured from roofs, landscaped and pervious areas on the site. This rainwater will be collected in cisterns (with a total storage capacity of 30,000 gallons), and in the void area underneath the reflecting pools. The collected rainwater will be treated and used for landscape irrigation.

CREDIT REQUIREMENTS (1 Point + 1 Additional Point)

Implement the following required strategies and, where possible, the following recommended strategy:

- **Required ::** Use harvested storm water for a minimum of 50% of landscape irrigation requirements in urban areas where project utilizes compromised fill soils (disconnected soil system). Additional points can be achieved for use of harvested water for 75% (1 additional point) of landscape irrigation requirements in less urban areas where natural soil horizons (full soil systems) remain intact.
- **Required ::** Employ high-efficiency irrigation systems with computer operation and linkages to meteorological data to optimize water resources. (note: slow-drip, sub soil irrigation cannot be used at PANYNJ facilities as it attracts rodents)
- **Recommended ::** Specify native or acclimatized site plantings that have evolved with local climatic conditions and require little if any irrigation after two year's establishment.

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of use of percentage of harvested stormwater for irrigation and narrative description of systems and plantings used.

REFERENCES

PANYNJ Sustainable Design Guidelines, Credit WEQ-4 - Landscape Hydrology.

IW-4 UTILIZE END USE METERING – WATER

RELATED CREDITS

IE-2 Commission Electrical and Mechanical Systems
IE-3 Utilize End Use Metering - Energy

PURPOSE

Verify consumption of water through the use of water metering, in order to reduce water consumption and assess distribution system water losses due to leakage and non-metered or unauthorized consumption.

CASE STUDY

Halifax Regional Water Commission Metering Program: Leak Detection

Leakage is a serious problem across Canada where between 10% and 50% of potable water is lost due to leaking pipes in the distribution system. In older cities, deteriorating municipal infrastructure causes potable water leakage to be as high as 30% to 50%. Halifax was the first municipality not only in Canada, but in North America to adopt an international best practice on water loss control in the distribution system and revolutionize their leakage prevention. InfraGuide was the first Canadian organization to create a concise document entitled 'Water Use and Loss in the Distribution System'. Subsequent InfraGuide best practices on this topic include 'Establishing a Metering Plan to Account for Water Use and Loss' and 'Speed and Quality of Linear System Repairs', which detail the technologies that can be used to reduce leakage effectively. The Halifax region has a fully metered system and by using universal metering, there is 100% accountability and effective control of their water.[24]

[24] Source: http://gmf.fcm.ca/files/Infraguide/Case_Studies/fact_sheet_case_study_halifax_april05.pdf

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies and, where possible, the following recommended strategies:

- **Required ::** Install water meters and related advanced metering systems (AMI) to provide real-time consumption monitoring remotely (as compared to collecting one reading/month manually) and have the future capability to handle time-of-use (TOU) billing.
- **Required ::** Determine appropriate location for meters: install in-flow and out-flow meters at all critical points in the domestic water consumption system.
- **Required ::** Utilize sub-metering for water use, including the following large users:
  - Tenants
  - Irrigation
  - Cooling Towers
  - PANYNJ Facilities
  - Offices
- **Recommended ::** Utilize zone metering and district metering to track water use.
- **Recommended ::** Install a monitoring system that tracks water use at each facility, monitors spikes, etc.
- **Recommended ::** Locate meters at strategic points for use as leak detection (see IS-12 for leak detection system installation).

CREDIT DOCUMENTATION

- Narrative description and/or documentation of implemented strategies

REFERENCES

InfraGuide: The National Guide to Sustainable Infrastructure, Establishing a Metering Plan to Account for Water Use and Loss.

IE-1 OPTIMIZE ENERGY PERFORMANCE

RELATED CREDITS

IS-15 Minimize Light Pollution
IE-2 Commission Electrical and Mechanical Systems
IE-3 Utilize End Use Metering - Energy
IE-4 Use On-Site Renewable Energy

PURPOSE

Reduce energy consumption of all infrastructure systems which consume energy. These systems include, but are not limited to, pumps, fans, cooling towers, lighting systems, and vertical transportation.

George Washington Bridge, New York and New Jersey[25]

CASE STUDY

George Washington Bridge, New York and New Jersey

The Port Authority of New York and New Jersey commissioned the installation of energy efficient LED lights at the Holland Tunnel and the George Washington Bridge as part of a program to equip all of the agency's bridges and tunnels with energy efficient lighting. LED lighting on the George Washington Bridge is expected to produce annual energy and maintenance savings of $49,000 and reduce carbon dioxide emissions by about 130,000 pounds a year.

[25] Source: flickr.com

CREDIT REQUIREMENTS **(2 Points + 4 Additional Points)**

Implement the following required strategy and, where possible, implement the recommended strategies using Table IE-1.1 in Appendix 04:

- **Required ::** All system components in project must show a documented reduction of energy usage of **10%** (2 points) over ASHRAE 90.1-2007 (as amended). Additional points can be achieved by reducing the energy usage by **20%** (2 additional points) and **30%** (4 additional points). Documentation shall include use of Table IE-1.1 (see Appendix 04) showing specified equipment and percentage improvement. This includes all systems in project requiring energy use including, but not limited to, pumps, fans, chillers, cooling towers, lighting systems, and vertical transportation.
- **Recommended ::** Utilize alternative strategies for peak load reduction.

CREDIT DOCUMENTATION

- Narrative description and/or documentation of implemented strategies including completed Table IE-1.1 (Appendix 04) showing documented percentage energy usage reduction of all energy using systems in project scope.

REFERENCES

LEED for Neighborhood Development (LEED-ND), GIB Credit 12 – Infrastructure Energy Efficiency.
GreenLITES Project Design Certification Program, E-2: Reduce Electrical Consumption.

IE-2 COMMISSION ELECTRICAL AND MECHANICAL SYSTEMS

RELATED CREDITS

IW-4 Utilize End Use Metering - Water
IE-1 Optimize Energy Performance
IE-3 Utilize End Use Metering - Energy
IE-4 Use On-Site Renewable Energy
IE-5 Protect Ozone Layer

PURPOSE

Commission electrical and mechanical systems (including pumps, fans, chillers, cooling towers, lighting systems, and vertical transportation) to verify that they are installed, calibrated and perform in accordance with design criteria.

CASE STUDY

U.S. Department of Energy – Energy Efficiency and Renewable Energy; State Energy Program, California
The state of California contracts with Nexant, an engineering consulting company, to study the effectiveness of California's many peak-load energy-reducing efforts as part of a post-installation / retro-commissioning study. Nexant evaluated the functioning of 55 LED projects (traffic lights) in several cities in California. A report completed in June 2003, confirmed that the average success rate in meeting their cost savings expectations was 94%, thus verifying a high correlation between installed performance and design criteria.[26]

[26] Source: http://apps1.eere.energy.gov/state_energy_program/case_study_detail_info.cfm/cs_id=9?print

CREDIT REQUIREMENTS (3 Points)

Implement the following required strategy and, where possible, the recommended strategy:

- **Required ::** Commission energy consuming systems, on a case by case basis, including, but not limited to, pumps, fans, motors, chillers, cooling towers, lighting systems, vertical transportation, irrigation systems, plumbing valves and piping, backup energy supply systems, traffic systems, electrical systems, and snow melting equipment, using the following commissioning steps:
  - Employ a 3rd party commissioning agent
  - Prepare a commissioning plan
  - Incorporate commissioning requirements into specifications
  - Develop an Owner's Project Requirements (OPR) document
  - Develop a Basis of Design Report (BDR) document
  - Conduct design reviews during Stage III
  - Conduct construction submittals reviews
  - Conduct pre-functional and functional testing
  - Prepare a commissioning report
  - Conduct a 10-month warranty review to determine if there are any open issues
- **Recommended ::** Develop an operations and maintenance manual (on a case by case basis).

CREDIT DOCUMENTATION

- Provide a commissioning plan and report

REFERENCES

PANYNJ Sustainable Design Guidelines, Credit EEQ-2 - Building Systems Commissioning.
Sustainable Design Guidelines for World Trade Center Redevelopment Projects, Credit EEQ-2 – Building Commissioning.

IE-3 UTILIZE END USE METERING – ENERGY

RELATED CREDITS

IW-4 Utilize End Use Metering – Water
IE-1 Optimize Energy Performance
IE-2 Commission Electrical and Mechanical Systems

PURPOSE

Verify consumption of energy through the use of energy metering.

Streetlights – Milton Keynes, Buckinghamshire, England[27]

CASE STUDY

Milton Keynes, Buckinghamshire, England

Faced with rising energy and maintenance costs due to aging street lighting equipment, Milton Keynes decided to modernize its network. The new system uses lower wattage street lights that last longer and offer higher quality lighting than those used previously. Each light includes a smart electronic ballast that identifies lamp and ballast failures; measures energy use, running hours, and voltage; and enables remote command through the power line network. As a trial project, Milton Keynes installed the system in more than 400 street lights. The energy meter indicates that so far, the system has helped cut the city's energy use by 40 percent. A similar street lighting system is also being used at the Ville de Quebec in San Jose, California.[28]

[27] Source: images.google.com

[28] Source: http://www.echelon.com/solutions/building/appstories/documents/MiltonKeynes_web.pdf

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies and, where possible, implement the recommended strategy:

- **Required ::** Install energy consumption sub-meters to monitor end-use energy consumption, including the following large users:
  - Tenants
  - PANYNJ Facilities
  - Offices
  - Electrical Infrastructure (i.e. chiller plants)
- **Required ::** Install energy meters and related advanced metering systems (AMI) which provides real-time consumption monitoring remotely (as compared to collecting one reading/month manually) and shall have the future capability to handle time-of-use (TOU) billing.
- **Recommended ::** Install a monitoring system that tracks energy use at each facility or sub-metered components, monitors spikes, etc.

CREDIT DOCUMENTATION

- Documentation of meter specification and installation.

REFERENCES

Template for an Agency Metering Plan from Guidance for Electric Metering in Federal Buildings, US Department of Energy Federal Energy Management Program.

IE-4 USE ON-SITE RENEWABLE ENERGY

RELATED CREDITS

IE-1 Optimize Energy Performance
IE-2 Commission Electrical and Mechanical Systems

PURPOSE

Utilize on-site renewable sources of energy to reduce environmental and economic impacts of fossil fuel energy use. Renewable sources of energy include including solar (solar thermal and solar electric), wind (structure mounted or pole mounted), geothermal (not ground source HVAC), low-impact hydro, biomass and bio-gas strategies.

Solar pump installation at Stewart International Airport.

CASE STUDY

Stewart International Airport – Solar Powered Irrigation System

As part of ongoing redevelopment at Stewart Airport, a Stage III design for the installation of an irrigation system at the long-term parking lot was completed. A solar powered irrigation system with underground rainwater collection tanks was provided to contribute to Stewart Airport's neutral carbon footprint goals and meet best management practices for storm water quality control. The system included duplex solar-powered submersible pumps, solar panels and associated controls. Each tree is provided with a low flow root-watering device for direct irrigation. In the event of over-watering, excess water will go back to the collection tank. The estimated construction cost for the installation of irrigation system is $300,000.

CREDIT REQUIREMENTS (3 Points)

Implement the following required strategy:

- **Required ::** Use on-site renewable technologies (such as solar or wind powered pumps, lighting, signage and fans) to offset energy use in project design.

CREDIT DOCUMENTATION

- Narrative description of use of on-site renewable energy.

REFERENCES

LEED for Neighborhood Development (LEED-ND), GIB Credit 10 – On-Site Renewable Energy Sources.
PANYNJ Sustainable Design Guidelines, Credit EEQ-5 - Renewable Energy Transition.

IE-5 PROTECT OZONE LAYER

RELATED CREDITS

IE-2 Commission Electrical and Mechanical Systems

PURPOSE

Reduce emissions of ozone depleting chemicals.

CASE STUDY

PANYNJ – R-22 Refrigerant Phaseout from Stationary and Mobile ACE Equipment

R-134a, R-410A, and R-407C refrigerants are being used to replace R-22 refrigerant in some new stationary and mobile AC equipment, a trend that is expected to continue as R-22 refrigerant is phased out. Some mobile AC equipment have been using alternatives since the early 1990s, with some buses and trains using R-134a refrigerant, and some heavy rail cars using R-407C refrigerant (WMATA 2005; Amtrak 2005; Motorcoach Training 2005).[29]

[29] Sources: http://www.epa.gov/ozone/title6/phaseout/ServicingNeedsRevisedDraftReport_September.2006.pdf
http://www.epa.gov/fedrgstr/EPA-AIR/2006/August/Day-23/a7105.htm

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies based on project type:

- **Required ::** Use non-CFC and non-HCFC based refrigerants in mobile and stationary AC equipment.
- **Required ::** Use fire extinguishers/ extinguishing systems that do not contain ozone-depleting substances. The following is a list of 'environmentally friendly' fire suppression system recommendations (all systems shall have the appropriate approvals):
  - FM200 - chemical
  - Ecaro 25 - chemical
  - Sapphire - chemical
  - Inergen – air
  - Water mist – water
  - Preaction systems – water
- **Required ::** Replace or retrofit CFC-based and HCFC refrigerants in existing mobile and stationary AC equipment and fire extinguishing equipment within the project boundary.

NOTE: CFCs and HCFCs are also used as solvents in cleaners, electronic circuit boards / precision cleaning, and as blowing agents in insulation.

CREDIT DOCUMENTATION

- Documentation of equipment and materials meeting credit requirements

REFERENCES

PANYNJ Sustainable Design Guidelines, Credit EEQ-4 – Ozone Layer Protection.
Sustainable Design Guidelines for World Trade Center Redevelopment Projects, Credit EEQ-4 – Ozone Layer Protection.

IE-6 PROVIDE ALTERNATIVE FUELING STATIONS

RELATED CREDITS

There are no related credits.

PURPOSE

Minimize pollution and conserve energy by promoting use of low polluting, non-gasoline, and hybrid fuel based vehicles.

A Natural Gas Fueling Station at LaGuardia Airport, New York[30]

CASE STUDY

Port Authority of New York and New Jersey (PANYNJ)

PANYNJ has opened several alternative fuel refueling stations at various locations in New Jersey and New York. These include natural gas fueling stations at JFK Airport, LaGuardia Airport, Newark Airport and close to the Holland Tunnel.[31]

[30] Source: http://www.theautochannel.com/news/2008/02/05/076779.html

[31] Sources: http://www.afdc.energy.gov/afdc/progs/ind_state.php/NJ/CNG; http://www.panynj.gov/pr/134-97.html; http://www.cleanenergyfuels.com/03/11-06-03.html

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategy:

- **Required ::** Provide alternative fuel stations as part of infrastructure projects including, but not limited to (stations may offer multiple alternative fuels):
  - Electric refueling stations for plug-in hybrid and electric vehicles
  - Biodiesel pumping stations
  - Compressed natural gas (CNG) fueling stations
  - Ethanol fueling stations

NOTE: Adding aboveground or underground fuel storage capacity will impact a facility's regulatory compliance requirements. This impact should be evaluated and presented to facility managers before adding any capacity.

CREDIT DOCUMENTATION

- Documentation of alternative fuel station implemented

REFERENCES

LEED for New Construction (LEED-NC), Credit SSc4.3 – Alternative Transportation, Low Emission and Fuel Efficient Vehicles.
The Sustainable Sites Initiative, Credit 8.8 – Reduce Emissions and Promote the Use of Fuel Efficient Vehicles.

IM-1 USE RECYCLED MATERIALS

RELATED CREDITS

IM-2 Use Local / Regional Materials
IC-6 Implement Construction Waste Management

PURPOSE

Incorporate materials with recycled content to preserve the raw materials resource base and to increase value and demand by supporting markets for recycled materials.

Route 9A, New York City, New York[34]

CASE STUDY

New York City Roadway Construction, New York

Almost all asphalt milled from New York City roadway reconstruction and resurfacing projects is recycled or reused as wearing courses, temporary asphalt base or subbase material. Although there are no requirements mandating contractors to recycle asphalt, City and private asphalt plants typically mill and recycle or reuse as much reclaimed asphalt pavement (RAP) as the market demands because of cost savings and prohibitions against dumping un-separated materials.[35]

[34] High Performance Infrastructure Guidelines, New York City Department of Design + Construction, 2005, page 78.

[35] High Performance Infrastructure Guidelines, New York City Department of Design + Construction, 2005, page 166.

CREDIT REQUIREMENTS (1 Point + 2 Possible Additional Points)

Implement the following required strategy:

Required :: Specify the following materials with noted percentage of recycled content. The entire quantity of a project's specified material must meet the percentage of recycled content listed below. For one material specified, the project achieves 1 point. For three materials specified, the project achieves 2 points. For five materials specified, the project achieves 5 points.

Material and Application	% Recycled Content Required
Asphalt RAP Top Course Roadways/Parking Lots	10% Recycled Content
Asphalt RAP Bottom Course Roadways/Parking Lots	25% Recycled Content
Asphalt RAP Top course Airfield	10% Recycled Content
Asphalt RAP Bottom course Airfield	25% Recycled Content
Any Application	15% Rubber Material
Concrete (Mix Design)	30% Fly Ash ***OR***
Concrete (Mix Design)	40% Ground Granulated Blast Furnace ***OR***
Concrete (Mix Design)	4% Silica Fume ***OR***
Concrete (Mix Design)	10% Metakaolin (clay based pozzolan)
Aggregate Base Course	50% Recycled Concrete Aggregate (RCA)
Non-Pavement Applications	25% RCA for Pipe Bedding Material
Non-Pavement Applications	40% HDPE for Sub-Drainage
Steel	50% Recycled Content

CREDIT DOCUMENTATION

- Documentation of total quantity of each project material with above percentage of recycled material specified.

REFERENCES

LEED for Neighborhood Development (LEED-ND), GIB Credit 14 – Recycled Content in Infrastructure.
GreenLITES Project Design Certification Program, M-2 Recycled Content.

IM-2 USE LOCAL / REGIONAL MATERIALS

RELATED CREDITS

IM-1 Use Recycled Materials

PURPOSE

Reduce environmental degradation resulting from transportation impacts by increasing the demand for construction materials and products that are extracted, harvested, or recovered and manufactured within a 500-mile radius of the project site.

Skyline Park, Denver, Colorado[36]

CASE STUDY

Skyline Park, Denver, Colorado

One of the primary objectives for the Skyline Park project in Denver, Colorado was to utilize regional materials. In keeping with their intention, locally quarried Colorado Red sandstone was used for the majority of Skyline Park's paving. Apart from being aesthetically pleasing, the textured sandstone paving provides a sense of identity, offers durability, and is able to withstand the harsh weather often experienced in Colorado.[37]

[36] http://www.downtowndenver.com/images/SkylineHistory.jpg and http://www.stoneworld.com/Articles/Feature_Article/5dcd3d53036f7010VgnVCM100000f932a8c0____

[37] http://www.stoneworld.com/Articles/Feature_Article/5dcd3d53036f7010VgnVCM100000932a8c0____

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategy:

Required :: Maximize use of local/regional materials; **100%** of any specified project materials on the following list must be sourced including the extraction and/or manufacturing location and distance to project site from within a 500-mile radius from the project site:

- Concrete - Aggregate
- Concrete – Lime
- Concrete – Sand
- Aggregates
- Cementitious Materials
- Gravel/Stone
- Mulches
- Concrete Block and Brick Pavers
- Plant Materials (75%)

CREDIT DOCUMENTATION

- Narrative description of each project material (at 100% of the quantity used in project), of extraction and/or manufacturing location and distance to project site

REFERENCES

GreenLITES Project Design Certification Program, M-3 Local Materials.

IM-3 REUSE MATERIALS

RELATED CREDITS

There are no related credits.

PURPOSE

Incorporate previously used, salvaged or refurbished materials and products (from sources on site) into new construction and renovation projects.

Taxiway A at John F. Kennedy International Airport, New York

CASE STUDY

Taxiway A Project for Airbus A380, John F. Kennedy International Airport, New York

In order to accommodate the Airbus A380 airplane, modifications to Taxiway A at John F. Kennedy International Airport were required. Under this contact (JFK 134.105), Taxiway A was shifted 16 feet for a total length of over four miles. The PANYNJ did an extensive testing program to evaluate the potential reuse of existing pavements in the new project. As a result of this analysis, the project reused the existing asphalt and lime cement flyash pavements as a base course for the new pavement. The pavement was removed and then remixed on site in accordance with PANYNJ specifications; a rigorous testing program was used to ensure all pavements were of high quality and met the strength requirements in the specifications. The decision to reuse this material on-site had a significant environmental and cost benefits: it eliminated the need for 25,000 cy of virgin material, eliminated the need for 2,200 truck trips and saved $2,000,000 in construction costs.

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategy:

Required :: Incorporate the maximum amount of previously used, salvaged, or refurbished materials in project. Some typical materials include the following:

- 25%-50% On-Site Reuse of Asphalt Millings
- 75% Rubblization of Concrete
- Aggregate Base Course
- Lime Cement Flyash Pavement
- Granite / Stone Curbing
- Brick
- Pre-Cast Concrete Paving Blocks
- Pre-Cast Concrete Planks
- Jersey Barriers
- Ornamental Fencing and Chainlink Mesh
- Clean Fill suitable for landscape vegetation (non-reformulated types)
- Compost
- Street Furniture
- Traffic Signal and Street Lighting Parts
- Conduit, Cable, and Supporting Electrical Accessories

NOTE: 'Salvaged' and 'refurbished' materials refer to the reuse of materials with minimal modification such as minor clean-up and/or repair. Reformulation of materials or using materials in a different context – such as crushed concrete pavement for roadbed fill – is termed recycling.

NOTE: There is no metric associated with this sustainable strategy. The goal is to salvage, refurbish and reuse the maximum amount of materials and products without compromising quality or function, to reduce pollution associated with manufacturing and transportation, reduce waste, and to conserve the natural resource base.

CREDIT DOCUMENTATION

- Quantity of material reuse or salvage at the project site and reused in project.

REFERENCES

GreenLITES Project Design Certification Program, M-1 Reuse of Materials.
The Sustainable Sites Initiative, Credit 5.4 – Reuse Salvaged Materials and Plants.

IM-4 USE DURABLE MATERIALS

RELATED CREDITS

IM-7 Enhance Pavement Lifecycle

PURPOSE

Conduct a durability assessment (and where applicable, a life cycle cost assessment) of materials used in large-scale projects to assess the full financial and environmental cost of the material and its future replacement. The 'first cost' of such materials is frequently offset by lower maintenance, repair and replacement requirements, making highly durable materials an advantageous long-term choice. Use of durable materials for infrastructure projects may have a first-cost impact, but is likely to be a highly economical and sustainable strategy in the long run based on lower maintenance costs over the design life of the project. With durable materials, likelihood of failure is reduced, the need for frequent repairs is diminished and replacement time is extended.

Wacker Drive, Chicago, Illinois[38]

CASE STUDY

Wacker Drive Rebuild, Chicago, Illinois

Wacker Drive, a bi-level roadway that runs through the heart of downtown Chicago, recently underwent a $200 million reconstruction of most of its 1.5-mile length. The city of Chicago demanded that the structure have a 75 to 100 year design life; in response to this challenge the design team specified high performance concrete. The concrete mix was designed with a focus on durability, not necessarily compressive strength in an effort to avoid cracking that occurs in overly rigid structures due to thermal expansion and contraction. The high performance concrete mix also enhanced the constructability of the roadway since water / cementitious materials ratio was set to a reasonable level; the mix was easier to place and finish since it was more forgiving in the field than a high compressive mix with very low water content. Additionally, the concrete was designed with tight restrictions on chloride permeability to resist the penetration of deicing salts applied during the harsh Chicago winters.[39]

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[38] http://www.concretethinker.com/solutions/Durability.aspx

[39] McGovern, Martin, Concrete Technology Today, November 2001

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategy:

Required :: Incorporate maximum amount of durable materials into new construction projects and provide approximate life expectancy of that material (this credit is not applicable to the majority of rehabilitation projects). Where applicable, provide a life cycle cost analysis. Some typical materials include, but are not limited to the following:

- Concrete Runways/Roadways
- Ductile Iron Piping
- Stainless Steel Rebar
- Ultra High Performance Concrete (see Note below)
- Class 5 Reinforced Concrete Piping
- HDPE (high density polyethylene) Pipe for Subdrains
- High Performance Weathering Steel

NOTE: Ultra High Performance Concrete is defined as concrete that is both high strength (above 6,000 psi) and low permeability (below 1,000 coulombs) with a total cementitious content below 650 lbs per cubic yard including a 50% substitution by weight of pozzolans.

CREDIT DOCUMENTATION

- Description of each durable material used (by quantity) and approximate life expectancy of that material; life cycle cost analysis shall provide cost and life expectancy.

REFERENCES

The Sustainable Sites Initiative, 5.9 Credit – Conduct a Life Cycle Assessment.
LEED Canada-NC for New Construction and Major Renovations, MRc8 – Durable Building.

IM-5 USE SUSTAINABLY HARVESTED WOOD

RELATED CREDITS

There are no related credits.

PURPOSE

Protect endangered species by specifying only wood and wood-based products which have been harvested according to sustainable forest management principles as defined by the Forest Stewardship Council (FSC) and which have a chain-of-custody (COC) certification from an approved source.

University of California, Merced, California[40]

CASE STUDY

University of California, Merced, California

The Central Plant complex at the University of California, Merced campus earned a LEED Gold certification. This complex, consisting of three buildings - a three-story unit that houses most of the university's power and infrastructure operations, a telecommunications building and a two-million-gallon water/thermal-storage tank, used FSC certified wood for its concrete formwork.[41]

[40] http://greensource.construction.com/projects/0801_UniversityofCalifornia.asp

[41] http://greensource.construction.com/projects/0801_UniversityofCalifornia.asp

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies:

- **Required ::** Use a minimum of 50% (by cost) wood products certified by Forest Stewardship Council of all wood products in project, temporary or permanent.
- **Required ::** Require all suppliers to provide an authentic Chain of Custody (COC) number on each vendor invoice.

Use FSC-certified lumber and wood-based products (plywood, particleboard, etc.) for the following applications:

- Concrete forms, sheathing, and bracing
- Temporary sidewalk/protective barriers (hoardings)
- Pier abutments
- Boardwalks and decks
- Wood telecommunications poles
- Railroad ties
- Timber piles
- Temporary construction buildings, shelters, etc.
- Landscape/street furniture
- Fencing
- Other construction elements

NOTE: The Forest Stewardship Council is the single, third party certifying organization to have established rigorous criteria for the management, health and growth of tropical, temperate and boreal forests across the globe. Adhering to the FSC Principles supports continued environmental quality of forest lands and ensures a cycle of timber regrowth, which reduces global warming impacts (CO^2 sinks) and sustains future yields.

CREDIT DOCUMENTATION

- Documentation showing use of FSC wood for 50% (by cost) of all wood products in project and COC number for each wood product.

REFERENCES

The Sustainable Sites Initiative, Credit 5.6 – Use Certified Wood.

IM-6 MINIMIZE USE OF TOXIC AND/OR HAZARDOUS MATERIALS

RELATED CREDITS

IC-1 Minimize Pollution from Construction Activity
IO-1 Implement Sustainable Landscape Maintenance

PURPOSE

Minimize the exposure to toxic and hazardous materials in new infrastructure and repair work that have adverse effects on human health and the environment. Analyze the composition and with the content of materials commonly used for construction, performance, enhancement, protection, sealing, marking and/or identification of infrastructure projects. Minimize the use of materials with high levels of volatile organic compounds (VOCs), hazardous air pollutants, heavy metals and other substances known to be deleterious to human health and/or the environment.

Use of TrackJet at Birmingham Airport, United Kingdom[42]

CASE STUDY

Use of TrackJet, Birmingham Airport, United Kingdom

Birmingham airport, like most airports in the UK, uses the Ultra-high-Pressure Precision Water Jet System – TrackJet- for removing rubber residues or paint markings on runways and roads. This system uses clean water without harmful chemical adhesives. It needs only 10% to 20% of the water and 30% of the fuel for the carrier vehicles of traditional High Pressure Washing Systems. TrackJet cleans roads and runways without damaging the surface macro and micro texture and therefore reduces indirect fuel consumption and maintenance costs. As noted in the Birmingham Post dated April 30th 2009, the city of Birmingham is finalizing the use of this sustainable technology for also cleaning up its highways.[43]

[42] http://www.forconstructionpros.com/article/article.jsp?siteSection=25&id=12721&pageNum=2

[43] http://www.forconstructionpros.com/article/article.jsp?siteSection=25&id=12721&pageNum=2

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategy:

- **Required ::** Minimize use of materials which contain or are made from or with the substances below. A list of toxic / hazardous materials with common usage and their environmentally preferable alternatives is provided in Appendix 05.

  - CFCs or HCFCs
  - Urea-Formaldehyde
  - Mercury , Lead, Cadmium
  - Phthalates
  - Aliphatic hydrocarbons
  - Aromatic hydrocarbons
  - Halogenated flame retardants – Bromides
  - Chlorinated plastics
  - Sodium chloride and calcium chloride
  - Wood preservatives as follows:
    - Creosote
    - PCA (Pentachlorophenol or penta)
    - CCA (Chromated copper arsenate)
    - ACA (Ammoniacal copper arsenate)
    - ACZA (Ammoniacal copper zinc arsenate)
    - ACC (Acid copper chromate)
    - CZC (Chromated zinc chloride)

CREDIT DOCUMENTATION

- Narrative description of strategies for minimizing use of toxic substances and/or describing use of environmentally preferable substances

REFERENCES

GreenLITES Project Design Certification Program, M-5 Hazardous Material Minimization.

IM-7 EXTEND PAVEMENT LIFECYCLE

RELATED CREDITS

IS-12 Coordinate Utility Work
IM-4 Use Durable Materials

PURPOSE

Extend pavement lifecycle by rehabilitation of pavements with materials to extend design life, and through regular monitoring and maintenance. Employ preventive maintenance techniques to extend pavement life cycle and defer major rehabilitation saving money, resources and minimizing disruption to facilities. Coordinate sub-grade infrastructure access and maintenance programs to minimize trenching and pavement degradation, reduce disruption, and maximize investment.

George Washington Bridge Westbound New York Approach, New York, NY

CASE STUDY

GWB –510- Pavement Rehabilitation of Trans Manhattan Expressway at GWB

Existing concrete pavement had reached end of useful life however full depth replacement was very expensive and would cause extensive facility disruption and major delays to I-95 corridor. PANYNJ Civil Engineering recommended utilizing thin surface asphalt overlay to prolong useful life of the pavement. Pavement has been in place for four years and is functioning fine.

CREDIT REQUIREMENTS (1 Point)

For rehabilitation projects where the pavement is at the end of its useful life; using the PANYNJ Pavement Management Program, implement the following required strategies and, where possible, implement the recommended strategies:

- **Required ::** Increase pavement lifecycle by **20%** and provide extended pavement design life greater than **5** years.
- **Required ::** Use best management practices (BMPs) and long design life materials such as high performance asphalt overlays, or concrete overlays, to extend existing pavement longevity.
- **Required ::** Where surfaces have deteriorated or are projected to deteriorate below the pavement trigger value prior to major rehabilitation, employ preventive maintenance to extend the life of the pavement in a cost effective manner. Preventive maintenance strategies are:

Asphalt	**Concrete**
Thin asphalt overlay(>2")	Concrete Overlay (>2")
Crack and Joint Sealing	Diamond grinding
Crack and Joint Repairs	Patching
Patching	
Diamond Grinding	

- **Recommended ::** Where applicable, utilize pavement lifecycle cost analysis to ensure that the approaches used are optimally effective.
- **Recommended ::** Co-ordinate anticipated utility and/or infrastructure upgrades work to coincide with scheduled pavement upgrades or surface replacement.

CREDIT DOCUMENTATION

- Documentation of required and recommended strategies including lifecycle and design life calculations.

REFERENCES

There are no references for this credit.

IM-8 UTILIZE THIN SURFACE PAVING

RELATED CREDITS

IM-7 Enhance Pavement Lifecycle

PURPOSE

Employ thin surface restoration techniques to preserve bituminous pavements and prevent premature deterioration of the pavement structure.

Truck-mounted Self-propelled Continuous Feed Micro-surfacing[44]

CASE STUDY

Canadian Municipalities – Thin Surface Paving Techniques

The benefits of thin surface restoration techniques, in comparison to traditional hot-mix overlays, are that they use less material and energy and their impact on other features of the roadway is minimal (e.g., reduction in curb height, and the need to increase thickness of shoulders and adjust the height of guide rails). Many Canadian Municipalities have been using several thin surface restoration techniques for protecting and restoring pavement structure.[45]

[44] http://sustainablecommunities.fcm.ca/files/Infraguide/Roads_and_Sidewalks/preserv_bitumin_pav_surf_resto_techn.pdf

[45] InfraGuide: The National Guide to Sustainable Infrastructure.

CREDIT REQUIREMENTS (2 Point)

For rehabilitation projects where the pavement is within 3 years of the end of its useful life; implement the following strategies:

- **Required ::** Increase pavement lifecycle by **20%** and provide extended pavement design life greater than **5** years.
- **Required ::** Where surfaces have deteriorated prior to the end of their useful life, repair, restore or protect pavement structure through the use of a Best Management Practice (BMP) thin surface overlay to extend the life of the pavement in a cost-effective manner. Below is a list of approaches most often used in association with thin surface restoration.

Asphalt	**Concrete**
Thin asphalt overlay(<2”)	Concrete Overlay (<2”)
Microsurfacing	White topping
Surface treatment (seal coat)	
Rejuvenator (restorative seal)	

CREDIT DOCUMENTATION

- Narrative description of thin surface strategy. If using thin overlay strategy, include thickness specification.

REFERENCES

There are no references for this credit.

IM-9 UTILIZE WARM-MIX ASPHALT TECHNOLOGY

RELATED CREDITS

IC-1 Minimize Pollution from Construction Activity

PURPOSE

Improve conditions for workers, protect neighborhood air quality and reduce use of fossil fuel by utilizing warm-mix asphalt (WMA) in place of hot-mix asphalt (HMA). WMA affects various environmental categories, for example it improves air quality since it generates 75% less emissions than hot mix asphalt (HMA), it reduces fuel requirements by more than 30% since the material requires less heating, and WMA can be hauled longer distances which reduces vehicle trips and by extension vehicle emissions. WMA is a more resourceful use of materials since it allows for a higher percentage of RAP and it uses less asphalt cement. Finally, WMA is a more flexible process as it allows for paving in colder weather, it provides enhanced roadbed compaction at lower temperatures, it minimally impacts roadway features such as curb height, manholes, guard rails and gratings, and it protects worker health and safety by reducing heat and emissions.

Warm Mix Asphalt Application at Logan International Airport, Boston, Massachusetts[46]

CASE STUDY

Use of Warm Mix Asphalt at Logan International Airport, Boston, Massachusetts

Logan International Airport in Boston is the first airport in USA to use warm mix asphalt on a runway repaving project (excluding the center 75'). The runway is 10,005 feet long and 150 feet wide. The warm mix was first tested at Logan on a taxiway and apron areas with Federal Aviation Administration (FAA) oversight before the airport received permission to use it on a runway. With a warm mix design, Massport achieved energy savings, heating fuel reduction and a significant reduction in carbon dioxide. Along with the lower production temperature benefits, the project was projected to generate additional savings by incorporating 18 percent reclaimed asphalt pavement (RAP) back into the warm mix.[47]

[46] http://www.airportbusiness.com/images/article/1236087589181_f3_02.jpg

[47] http://www.allbusiness.com/science-technology/earth-atmospheric-science/11819949-1.html

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies for the project areas identified:

For Airfield

- **Required ::** Utilize warm mix asphalt (WMA) for 100% of asphalt pavement for shoulder and erosion pavements.

For Roadways

- **Required ::** Utilize warm mix asphalt (WMA) for 100% of asphalt pavement for roadway pavements.

For Parking Lots

- **Required ::** Utilize warm mix asphalt (WMA) for 100% of asphalt pavement in parking lot pavements.

NOTE: Protect warm asphalt mix from fuel contamination.

CREDIT DOCUMENTATION

- Documentation of use of WMA and indicate percentage of usage area.

REFERENCES

There are no references for this credit.

IC-1 MINIMIZE POLLUTION FROM CONSTRUCTION ACTIVITY

RELATED CREDITS

IS-2 Prepare a Site Assessment
IM-6 Minimize Use of Toxic and/or Hazardous Materials
IM-9 Utilize Warm-Mix Asphalt Technology
IC-2 Protect Existing Natural Systems
IC-4 Utilize Green Construction Equipment
IC-5 Reduce Noise and Vibration During Construction

PURPOSE

Minimize atmospheric pollution and degradation of nearby water bodies and aquatic ecosystems by preventing the discharge of pollutants from the site resulting from construction activities.

Wheel Wash and Dust Suppression - World Trade Center Memorial and Memorial Museum, New York, New York[48]

CASE STUDY

The World Trade Center Memorial and Memorial Museum, New York, New York

Dust prevention is an important aspect of construction at The World Trade Center Memorial site. Stormwater collected in sedimentation tanks at the site is used for controlling fugitive dust. Strategies to minimize pollution include regular sweeping and wetting of dust and dry soils, use of approved sprayed suppression agents, wheel washing in designated truck wash-off areas, as well as wetting and covering of stockpiled materials to prevent erosion, when applicable.

[48] Bovis Lend Lease – WTC Memorial and Memorial Museum Construction Stormwater and Pollution Prevention Plan

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies:

- **Required ::** Prepare a simplified construction stormwater pollution prevention plan as detailed below and reflect on contract drawings for any project over **½ acre of soil disturbance (in both NJ and NY)** to minimize pollution during construction. This applies to minimizing pollution in stormwater as well as air pollution from dust and particulate matter at the construction site. This plan should include the following components:[49]
  - On a drawing titled Pollution Control Plan, indicate the Location of Controls on the Site Map.
  - Identify Dust Mitigation measures:
    - Utilize sprayed suppression agents (nonhazardous and biodegradable) for containment of fugitive dust; adjust strategies for meteorological conditions.
  - Identify Structural Erosion and Sediment Control measures; can include, but are not limited to:
    - Silt fencing (Straw bales and hay bales are not recommended for storm drain inlet protection in EPA Document 832/R-92-005[50])
    - Use of geotextiles and gravel and stone filter berms around construction areas to minimize sedimentation.
  - Identify opportunities to collect and utilize stormwater for construction activities such as wetting dust for suppression and washing vehicle tires.
  - Proper disposal of construction site waste (i.e., spoils from concrete truck wash-out)
  - Control offsite vehicle tracking with typical details for stone pads at construction exits.
  - Prepare an Inspection and Maintenance Plan; include standard forms to document installation and/or repair of pollution control measures.
  - Follow standard procedure when an unexpected environmental condition or contamination is encountered.
- **Required ::** Inspect and maintain controls - Inspect every 7 days or within 24 hours of a rainfall of more than ½"; maintain records of construction activity.
- **Required ::** Groundwater dewatering discharges to surface water or storm sewer must be in compliance with the appropriate State's discharge general permit requirements.

NOTE: All projects with soil disturbance greater than **1 acre (NY)** and **1/10 acre (NJ)** should comply with state soil disturbance requirements:

- New York Standards and Specifications for Erosion and Sediment Control (08/2005)
- New York Stormwater Pollution Prevention Plan (6NYCRR-750).
- Soil Erosion and Sediment Control Act NJSA 4:24-39 and NJAC 2:90-1.1
- Stormwater Management Rules NJAC 7:8

CREDIT DOCUMENTATION

- Documentation of stormwater pollution prevention plan and implementation during construction.

REFERENCES

LEED for Neighborhood Development (LEED-ND), GIB Prerequisite 4 – Construction Activity Pollution Prevention.
NYC DDC High Performance Infrastructure Guidelines, CP.2 – Protect Water Sources During Construction.
The Sustainable Sites Initiative, Prerequisite 7.1 – Control and Retain Construction Pollutants.
EPA Office of Water, Storm Water Management for Construction Activities, Pub. No. EPA 832-R-92-005.

[49] SEQ-6: Construction Stormwater Pollution Prevention; World Trade Center Sustainable Design Guidelines; 2005; pages 75, 81, 82.
[50] EPA Document 832/R-92-005; Storm Drain Inlet Protection; page 3-56

IC-2 PROTECT EXISTING NATURAL SYSTEMS

RELATED CREDITS

IS-2 Prepare a Site Assessment
IS-5 Protect the Ecological Health of Wetlands, Floodplains and Riparian Buffers
IS-6 Protect and Maintain Absorbent Landscapes
IS-8 Utilize Appropriate Vegetation
IS-9 Use Turfgrass Appropriately
IS-11 Balance Earthwork
IS-13 Utilize Trenchless Technology
IS-18 Optimize Roadway Alignment Selection
IC-1 Minimize Pollution from Construction Activity
IO-1 Implement Sustainable Landscape Maintenance
IO-2 Maintain Soil Quality

PURPOSE

Protect the natural environment, as well as any sensitive, natural or cultural features from disturbance, degradation or damage due to construction activities at the site.

Route 116 in Plainfield, Massachusetts[51]

CASE STUDY

Route 116 through Plainfield, Massachusetts

The goal of roadway landscape design for the Massachusetts Highway Department is to integrate the road into the landscape context. This goal is guided by three objectives: (1) protection of natural and cultural resources, (2) restoration and rehabilitation of landscapes damaged or compromised by transportation improvements and (3) enhancement of the corridor such that it becomes not merely a functional facility, but a community asset. During the reconstruction of Route 116 through Plainfield, Massachusetts, each tree (mostly maple) along the road was examined to determine if it could be saved and a special roadway base was used to protect the root systems of the maples. In addition, Mass Highway planted new maples along several stretches of the route and used soil bioengineering techniques to reduce impacts on adjacent wetlands.[52]

[51] Source: flickr.com; username: smart351
[52] Source: http://www.frcog.org/pubs/transportation/DesignAlternatives/ch4.PDF

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies and, where possible, the following recommended strategies:

- **Required ::** Limit site disturbance to a maximum of 10' 0" beyond immediate area of the Limit of Work Line as reflected on the site plan.
- **Required ::** Minimize the extent and the duration of exposure of bare ground surface to be opened at any one time, to prevent erosion at the source.[53] This action must be reflected on the Staging Plans and must be coordinated with the project's Soil Disturbance Permit.
- **Required ::** Utilize compromised or severely compacted land, or hardtop / pavement for storing of equipment, road machinery, etc.
- **Required ::** Monitor work to ensure progress according to protection schemes and make adjustments if necessary for greater protection of existing natural systems. When changes are warranted, adjust construction activities to maintain required disturbance limits and protective measures.
- **Required ::** Install permanent tree protection where appropriate on the site and do not permit work area on any projects to extend beneath the dripline of mature trees, per New York City regulations (Tree Planting Standards, City of New York Parks and Recreation). Where trenching is required utilize, an airspade or hand dig, and require that the entire tree and it's roots are protected and maintained for the duration of the contract by a Certified Arborist.
- **Recommended ::** Complete and employ permanent structures and controls to stabilize areas as soon as practical for use as erosion and sediment control measures for the remaining construction operations.[56]
- **Recommended ::** Minimize impacts to established vegetation; provide protection measures during construction for existing trees and landscape features to remain. Where established vegetation must be disturbed, re-grade area and re-vegetate as soon as work has been completed.
- **Recommended ::** Utilize Geosynthetic-reinforced soil (GRS) systems to construct retaining walls, embankments, slopes, and shallow foundations, as well as bridge abutments, to minimize the impact of access for heavy equipment.
- **Recommended ::** Protect vegetation from the impact of sand mixed with de-icing chemicals in winter. Limit the use of sodium chloride and calcium chloride; utilize less toxic materials such as potassium acetate or calcium magnesium acetate (both are less harmful to vegetation and less corrosive).

CREDIT DOCUMENTATION

- Documentation of 10' beyond Limit of Work Line and description of additional strategies implemented during construction.

REFERENCES

The Sustainable Sites Initiative, Credit 4.4 – Minimize Soil Disturbance in Design and Construction.
LEED for Neighborhood Development (LEED-ND), GIB Credit 6-Minimize Site Disturbance in Design /Construction.
High Performance Infrastructure Guidelines, CP.1 – Develop and Enforce a Site Protection Plan.
High Performance Infrastructure Guidelines, CP.2 – Protect Existing and Future Planted Areas.
AASHTO Center for Environmental Excellence, Construction Practices for Environmental Stewardship.

[53] Construction Practices for Environmental Stewardship; AASHTO Center for Environmental Excellence; http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/4_2.aspx

IC-3 UTILIZE TRANSPORTATION MANAGEMENT DURING CONSTRUCTION

RELATED CREDITS

IS-1 Utilize an Integrated Team Approach
IS-17 Optimize Traffic Safety
IC-4 Utilize Green Construction Equipment
IC-5 Reduce Noise and Vibration During Construction

PURPOSE

Promote more efficient and effective construction phasing and staging, minimize construction duration, improve work zone safety, and minimize traffic and mobility impacts resulting in a reduction of petroleum consumption and air emissions.

I-5 Columbia River Bridge, Portland, Oregon and Vancouver, Washington[54]

CASE STUDY

Interstate 5 Interstate Bridge Trunnion Repair, Columbia River Bridge, Portland, Oregon and Vancouver, Washington

A bi-state, multi-jurisdictional Traffic Management Team worked together to develop a comprehensive Traffic Management Plan (TMP) in order to mitigate the negative impacts on traffic associated with the closure of the northbound structure of Interstate 5 (I-5). The plan was implemented successfully, and the team estimated that without the development and implementation of a TMP for this project, traffic backups on I-5 would have likely extended 50 miles to the north and 40 miles to the south.

[54] Source: rootforce.org

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies and, where possible, the following recommended strategies:

- **Required ::** Provide a preliminary sequencing plan for approval before proceeding with the work.
- **Required ::** Provide analysis showing the selected TMP reduces use of fuel/energy over other feasible options and that the most efficient scheme is chosen by the project team.
- **Required ::** During the design phase develop a comprehensive project Transportation Management Plan (TMP) for airfield, roadway, rail or maritime; TMP shall include:
  - Temporary Traffic Control Plan.
  - For major projects with regional impacts and long construction durations provide:
    - Transportation Operations component minimizing delay impact on public.
    - Public Information component for projects with long construction durations and/or that will increase travel time by a minimum of 20 minutes above the baseline condition.
- **Required ::** During construction re-evaluate TMP and revise if necessary
- **Required ::** Schedule construction activities, loading, and unloading for minimal disturbance to traffic flow.
- **Recommended ::** Minimize use of explosives: Use alternative strategies such as hydraulic gas or chemical splitters in populated or environmentally sensitive areas
- **Recommended ::** Minimize staging areas when possible.
- **Recommended ::** Monitor mobility and safety of the work zone during construction.

CREDIT DOCUMENTATION

- Documentation of petroleum reduction analysis and strategies implementation during construction.

REFERENCES

GreenLITES Project Design Certification Program, E-3: Reduce Petroleum Consumption.

IC-4 UTILIZE GREEN CONSTRUCTION EQUIPMENT

RELATED CREDITS

IC-1 Minimize Pollution from Construction Activity
IC-3 Utilize Transportation Management During Construction
IC-5 Reduce Noise and Vibration During Construction

PURPOSE

Protect worker health and site atmospheric quality by using current best management practices utilizing EPA recommended diesel emissions control technologies, and ultra low sulfur diesel (ULSD) in vehicles and non-road site equipment.

Off-Road Diesel Equipment at World Trade Center Site, New York, New York[55]

CASE STUDY

World Trade Center Memorial and Memorial Museum, New York, New York

Contractors at World Trade Center Memorial and Memorial Museum project are required to submit an "Idling Control Plan". Idling Control Plans describe the measures the contractor will implement to limit idling by operators and drivers under their contract. Trade contractors who contest the efficiency and practicality of turning engines off after 3 minutes of non-activity are required to complete and submit the Idling Section of the WTC Memorial Equipment Checklist which documents the manufacturer's recommendations concerning idling for each of the Trade contractor's equipment. Trade contractors are required to fuel non-road equipment on site with Ultra Low Sulfur Diesel (ULSD) and submit documentation confirming the fuel's compliance with the ULSD specification. The Lower Manhattan Construction Command Center (LMCCC) tests the Trade

[55] Bovis Lend Lease – WTC Memorial and Memorial Museum Construction Environment Plan

contractor's fuel stored on site periodically for compliance. Trade contractors are encouraged to use biodiesel. Trade contractors are also required to submit documentation confirming investigation into Nitrogen Oxide Emission Reduction technologies as well as an up- to- date Equipment Checklist – Fuel and Filter as often as necessary. After reviewing and approving the Checklist, the LMCCC visits the site and "tags" newly approved equipment for use indicating that the equipment qualifies as "Low Emissions."

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies and, where possible, the following recommended strategy to minimize all airborne pollutants generated by diesel powered equipment and vehicles:

- **Required ::** All diesel powered equipment and vehicles shall use ultra low-sulfur diesel (ULSD) fuel with an average sulfur content of no more than 15 parts per million.
- **Required ::** All off-road diesel equipment 50 horsepower or greater shall be retrofitted with emissions control devices using Best Available Technology (BAT). The emission control devices shall be targeted primarily toward the reduction of particulate matter and secondarily toward the reduction of NOx.
- **Required ::** Tier 0 diesel engines shall not be used unless they have been upgraded to Tier 1 engines, then retrofitted with BAT for emissions reduction.
- **Required ::** Idling time for both on-road and off-road equipment and vehicles shall be limited to 3 minutes.
- **Recommended ::** When electric power is available at the site, electrically powered equipment is preferred over diesel powered versions of the same equipment.

CREDIT DOCUMENTATION

- Documentation of required strategies in specifications for contractor.

REFERENCES

The Sustainable Sites Initiative, Credit 7.6 – Minimize Generation of Greenhouse Gas Emissions and Exposure to Localized Air Pollutants During Construction.
WTC Sustainable Design Guidelines, SEQ-5 – Construction Environment.
High Performance Infrastructure Guidelines, CP.6 – Use Cleaner Construction Equipment.

IC-5 REDUCE NOISE AND VIBRATION DURING CONSTRUCTION

RELATED CREDITS

IC-1 Minimize Pollution from Construction Activity
IC-3 Utilize Transportation Management During Construction
IC-4 Utilize Green Construction Equipment

PURPOSE

Minimize the impact of construction work by reducing noise pollution and vibration associated with construction activities and use of non-road equipment.

The Big Dig, Boston, Massachusetts

CASE STUDY

The Big Dig Noise Control Specification, Boston, Massachusetts

A state of the art noise control specification (section 721.560) was developed for the $14.6 billion Big Dig project in Boston, Massachusetts, which has subsequently become a model specification for construction noise control in other large construction projects throughout the United States. Local community and environmental groups were involved in commenting on and enhancing the requirements of the specification, and the construction authority spent four years developing comprehensive noise control and monitoring plans. Some of the mitigation measures implemented include, the treatment of 150 windows adjacent to the corridor, the hanging of noise curtains, the erection of noise barriers, and regular monitoring by noise control officers armed with decibel meters and the authority to stop construction activity should noise levels violate the thresholds identified in the plan. The loudest activities, like jack hammering elevated roadways, were permitted only during daytime hours, and night work was shifted to commercial areas where it was less likely to affect residents.

CREDIT REQUIREMENTS (1 Point)

Implement the following required strategies and, where possible, the following recommended strategies:

- **Required ::** All debris conveyors and containers shall be lined or covered with sound absorbing materials.
- **Required ::** All pneumatic support equipment shall have intake and exhaust mufflers recommended by the manufacturer.
- **Required ::** All impact devices shall be equipped with acoustically attenuating shields or shrouds recommended by the manufacturer.
- **Required ::** All internal combustion equipment shall have mufflers and shield paneling recommended by the manufacturer.
- **Required ::** Idling time for both on-road and off-road equipment and vehicles shall be limited to 3 minutes.
- **Required ::** Prior to work commencing, and at critical times throughout the project, advise the local community via notices, mailers, street postings, etc. about the projected work, its anticipated duration, and measures in-place to minimize the disruption. Ensure that the public is aware of any planned blasting procedures by posting public notices in highly visible locations.
- **Recommended ::** Minimize use of equipment that generates more than 80 db(A) of noise, and use such equipment only during daylight hours. (I.e. not at night in residential areas).
- **Recommended ::** Limit vibration resulting from construction equipment when work is close to tunnels, utilities or other sensitive structures and closely monitor peak particle velocity (PPV) compliance through seismograph readings.
- **Recommended ::** Utilize an approved sound level meter for self-monitoring and proactively correct conditions where the noise generated by specific pieces of equipment exceeds allowable levels.
- **Recommended ::** Utilize noise barriers to contain noise where practicable.

CREDIT DOCUMENTATION

- Documentation of required strategies in specifications for contractor.

REFERENCES

WTC Sustainable Design Guidelines, SEQ-5 – Construction Environment.
AASHTO Center for Environmental Excellence, Land Based Construction Noise Control Practices
New York City Local Law 113 – Noise Control Code.

IC-6 IMPLEMENT CONSTRUCTION WASTE MANAGEMENT

RELATED CREDITS

IM-1 Use Recycled Materials
IC-7 Implement Integrated Pest Management During Construction

PURPOSE

Establish a plan to divert the maximum amount of infrastructure construction and demolition (C&D) waste from disposal in landfills and/or incinerators, and to support resource conservation and recycling programs

On-Site Sorting, Construction Waste Management – World Trade Center Memorial and Memorial Museum, New York, New York[56]

CASE STUDY

World Trade Center Memorial and Memorial Museum, New York, NY

The World Trade Center Memorial and Museum Projects have implemented a Construction Waste Plan to divert a minimum of 75% of construction waste generated on site from landfills. Metals, clean dimensional wood, cardboard, concrete debris, concrete formwork, and masonry are some of the materials that will be recycled.

[56] Bovis Lend Lease – WTC Memorial and Memorial Museum Construction Stormwater Pollution Prevention Plan

CREDIT REQUIREMENTS (1 Point + 1 Possible Additional Point)

Implement the following required strategy and where possible, the following recommended strategies:

- **Required ::** Divert from landfills and/or incinerators a minimum of 75% of the demolition and construction debris, by weight, for the materials below:
  - Asphalt Concrete
  - Portland Cement Concrete
  - Steel
  - Clean Unrestricted Soil
- **Recommended ::** Divert from landfills and/or incinerators a minimum of 75% of the demolition and construction debris, by weight, for the following expanded list of materials to achieve 1 additional point:
  - Metals –Aluminum, Copper, Zinc, etc.
  - Concrete paving, pipe, etc.
  - Concrete pavers
  - Clean soils
  - Non-chlorinated plastic pipe, etc.
  - Stone pavers
  - Masonry
  - Glass
  - Curbing materials (concrete, stone, granite, etc)
  - Clean Dimensional Wood (forms, etc.)
  - Cardboard
  - Packaging
  - Plastics - Beverage Containers, Packing Materials, etc
  - Biodegradable materials (food, food containers, wrappers, etc.)
- **Recommended ::** Implement on-site sorting of demolition and construction debris.

CREDIT DOCUMENTATION

- Documentation from contractor construction waste diverted from landfill during construction.

REFERENCES

WTC Sustainable Design Guidelines, Credit MEQ-2 – Construction Waste Management.
High Performance Infrastructure Guidelines, CP.4 – Implement a Waste Management and Recycling Plan.
The Sustainable Sites Initiative, Credit 7.4 – Divert Construction and Demolition Materials from Disposal.

IC-7 IMPLEMENT INTEGRATED PEST MANAGEMENT DURING CONSTRUCTION

RELATED CREDITS

IC-6 Implement Construction Waste Management
IO-1 Implement Sustainable Landscape Maintenance

PURPOSE

Mitigate health concerns caused by unwanted pest infestations and the associated excrement, as well as exposure to the traditional toxic chemicals used to manage pests, through preventative measures, the use of physical controls and more benign, bio-intensive pesticides.

Harvard University Construction Site, Cambridge, Massachusetts[57]

CASE STUDY

Harvard University, Cambridge, Massachusetts

Harvard University has developed an Integrated Pest Management Program (IPM) for Harvard University Construction Projects that provide guidelines for pest control at construction projects at the university. Construction projects include new construction, major renovation and building demolitions. IPM is managed by Environmental Health and Safety Department (EH&S) using a least-chemical means approach. Some of the requirements of the program are:

- Regular inspection of construction sites.
- Ensuring that food wastes are not contributing to rodent infestations.
- Following best management practices.
- Following protocol for reporting and responding to pest control emergencies
- Using least toxic pesticides in a manner that minimizes exposure to humans and the environment
- Maintain records of inspections, issues identified, and corrective action taken

[57] Source: http://www.uos.harvard.edu/ehs/pest_control/ipm_construction.pdf

CREDIT REQUIREMENTS (1 Point)

Implement the required strategies and, where possible, the following recommended strategies:

- **Required ::** During construction reduce or eliminate water and food sources for pests by:
  - Do not permit garbage or rubbish to accumulate at the job site.
  - Establish eating areas at the project site for work crews and provide clearly marked, dedicated waste receptacles with tight, rust-proof lids for putrescible waste:
    - Empty these receptacles daily.
    - Wash down these receptacles weekly.
    - Utilize pest resistant containers for recyclables.
  - Eliminate standing water wherever possible: Standing water occurs after rainstorms in building recesses, roadway ruts, ditches, cupping on roof surfaces, masonry cavities, pipes, discarded tires and containers, among many others
  - Promptly repair leaks, broken pipes and walls or pipes that appear to 'sweat'.
  - Cover drains and open pipes with grills to prevent pest infestation.
- **Required ::** Perform daily inspections of pest control measures on construction site.
- **Recommended ::** Reduce potential harborage for rodents: Harborage occurs in long grass and weeds, around temporary construction buildings and around materials stacked or stored directly on the ground:
  - Trim site vegetation
  - Eliminate weeds
  - Elevate and store all project materials on racks at 18" above ground.
- **Recommended ::** Utilize monitoring tools (beyond direct visual observation) to attract and confirm presence of pests, including placebo baits for rodents and sticky traps for cockroaches.
- **Recommended ::** Utilize non-toxic pest controls – glue traps, 'snag traps' – before using poisons to reduce or eliminate pest infestation.
- **Recommended ::** When using poisons to reduce or eliminate pest infestation during construction, use less toxic materials such as:
  - Warfarin Rodenticides (Rat and Mouse Poison).
  - Tamper Resistant Bait Stations
  - Insecticidal Dusts
  - Silicon Dioxide from Diatomaceous Earth

CREDIT DOCUMENTATION

- Documentation of required strategies during construction.

REFERENCES

WTC Sustainable Design Guidelines, IEQ-9 – Integrated Pest Management.

IO-1 IMPLEMENT SUSTAINABLE LANDSCAPE MAINTENANCE

RELATED CREDITS

IS-6 Protect and Maintain Absorbent Landscapes
IS-8 Utilize Appropriate Vegetation
IS-9 Use Turfgrass Appropriately
IW-3 Reduce Use of Potable Water for Irrigation
IM-6 Minimize Use of Toxic and/or Hazardous Materials
IC-2 Protect Existing Natural Systems
IC-7 Implement Integrated Pest Management During Construction
IO-2 Maintain Soil Quality

PURPOSE

Utilize sustainable best management practices for landscape maintenance to protect and restore the natural environment, conserve resources, and reduce use of chemical treatments (see *Aviation Landscape and Sustainable Design Criteria* provided as a reference for best management practices in Appendix 06).

Central Park Conservancy, New York, New York[58]

CASE STUDY

Central Park Conservancy, New York, New York

The Central Park Conservancy follows several sustainable practices during landscape maintenance, including:

- Recycling 100% of the park's organic waste including logs, branches, shrubbery clippings, and leaf litter to produce top quality compost and mulch.
- Non-toxic pest and disease control and integrated pest management.
- Water quality testing, monitoring of oxygen levels, temperature, and nutrient supply, and recommendations for preventative or corrective action.[59]

[58] http://www.flickr.com/photos/drosera-x/387688560/ and http://alumni.uvm.edu/catamounts_care/newyork.asp

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategy:

- **Required ::** Develop a sustainable landscape maintenance plan as part of the design documents that clearly defines the goals of the project and outlines environmentally informed methods to achieve them. Include 5 of the following 10 strategies in that plan:
  - Removal of invasive species
  - Recycling of organic waste
  - Use of organic compost as fertilizer
  - Obtaining seeds and plants from facilities that practice sustainable plant production
  - Reduce soil erosion or soil compaction from maintenance activities
  - Use harvested rainwater or treated graywater for irrigation purposes
  - Utilize a computerized irrigation system connected to a weather station that shuts itself off when a line is broken
  - Education of employees on sustainable landscape maintenance
  - Use of a low-toxicity integrated pest management (IPM) system
  - Protect vegetation from the impact of sand and de-icing chemicals in winter. Limit the use of sodium chloride and calcium chloride; utilize less toxic materials such as potassium acetate or calcium magnesium acetate (both are less harmful to vegetation and less corrosive)

NOTE: At airports and within 5 miles of EWR, JFK, LGA, SWF, and within 10,000 feet of TEB, utilize plant species and wildlife management practices in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5200/33B. Hazardous Wildlife Attractants On or Near Airports, August 28, 2007.

CREDIT DOCUMENTATION

- Documentation of required strategies in specifications for contractor and implementation post-construction.

REFERENCES

The Sustainable Sites Initiative, Prerequisite 8.1 – Plan for Sustainable Landscape Maintenance.
PANYNJ Aviation Landscape and Sustainable Design Criteria (see Appendix 06)

[59] http://www.centralparknyc.org/site/PageNavigator/Green/green_sustainablepractices

IO-2 MAINTAIN SOIL QUALITY

RELATED CREDITS

IS-6 Protect and Maintain Absorbent Landscapes
IS-8 Utilize Appropriate Vegetation
IS-9 Use Turfgrass Appropriately
IS-10 Amend and Reuse Existing Soils
IC-2 Protect Existing Natural Systems
IO-1 Implement Sustainable Landscape Maintenance

PURPOSE

Retain the environmental quality of existing natural or previously amended soils through sustainable maintenance practices. Soil quality contributes to stormwater management, and can be designed to enhance percolation rates, recharge groundwater sources, slow the pace of run-off and reduce pollution of receiving water bodies, as well as support healthy vegetation.

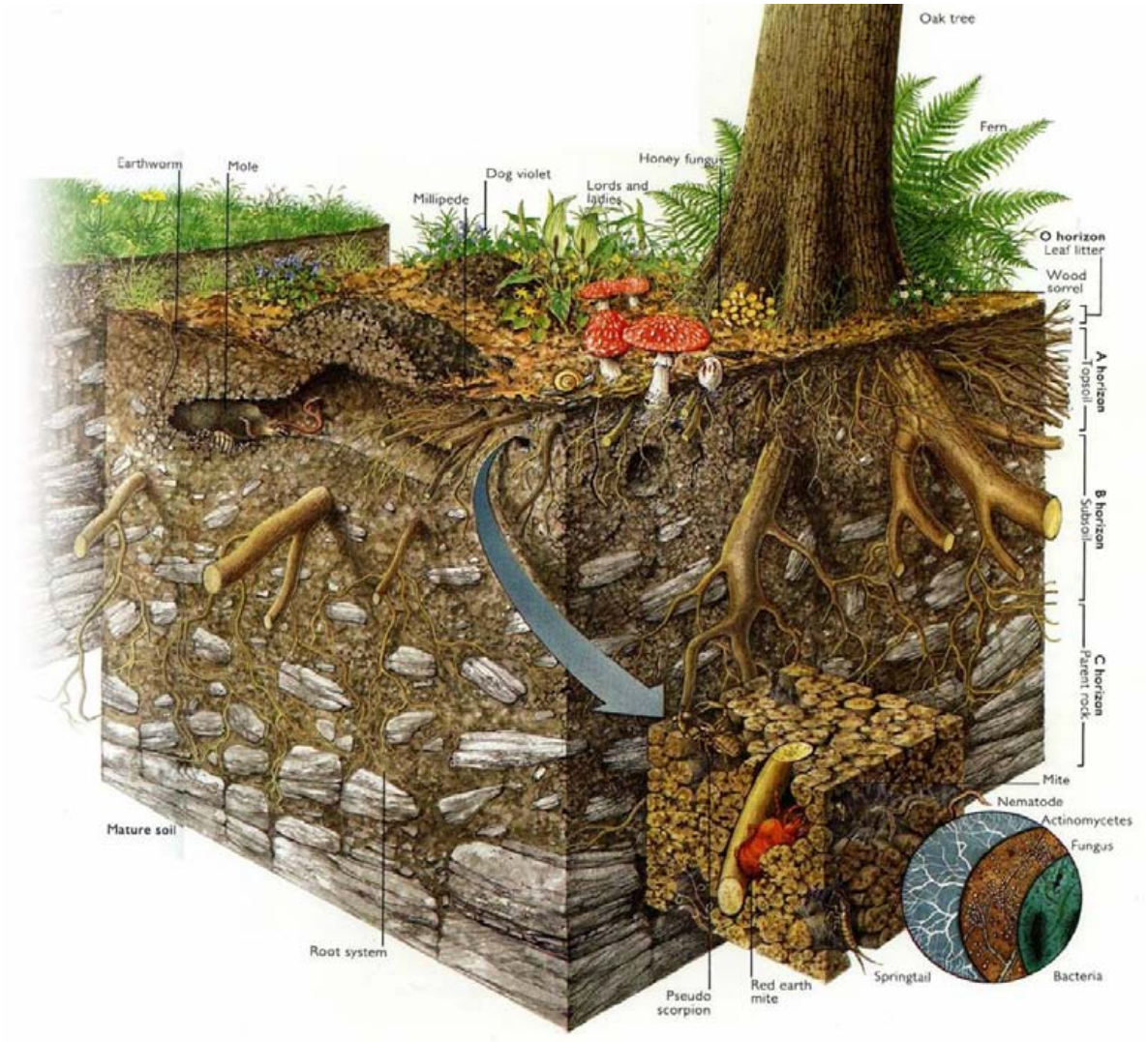

Illustration of Healthy Soil

CASE STUDY

New Soil Strategy for England

The Department of Food Environment and Rural Affairs (defra) has published the new Soil Strategy for England, which sets out the Government's vision to improve sustainable management of soil and tackle degradation over the next 20 years. Their agenda for better soil management includes:

- Preventing soil pollution
- Effective soil protection during construction and development
- Protecting and enhancing stores of soil carbon
- Building the resilience of soils to a changing climate[60]

CREDIT REQUIREMENTS (2 Points)

Implement **4 of the 8** following recommended strategies as part of the design documents:

- **Recommended :: ** Analyze the type and quality of soil(s) at project site
- **Recommended :: ** Amend existing soils as necessary to meet anticipated uses of the land, support existing and new vegetation and enhance stormwater management
- **Recommended :: ** Prevent soil pollution and contamination of land during construction and/or maintenance work
- **Recommended :: ** Protect soil and minimize soil erosion during maintenance activities
- **Recommended :: ** Avoid soil compaction during maintenance activities
- **Recommended :: ** Recycle waste organic matter into mulch /compost; use for improving soil quality where practical
- **Recommended :: ** Manage snow/ice deicing and or removal without negatively impacting soil quality
- **Recommended :: ** For landscaped areas, prepare a watering schedule to prevent over or under watering

CREDIT DOCUMENTATION

- Documentation of recommended strategies in specifications for contractor and implementation post-construction.

REFERENCES

The Sustainable Sites Initiative, Prerequisite 4.3 – Create a Soils Management Plan.

[60] http://www.defra.gov.uk/environment/quality/land/soil/documents/soil-strategy.pdf

IN-1 INNOVATION CREDIT

PURPOSE

Project design includes a strategy or strategies that incorporate significant innovations in environmental sustainability which build upon PANYNJ Sustainable Infrastructure Guideline objectives and are not specifically listed in the guidelines.[61]

[61] https://www.nysdot.gov/programs/greenlites/repository/Green%20LITES%20Certification%20Program%20Document%20-%20April%202010.pdf

CREDIT REQUIREMENTS (2 Points)

Implement the following required strategies as part of the design documents:

- **Required ::** Item or method that incorporates new and/or innovative ways to provide a more environmentally, economically and/or sustainable project. Points awarded in this category are subject to review.

CREDIT DOCUMENTATION

- Documentation of innovative strategy.

REFERENCES

GreenLITES Project Design Certification Program, I- 1: Innovation.

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GLOSSARY OF TERMS

Absorbent Landscapes	Landscapes that are capable of high rates of stormwater absorption, infiltration and treatment. The subsoil infiltration rate for absorbent landscapes should be 2 inches per hour or greater.
Acclimatized Vegetation	Plants that can be sustained naturally and thrive in the conditions specific to a site's microclimate.
Alternative Fuel	Fuels defined as alternative fuels by the Energy Policy Act (EPAct) of 1992; these include: ▪ Pure methanol ▪ Ethanol, and other alcohols ▪ Blends of 85% or more of alcohol with gasoline ▪ Natural gas and liquid fuels domestically produced from natural gas ▪ Liquefied petroleum gas (propane) ▪ Coal-derived liquid fuels ▪ Hydrogen ▪ Electricity ▪ Pure biodiesel (B100) ▪ Fuels, other than alcohol, derived from biological materials ▪ P-Series fuels - blend of 35% natural gas liquids (pentanes plus), 45% ethanol and 25% methyltetrahydrofuran (MeTHF), a biomass-derived co-solvent
AMI Systems	Advanced Metering Infrastructure Systems
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BAT	Best Available Technology
BDR	Basis of Design Report
BMP	Best Management Practice
Brownfield	Real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. A site has to be declared a brownfield by a federal, state or local agency.
BRT	Bus Rapid Transit
C&D	Construction and Demolition
CFC	Chlorofluorocarbons

CIPP	Cured-In-Place Pipe
COC	Chain-of-Custody
Contaminated Site	A site classified as a Brownfield or contaminated site by a federal, state, or local agency or a site documented as contaminated with a Phase II Environmental Site Assessment (as described in ASTM E1903-97)
defra	Department for Environment, Food and Rural Affairs
DEP	Department of Environmental Protection
DOT	Department of Transportation
Durable Materials	Materials that are capable of withstanding wear and tear or decay, and can be used over a relatively long period of time. Durable materials may have a higher first cost but is likely to be highly economical in the long run because of higher life expectancy and reduced maintenance costs.
Ecologically Sensitive Area	Natural spaces that have significance to the environment in which they are located and are vulnerable to a negative environmental impact. Ecologically sensitive areas include: ▪ Previously undeveloped land whose elevation is lower than 2.5 feet above the FEMA 100-year flood level ▪ Wetlands ▪ Water bodies ▪ Parklands ▪ Historic sites
EH&S	Environmental Health and Safety Department
EPAMT	Elizabeth – Port Authority Marine Terminal
EWR	Newark Liberty International Airport
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FSC	Forest Stewardship Council
GRS	Geosynthetic-Reinforced Soil
HCFC	Hydrochlorofluorocarbons
HDPE	High Density Polyethylene

HFC	Hydrofluorocarbon
High Visibility Crosswalks	Textured pavement crosswalks, ‘zebra’ and ‘continental’ crosswalks, and ‘triple-four’ crosswalks typically marked with white and retroreflective (visible at night) markings.
HMA	Hot mix asphalt
HOV	High Occupancy Vehicle
IESNA	Illuminating Engineering Society of North America
IPM	Integrated Pest Management
ITS	Intelligent Transportation Systems
JFK	John F Kennedy International Airport
LEA	Lead Engineer or Architect
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
LGA	LaGuardia Airport
LMCCC	Lower Manhattan Construction Command Center
Native Vegetation	Plants that occur naturally in a particular region.
NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
On-site Renewable Energy	Renewable energy including solar (solar thermal and solar electric), wind (structure mounted or pole mounted), geothermal (not ground source HVAC), low-impact hydro, biomass and bio-gas, that is available and harvested on-site.
OPR	Owner’s Project Requirements
PANYNJ	Port Authority of New York and New Jersey
PPV	Peak Particle Velocity
Previously Developed Site	Site which has been paved, built on, or regraded.
PSE&G	Public Service Electric and Gas Company
Rainwater Neutrality	The concept of maintaining / restoring rainwater balance in a site where

	development would otherwise disturb the natural rainwater cycle. Rainwater neutrality is accomplished by managing not just stormwater but rainwater itself, taking into account all the processes in a natural rainwater cycle including evapotranspiration, infiltration and runoff. Rainwater neutrality seeks to retain the natural water balance of a project site, post-development, by utilizing sustainable design techniques such as low-impact design, use of pervious surfaces, landscaping, and rainwater reuse.
RAP	Reclaimed Asphalt Pavement
RCA	Recycled Concrete Aggregate
Recycled Materials	Materials that contain, as an integral part of their make-up, previously manufactured products.
Reused / Salvaged / Refurbished Materials	Materials that are used again, essentially in the form that they were originally cast. Reused, salvaged or refurbished materials may be cleaned and refinished but they are not remanufactured.
SRI	Solar Reflectance Index
SWF	Stewart International Airport
TEB	Teterboro Airport
TMP	Traffic Management Plan
TOU	Time-of-Use
TSM	Transportation System Management
TSS	Total Suspended Solids
UHPC	Ultra High Performance Concrete
ULSD	Ultra Low Sulfur Diesel
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
VOC	Volatile Organic Compounds

Wetland	As per the U. S. Army Corps of Engineers and the U. S. Environmental Protection Agency, wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Wetland Buffer	Land within 100 feet of the outer edge of a wetland, floodplain, or riparian buffer transition area, or from the extent of the regulated area. See diagram in ISEQ-5
WMA	Warm Mix Asphalt
WMATA	Washington Metropolitan Area Transit Authority
XBL	Exclusive Bus Lane

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APPENDIX 01

Policy on Sustainable Design (AI 45-2)

THE PORT AUTHORITY OF NY & NJ

AI 45-2

Office of the Executive Director

Effective: July 13, 2006

SUSTAINABLE DESIGN

I. Introduction

Sustainable design seeks to reduce the environmental impact to improve the maintenance and operation of new and renovated buildings and facilities. The Port Authority's sustainable design guidelines, developed and updated periodically by the Engineering Department, emphasize and strive for a balance among the following goals: (1) energy conservation and efficiency: (2) conservation of water and other natural resources; (3) waste reduction; and (4) healthy indoor environments. The guidelines also seek to benefit the region's economy by encouraging the use of locally manufactured materials and by supporting emerging regional markets in renewable energy and clean technologies.

II. Instruction

A. The Port Authority's policy is to reduce adverse environmental impacts of the design, construction, operation and maintenance and occupancy or leasing of new or substantially renovated buildings and facilities, reconstruction projects, and programs. Departments adhere to this administrative instruction as outlined in paragraphs B, C, and D below. Because the Instruction may necessitate design decisions or the use of materials that have a higher first cost than would conventional designs or materials, departments implement sustainable design only when life cycle cost analyses, prepared by or reviewed by the Engineering Department, show that such costs are neutral, or that sustainable design will yield a positive return on investment (referred to as the "life cycle cost criterion").

B. New Buildings and Facilities

1. The sustainable design guidelines apply to a new building or facility that is 20,000 gross square feet or more, or any new multi-building construction project in which the buildings are of the same construction type and have a combined area of 20,000 gross square feet or more, provided the sustainable design measures meet the life cycle cost criterion and do not compromise safety or security. A new building or facility that is 20,000 gross square feet or more, or any new multi-building construction project in which the buildings are of the same construction type and have a combined area of 20,000 gross square feet

or more, is to surpass building code standards for energy efficiency by at least 20 percent.

2. A new building or facility or multi-building project of less than 20,000 gross square feet incorporates significant attributes of applicable sustainable design principles (site planning, water, energy, materials and resources, and indoor environmental quality) to comply with this Instruction. Incorporation of these attributes is based on the life cycle cost criterion.

C. Substantial Renovations and Reconstruction Projects

1. A substantial renovation in a building or facility of 20,000 gross square feet or more is to surpass building code standards for energy efficiency by at least 10 percent, provided that this measure meets the life cycle cost criterion. Additionally, best efforts are used to adhere to the sustainable design guidelines.

2. A reconstruction project in a building or facility of 20,000 gross square feet or more is to surpass building code standards for energy efficiency by at least 10 percent, provided that this measure meets the life cycle cost criterion. Additionally, best efforts are used to adhere to the sustainable design guidelines.

3. A substantial renovation or reconstruction project in a building or facility of less than 20,000 gross square feet is to incorporate significant attributes of applicable sustainable design (with respect to water, energy, materials, resources and indoor environmental quality) to comply with this Instruction. Incorporation of these attributes is based on the life cycle cost criterion.

D. Programs

To the extent that it is deemed reasonable by the Chief of Real Estate and Development, with the concurrence of the Chief Financial Officer, applicable sustainable design principles (site planning, water, energy, materials and resources, and indoor environmental quality) are to be applied to all programs in which the Port Authority participates.

III. Definitions

A. “Building” or “facility” is defined as a structure of 5,000 gross square feet or more.

B. Substantial renovation" is defined as the replacement of more than 50 percent of any building subsystem, measured in units appropriate to the subsystem, within any consecutive 12-month period.

C. "Subsystem" is defined as a building assembly or building set of units made up of various components that serve a specific function including, but not limited to, exterior walls, windows, doors, roofs, ceilings, floors, lighting, piping, duct work, insulation, heating, ventilation and air cooling (HVAC) system equipment or components, electrical appliances and plumbing appliances.

D. "Reconstruction project," commonly referred to as a "gut rehabilitation," is defined as a renovation: (1) in which four or more primary building systems of a building or facility undergo at least a 50% replacement within a 12-month period: and (2) during the performance of which the affected building area is unoccupiable for 30 days or more due to the nature of the construction.

E. "Primary building systems" is defined as: (1) HVAC; (2) lighting; (3) exterior walls and windows; (4) roofs and ceilings; (5) plumbing; and (6) other electrical.

F. "Program" is defined as an action or series of related actions initiated by the Real Estate and Development Department that has been authorized by the Board of Commissioners.

IV. Space Leased to the Port Authority

To the maximum extent practical, the Real Estate Department implements the Port Authority's sustainable design policy (with regard to water, energy, materials and resources, and indoor environmental quality) in spaces leased to the Port Authority. The Real Estate Department seeks to execute improvements whose expected cost savings provide a payback prior to the end of the lease term.

V. Port Authority Tenants

Leases provide or will provide that tenant construction, substantial renovation and reconstruction are to comply with this Administrative Instruction. This requirement is incorporated into leases at inception, renewal or modification as appropriate.

VI. Roles & Responsibilities

A. Port Authority Contracts

The Project Management Department identifies building and facility projects in the Port Authority Capital Plan that meet the criteria for implementation of the sustainable design guidelines as set forth in paragraphs II. A. and II. B. For such projects, a project team comprising representatives from the Project Management Department, the Engineering Department, and the respective line department identifies and evaluates ways to comply with this Instruction. This evaluation takes place in the planning stages of design (pre-Stage I, Stage I, and Stage II). The Project Management Department reports the status of these projects to the Office of Environmental Policy, Programs & Compliance on a quarterly basis.

The Project Management Department develops and maintains an agency-wide list of proposed projects in the planning stages (pre-Stage I, Stage I, and Stage II) with opportunities for sustainable design applications. The Project Management Department also maintains a list of all projects that move into final design and construction (Stage III and IV) that incorporate sustainable design applications. The Project Management Department updates both lists at least twice a year and transmits them to the Office of Environmental Policy, Programs & Compliance.

B. Tenant Alteration Applications

The Tenant Alteration Application process requires tenants to adhere to this Administrative Instruction. All tenant projects that require approval of Tenant Alteration Applications are reported to the Office of Environmental Policy, Programs & Compliance on a bi-annual basis.

C. Port Authority Programs

The Office of the Chief of Real Estate and Development periodically reports on its efforts to incorporate sustainable design principles in Port Authority programs to the Office of Environmental Policy, Programs & Compliance.

APPENDIX 02

Project Design Evaluation - Climate Change Projections

THE PORT AUTHORITY OF NY & NJ

MEMORANDUM

Engineering/Architecture Design Division

To: All Staff

From: Jack Buchsbaum

Date: June 19, 2009

Subject: **Project Design Evaluation - Climate Change Projections**

Copy To: F. Lombardi, P. Zipf, D. Berger, S. Murrell, R. Chercio, B. McLaughlin, S. DesRoches

The Port Authority of NY & NJ is participating in two climate change studies for New York City and New York State. The results of these studies will assist the agency in adapting to the impacts that climate change will present for our infrastructure. The following climate change projections have been developed from information provided to the City of New York by the Columbia Center for Climate Change Systems Research.

The design of all new construction and major rehabilitation projects is to be evaluated based on the following climate change variables impact:

Air Temperature

- Mean air temperature (annual) is projected to increase from a baseline of 55°F to 61°F by the 2080's.

Precipitation

- Mean precipitation (annual) is projected to increase by 10% by the 2080's from the current baseline of 46.5 in/year.

Flood Elevation

- Mean sea level elevation is anticipated to increase by 18" over the current MHW. Accordingly, designs shall consider an 18" increase over the current FEMA 100-year flood level plus one-foot criteria (Current FEMA 100 year flood level plus 2.5').

Where prohibiting factors preclude the application of these design criteria to all project elements, focus should be centered on critical project elements, those for which disruption of service would result in significant impacts to facility operations.

These interim design criteria are based upon current climate change projections and will be in effect until further information is available. These projections will be reviewed and/or updated on a two-year basis.

APPENDIX 03

PANYNJ Bicycle Policy and Implementation Plan

(Board – 2/25/10)

PORT AUTHORITY BICYCLE POLICY

Bicycling is a rapidly growing mode of transportation in the New York-New Jersey region and throughout many of the nation's metropolitan areas. Since 2000, bicycle commuting has almost tripled in New York City, and it is expected to double again by 2015.

Federal, state and local policies increasingly support cycling as transportation. Federal law requires consideration of non-motorized users during planning, development, and construction of transportation projects that receive federal aid. The Federal Highway Administration expects transportation agencies to accommodate bicycling and pedestrian use as a routine part of their planning, design, construction, operations and maintenance activities**.**

The region's metropolitan transportation planning organizations, including the North Jersey Transportation Planning Authority, Inc. and the New York Metropolitan Transportation Council, have initiated plans for improving and increasing regional bicycle infrastructure. The region's public transportation providers, including New York State's Metropolitan Transportation Authority, New Jersey Transit Corporation (NJT), the New York State Department of Transportation and the New Jersey Department of Transportation, all have developed bicycle plans and added new bicycle facilities. The New York City Department of Transportation plans to add hundreds of new lane miles for bicycles on New York City streets by 2030, which will increasingly affect Port Authority facilities.

Recent local legislation requires secure indoor bicycle parking in both new and existing commercial and residential buildings in New York City. Jersey City's recent Master Plan includes the goal of a city-wide bicycle-friendly environment by 2050, and assumes Port Authority and NJT collaboration in providing bicycle access and storage.

Port Authority facilities currently provide some accommodations for bicycle users, such as bicycle access for the George Washington and Bayonne Bridges, off-peak access to the Port Authority Trans-Hudson rail system, and some bicycle routes and racks at other facilities.

A formal Port Authority bicycle policy would provide staff with additional guidance and support as they respond to the growing presence of bicycles as a mode of travel within the overall regional transportation system.

Accordingly, it was recommended that the Board adopt the following policy statement:

"In keeping with its mission to meet the critical transportation needs of the bi-state region, the Port Authority supports bicycling as an important and sustainable mode of travel. The Port Authority seeks to provide its customers, tenants, visitors and employees

with safe and convenient bicycle access and secure bicycle parking at its facilities, wherever operationally and financially feasible."

The Executive Director may, consistent with the policy, need to take the following steps to advance this policy:

- Integrating improved bicycle access, safe bicycle lanes, and secure bicycle parking and storage into existing Port Authority buildings, roadways and other facilities owned or operated by the Port Authority.
- Ensuring that design guidelines for new construction and major renovations include sufficient bicycle access, storage, and related amenities to meet emerging demand.
- Developing multi-modal transit hubs that encourage biking and walking.
- Removing any unnecessary restrictions on bicycle access, and promoting the safe co-existence of motor vehicles, bicycles and pedestrians at Port Authority facilities.
- Encouraging tenants to expand bicycle access and accommodation.
- Coordinating bicycle facility improvements and inter-modal connections with regional planning organizations, other regional transportation providers, and local governments.

Initial steps should incur minimal incremental costs, which can be absorbed by existing operations and maintenance budgets. Costs of accommodating bicycle travel when expanding, upgrading, or constructing major new surface transportation facilities are to be included in specific project plans and in future budgets. To the extent that any of these actions requires significant additional investment, the Executive Director may seek further Board consideration and authorization.

Pursuant to the foregoing report, the following resolution was adopted with Commissioners Coscia, Grayson, Holmes, Pocino, Sartor, Silverman and Steiner voting in favor; none against:

RESOLVED, that the following statement is adopted as Port Authority policy:
"In keeping with its mission to meet the critical transportation needs of the bi-state region, the Port Authority supports bicycling as an important and sustainable mode of travel. The Port Authority seeks to provide its customers, tenants, visitors and employees with safe and convenient bicycle access and secure bicycle parking at its facilities, wherever operationally and financially feasible."; and it is further

RESOLVED, that the Executive Director be and he hereby is authorized to take steps, consistent with the Port Authority's By-Laws and Budgets adopted by the Board, to effectuate this policy; and it is further

RESOLVED, that the form of any documents generated pursuant to this resolution shall be subject to the approval of General Counsel or his authorized representative.

APPENDIX 04

Table IE-1.1

The Port Authority of NY & NJ - Sustainable Design Guidelines

IEEQ-1 Optimize Energy Performance Worksheet

EQUIPMENT TYPE	ASHRAE 90.1 (2007) MINIMUM EFFICIENCY REQUIREMENTS	ASHRAE 90.1 (2007) REFERENCED TABLE	DESIGN CASE - SELECTED EQUIPMENT	PERCENTAGE IMPROVEMENT >I0%
List all project equipment requiring energy usage. These systems include but are not limited to pumps, fans, motors, chillers, cooling towers, lighting systems, and vertical transportation.	List minimum energy efficiency requirements for each equipment type (including unit)	List referenced ASHRAE table and page number	List all selected project equipment.	Show for each equipment type a % improvement over ASHRAE 90.1 (2007) **greater than 10%** for each equipment type**.**

APPENDIX 05

Toxic and / or Hazardous Materials

LIST OF TOXIC AND / OR HAZARDOUS MATERIALS

Material	Common Usage	Environmentally Preferable Alternatives
CFCs	HVAC - Refrigerant	R-22, R-123, R-134a, R-245fa, R-407c, and R-410a refrigerants
HCFCs	HVAC - Refrigerant	R-22, R-123, R-134a, R-245fa, R-407c, and R-410a refrigerants
Urea-Formaldehyde	Composite wood products, insulation, furniture, and adhesives	There are many readily available composite wood, insulation, furniture, and adhesives products that do not have any added urea-formaldehyde
Mercury	Batteries, HVAC controls, electrical components, paint, flooring, medical equipment, switches & relays, and lamps	There many alternative materials and products that are mercury free for batteries, HVAC controls, electrical components, paint, flooring, medical equipment, switches & relays, and lamps
Lead	Flashing and roofing, radiation shielding, solder, and electrical cable jacketing	PET plastics for wire jacketing and stainless steel, galvanized, and paint finishes for flashing and roofing materials
Cadmium	Batteries, metal alloys, hardware coatings, and paints	For hardware coatings - stainless steel and galvanized finishes. For all other applications there are viable cadmium free options
Phthalates	Pipes, conduits, waterproofing, roofing, siding, door and windows, resilient flooring, carpet backing, wall covering, signage, window treatments, furniture, and wire cable sheathing	PET plastic for wiring jacketing; natural and polyolefin materials for wallcovers; rubber, linoluem, PVC-free resilient flooring options; nylon, polyester for shower curtains; polyurethane, nylon, nylon microfiber and polyethylene; fiberglass base with cotton flocked backing, polyester with arcylic foamed backing, polyester, polyester and cotton, olefin-coated olefin yarn, and thermoplastic olefin. There are many PVC-free options for piping, conduits, flooring, carpet, wall protection systems, windows & doors, backings, and window treatments

Aliphatic hydrocarbons (VOC)	Paint, sealants, roofing products, resilient flooring, carpets, adhesives, and sealants	There are many readily available roofing products, resilient flooring products, carpets, adhesives, and sealants that have low or zero VOC emissions
Aromatic hydrocarbons (VOC)	Paint, sealants, roofing products, resilient flooring, carpets, adhesives, and sealants	There are many readily available roofing products, resilient flooring products, carpets, adhesives, and sealants that have low or zero VOC emissions
Halogenated flame retardants – Bromides	Fabrics, plastics, foams, insulation, carpet backing, epoxy and resins, kitchen appliance, housing paints, and electrical devices	For fire extinguishing agents suggest Argon
Chlorinated plastics	Pipes, conduits, waterproofing, roofing, siding, door and windows, resilient flooring, carpet backing, wall covering, signage, window treatments, furniture, and wire cable sheathing	PET plastic for wiring jacketing; natural and polyolefin materials for wallcovers; rubber, linoluem, PVC-free resilient flooring options, nylon, polyester for shower curtains; polyurethane, nylon, nylon microfiber and polyethylene; fiberglass base with cotton flocked backing, polyester with arcylic foamed backing, polyester, polyester and cotton, olefin-coated olefin yarn, and thermoplastic olefin. There are many PVC-free options for piping, conduits, flooring, carpet, wall protection systems, windows & doors, backings, and window treatments
Sodium chloride and calcium chloride	Road salt for melting ice	Calcium Magnesium Acetate, Potassium Acetate
Creosote	Coal tar-based creosote is the most commonly used wood preservative in the United States. It is also used for roofing	There are many cresote free roofing products
PCA (Pentachlorophenol or penta), CCA (Chromated copper arsenate), ACA (Ammoniacal copper arsenate), ACZA (Ammoniacal copper zinc arsenate), ACC (Acid copper chromate), CZC (Chromated zinc chloride	Wood treatment	Borates (boric acids and borax), ACC (Ammoniacal Copper Citrate), ACQ (Alkaline Copper Quaternary Ammonium), CBA (Copper Azole)

APPENDIX 06

Aviation Landscape and Sustainable Design Criteria

AVIATION LANDSCAPE AND SUSTAINABLE DESIGN CRITERA

Engineering Department

Port Authority of NY & NJ

March 17, 2010

INTRODUCTION

Landscape architecture provides the Port Authority of NY & NJ aviation facilities with a number of design criteria strategies : 1) Airport Redevelopment Site Planning, 2) Landscape Operational Upgrades that target landscape and irrigation installations, 3) Runway Safety Area Programs, 4) Wetland Mitigation, 5) Landscape Plants and Design Criteria that provide minimal attractants to birds and other undesirable pests, and 6) Sustainable Design Practices: Best Management Practices for Storm Water Management Practices, and Alternative Pavement Treatments and 7) Review of Tenant Landscape Applications.

1) Airport Redevelopment Programs – Landscape Architectural efforts have historically been an integral member of the design team commencing with conceptual design, site design development, through contract development, implementation and on-going maintenance. The landscape contract is prepared separately but in tandem with the roadways, traffic requirements and infrastructure contract development program. The landscape contract installation and minimum two-year maintenance contract follows the completion of the road ways, buildings, and infrastructure contract.

2) Landscape Operational Upgrade Programs – Landscape Architectural efforts include rehabilitation strategies for neglected, underutilized or reclaimed areas.

3) Runway Safety Areas – Landscape Architectural efforts include tree crown reduction on public and private property, working with operational and wildlife staff to greatly reduce avian and other wildlife hazards and create safer runway safety areas for planes and emergency vehicles.

4) Wetland Mitigation – Landscape Architectural efforts work with regulatory agencies and local interest groups to create tidal wetland habitats when required by permit.

5) Landscape Plants and Design Criteria that provide minimal attractants to birds and other undesirable pests (i.e. Asian Longhorned beetle), offer sustainable characteristics and reliable performance under variable soil and climate conditions.

6) Sustainable Design Practices – Sustainable design seeks to reduce environmental impacts and improve the maintenance and operations of new and renovated facilities.

- Best Management Practices for Storm Water Management Practices
- Alternative Pavement Treatments – Impervious and Pervious Treatments
- Locally reduce carbon emissions during the seasonal growth period
- Locally reduce surface temperatures.

7) Review of Tenant Landscape Applications – Landscape Architectural staff work with the TAA-QAD staff by reviewing applications and providing the tenants with the current FAA and PA guidelines in regard to landscaping at our airports.

GOALS

The goal of the Landscape staff has been to provide a quality landscape environment that complements the facilities design, meets functional requirements (roadways, signage, exists and entrances to frontages, parking facilities and residual open space) and incorporates sustainable practices wherever permissible.

In order to achieve these goals, a successful landscape must satisfy these objectives:

1. Select a palate of plants suitable to the facilities environment, while providing maximum seasonal interest and minimal pest problems.

2. A design that is incorporated into an area suitable for vigorous plant growth and considers the impacts with and without permanent maintenance.

3. A design that considers the impacts with and without permanent irrigation.

4. A design that considers the significance of sustainable design practices. The goal of the Port Authority of NY & NJ Sustainable Design Guidelines is: (1) energy conservation and efficiency; (2) conservation of water and other natural resources; (3) waste reduction; and (4) healthy indoor environments.

5. A design that is installed under a separate, stand alone landscape installation contract that requires a minimum two year maintenance follow up by the installing Contractor, who shall have as his superintendent over the entire installation and maintenance a State Certified Arborist knowledgeable and experienced in this type of Work.

THE ENVIRONMENT AND IT'S IMPACT ON LANDSCAPING

The area provided for landscaping at Port Authority facilities are primarily infertile sandy soils, compacted urban fill, or without soil altogether, having either low moisture capacity or excessive moisture retention, alkaline, and high in soluble salts. Such conditions are not suitable for

establishing healthy and vigorously growing plants. Additionally the locations of these areas are subject to constant winds and cyclic periods of excessive heat, drought and de-icing salts.

The Port Authority of NY/NJ has gone a long way to improving the environmental conditions required to support healthy and vigorously growing plants and turf in all contracts let in the last ten years. The basic elements including screened loam soil, planting mixes, structural soils, subsurface drainage, introduction of permanent irrigation, introduction of biostimulants, hydrogels, use of certified arborists, stringent Nursery inspections, avoidance of bird attractants, mandatory 2-year maintenance following a capital installation and follow up on-going maintenance has made this difference.

Landscape plants also require adequate root growing space to stay healthy, thrive and provide a positive, pleasing image. However, the demands for traffic improvements, parking (patron, tenant, taxi, limo, HOV, trailer trucks), elevated guideway, roadways (public, restricted service), train stations and connectors, terminal growth, control towers, heating and cooling plants and additional above ground and underground utilities are eroding away the limited available space at an alarming rate.

The major impediments to establishing trees in paved, urban areas is the lack of adequate volume of soil for tree root growth, adequate water, nutrients, oxygen, construction injury due to lack of or improper tree protection during construction, improper tree handling and planting at installation and lack of reasonable maintenance.

Research studies on urban tree plantings have established for some time that the rule-of-thumb requirement for a street tree pit should be to provide “1 cubic yard of soil volume for every 5 cubic yards of crown volume”.

DESIGN PARAMETERS / RECOMMENDATIONS

Landscaped areas can be broken down into five areas: 1) Building Site, 2) Primary Entrance/Exit Roadways, 3) Secondary Roadways, 4) Airside and 5) Tenanted spaces.

BUILDING SITE

1. Opportunities for large scale landscaping are rarely available. However opportunities for creative hardscape elements exist, such as decorative pavement treatments, environmental/art fence, bollards, canopies, and lighting.

2. The side and rear parking lot edges should have a 30 foot wide median consisting of a single row of trees, low hedge and security fence. This design element is now almost nearly impossible to implement with the requirement of parking structures and roadway improvements to meet the patrons demand for adequate daily parking availability.

3. A median 50-foot wide or more may provide an opportunity for introducing Best Management Practices including; bio-filtration, infiltration trenches and swales.

4. Small irregular islands occurring at the extreme ends of the entrance and exist to terminal frontage islands offer opportunities to provide seasonal flowering displays and masses of evergreen and deciduous groundcover. This design element actively competes with hand holes, manholes, electrical, equipment boxes, sign foundations, traffic lights and guide rail. Where this area is unsuitable for planting then a decorative hardscape pavement will be introduced.

5. Larger irregular islands provide an opportunity for ornamental trees as well as a few specimen canopy trees in order to add a sense of maturity and to soften the scale of the buildings, overpasses and wide expansive roads. This design element competes with electrical vaults, pump stations and off road parking of service vehicles.

6. Salt splash pavements at curb lines and fence lines are attractive hardscape elements as well as a means to reduce maintenance at guide rails, fence lines and roadway edges. Salt splash consisting of eight-inch hexagonal asphalt pavers laid out in a random pattern composed of two different color aggregates is evident at JFK. At EWR, the salt splash pavement is composed of three different colored concrete eco-stone pavers and allows for the water permeability. At LGA, the salt splash hardscape treatment is a simple pre-cast concrete Unilock paver. Wherever possible the saltsplash pavement should be composed of a permeable pavement system.

7. Select a standard or custom fence element and use it consistently throughout the facility. An art/environmental fence element should be used at the frontages.

8. Green roofs are an option that offer a number of sustainable attributes: a) reduces storm water runoff, b) reduces the heat island effect, c) provides thermal insulation, and d) prolong the life of the water proof membrane.

9. Street trees cannot survive the limited below grade volumes provided by the traditional 5’ X5’ tree pit. Structural soils and ‘Silva Cells’ have been introduced that span under paved surfaces which satisfy both tree and pavement requirement.

PRIMARY ENTRANCE/EXIT ROADWAYS

1. Small irregular islands should be paved with the same decorative permeable hardscape pavement used in the salt splash treated areas.

2. Larger irregular islands will provide opportunities for seasonal displays and ground cover plants as well as a few specimen canopy trees in order to add a sense of maturity and to

soften the scale of the overpasses and wide expansive roads. Seasonal displays and groundcover will be especially evident at entrance/exit ramps.

4. Medians between the roadway and the adjacent use should consist of a 30-foot wide buffer, which includes a double row of trees, low hedge, seasonal displays and groundcover and security fence. Seasonal displays and groundcover will be especially evident at the base of directory signs located on the inbound roadways.

5. Medians may also contain infiltration / filtration trenches that support vegetation while treating stormwater runoff. These bio-infiltration systems reduce downstream stormwater runoff, reduce total suspended solids, mitigate heavy metals and remove excessive nutrients.

5. Salt splash consisting of a permeable pavement system that allows stormwater infiltration and filtration. Salt splash pavement maybe introduced along roadway edges and under fences and guide rails to reduce maintenance, while providing positive year-round image.

6. A standard custom picket fence element has been identified at JFK and EWR. The fence should be used for all Port Authority and Tenanted spaces that face onto the primary entrance/exit roadways.

7. Select Tall Fescue seed cultivars that can thrive on low nutrient, low water availability and that ar“90% endophyte enhanced” variety.

SECONDARY ROADWAYS

1. Small irregular islands should be treated with hardscape, such as colored asphalt or concrete pavers.

2. Larger irregular islands will contain ornamental trees as well as a few specimen canopy trees in order to add a sense of maturity and to match the scale of the overpasses and wide expansive roads.

3. Depending on topography the area between the roadway and the adjacent use should consist of a 30-foot wide buffer, which includes a double row of trees, low hedge, seasonal displays and groundcover and security fence or a bio-infiltration / filtration trench.

4. Seasonal displays and groundcover could be evident at the base of any inbound directory signs.

5. Salt splash consisting of eight-inch hexagonal asphalt pavers laid out in a random pattern composed of two different color aggregates is evident at JFK. At EWR, the salt splash paver is composed of three different colored concrete pavers.

6. Embankments will be solidly planted with an appropriate groundcover.

7. Select Tall Fescue lawn seed cultivars that can thrive on low nutrient, low water availability and that are “90% endophyte enhanced” variety.

8. Grade conditions beneath overpasses, guide ways, guide rails will have gravel mulch or stabilized crushed stone screenings, which reduce maintenance while providing an attractive appearance.

9. Port Authority and Tenanted spaces requiring fencing should have a uniform fencing system.

AIRSIDE

1. Select Tall Fescue seed cultivars that can thrive on low nutrient, low water availability and that are “90% endophyte enhanced” variety.
2. Incorporate 2” – 6” of compost into the existing soil to increase the water holding capacity of the soil.
3. Follow the maintenance routine prescribed by Wildlife Biologist.
4. Areas likely to experience emergency vehicles and/or jet engine thrusting should have polypropylene fibers incorporated into the soil to reinforce root/soil contact.
5. Avoid surface water ponding.

DESIGN CRITERIA

A LANDSCAPE DESIGN LEAST LIKELY TO ATTRACT BIRDS SHOULD HAVE THE FOLLOWING QUALITIES:

1. Avoid plant material and design features that provide birds with a source of FOOD, WATER, COVER and SPATIAL DOMAIN.
2. Canopy trees should be planted in linear rows, canopies spaced 15-20 feet apart at maturity. (Adjacent canopies should never be touching)
3. Shrubs and small trees should be used moderately and not be planted under or directly adjacent to canopy trees. (Avoid creating eco-diversity)
4. Shrub beds should be small in size and discontinuous.
5. Flowering ornamental trees should be limited in quantity.
6. Groundcover should be well manicured, healthy, dense , moderately tall lawn, a fruitless low growing groundcover, gravel or bark mulch.
7. All plants should be planted at the same size and time.

PLANT MATERIAL

TREES

Trees shall be selected that meet the following criteria:

* To withstand pollution and tough urban environments,
* To tolerate wind and drought.
* To tolerate excessive road de-icing salts and salt-laced prevailing winds.
* To be unattractive to birds as a food source and meet FAA approval.
* To be unattractive to birds as a roosting site and meet FAA approval.
* To be primarily deciduous, since evergreen trees are an ideal bird habitat.
* To have interesting flowers, fall color, size, shape or habit.
* To be obtainable on the commercial market.
* To be not listed on any quarantine or invasive plant list

Carpinus betulus ‘Fastigiata’	Columnar Europeon Hornbean
Gleditsia triacanthos ‘Halka’	Moraine Honeylocust
Quercus phellos	Willow Oak
Quercus robor ‘Fastigiata’	Fastigiate English Oak
Quercus robor ‘Crimschmidt’	Crimson Spire Oak
Zelkova serrata ‘Green Vase’	Green Vase Zelkova

ORNAMENTAL TREES

Ornamental trees shall meet the same criteria as trees.

Chioanthus virginicus	Fringe Tree
Cornus x Ruth Ellen	Stellar White Dogwood (Fruitless)
Koelreuteria paniculata	Golden Rain Tree
Malus ‘Coralburst’	Coralburst Crabapple (Fruitless)
Malus ‘Spring Snow’	Spring Snow Crabapple (Fruitless)
Parrotia persica	Persian Parrotia
Syringa reticulata ‘Ivory Silk’	Ivory Silk Lilac

EVERGREEN TREES

Pinus flexilis	Limber Pine
Pinus pariviflora	Japanese White Pine

SHRUBS AND GROUNDCOVER

Shrubs and groundcovers shall meet the same criteria as trees.

Abelia x grandiflora ‘Edward Goucher’	Edward Goucher Abelia
Clethera alnifolia ‘Hummingbird’	Summersweet
Forsythia x ‘Goldtide’	Goldtide Forsythia
Fothergilla gardenii	Dwarf Fothergilla
Hamamelis x intermedia ‘Arnold Promise’	Arnold Promise Witchhazel
Heptacodium mconioides	Seven-Son
Hydrangea paniculata ‘Limelight’	Limelight Hydrangea
Hydrangea paniculata ‘Tardiva’	Tardiva Hydrangea
Hydrangea quercifolia ‘SnowQueen’	Snow Queen Oakleaf Hydrangea
Hypericum ‘Hidcote’	Hidcote
Juniperus chinensis sargenti	Sargent’s Chinese Juniper
Juniperus chinensis ‘Sea Green’	Sea Green Juniper
Juniperus procumbens ‘Nana’	Japanese Garden Juniper
Juniperus Sabina tamariscifolia	Tam Juniper
Itea japonica ‘Henry’s Garnet’	Henry’s Garnet Sweetspire
Potentilla fruticosa ‘Goldfinger’	Goldfinger Bush Cinquefoil
Spiraea x bumalda ‘Froebelii’	Spirea Froebelii
Spiraea x media ‘Snowstorm’	Spirea Snowstorm
Spiraea nipponica ‘Snowmound’	Snowmound Spirea
Stephanandra incisa ‘Crispa’	Lace Shrub
Syringa meyeri ‘Palibin’	Dwarf Korean Lilac
Taxus x media ‘Greenwave’	Greenwave Yew
Taxus x media ‘Tauntonii’	Taunton Spreading Yew
Taxus x media ‘Wardii’	Ward’s Yew
Weigela florida ‘Carnaval’	Carnaval Weigela
Weigela florida ‘Alexandra’	Wine & Roses Weigela
Weigela florida ‘Variegata Nana’	Dwarf Variegated Weigela

SEASONAL DISPLAY PERENNIALS

Caryopteris x clandonensis ‘First Choice’	Blue Mist Caryopteris
Coreopsis grandiflora ‘Moonbearm’	Tickseed
Eupatorium purpureum ‘Big Umbrella’	Big Umbrella Joe Pye Weed
Eupatorium purpureum ‘Gateway’	Gateway Joe Pye Weed
Hemerocallis ‘Happy Returns’	Happy returns Daylily
Hemerocallis ‘ Stella de Oro’	Stella de Oro Daylily
Hosta species	Hosta
Liriope muscari ‘Big Blue’	Big Blue Lily Turf
Nepeta faassenii ‘Walkers Low’	Walkers Low Catmint
Pennisetum alopcuroides “Cassian’	Cassian Fountain Grass
Perovskia atriplicifolia	Russian Sage
Salvia nemorosa	Meadow Sage
Sedum x ‘Autumn Joy’	Autumn Joy Sedum
Sedum ‘Mini Joy’	Mini Joy Sedum
Stachys byzantina ‘Helene von Stein’	Lambs Ears

SEASONAL DISPLAY ANNUALS

Begonia ‘Cocktail Series’	Begonia
Catharanthus roseus	Periwinkle
Coleus species	Coleus
Chrysanthemum species	Chrysanthemum
Helichrysum petiolare	Licorice plant
Lantana camara cultivars	Lantana
Petunia ‘Purple Wave’	Wave Series Petunia
Portulaca grandiflora ‘Margarita Fruit’	Rose Moss
Tithonia rotundifolia ‘Fiesta Del Sol’	Mexican Sunflower
Viola x wittrockiana cultivars	Pansy

SEASONAL DISPLAY BULBS

Daffodil x ‘Ice Follies’	Ice Follies Daffodil
Daffodil x ‘King Alfred’	King Alfred Daffodil

PLANTS SUITABALE FOR STORM WATER MANAGEMENT

	OBL	FACW	FAC
Trees & Shrubs			
Clethera alnifolia / Sweet pepperbush			X
Diervilla lonicera / Bushhoneysuckle			X
Hamamelis virginia / Witch hazel			X
Itea virginica / Sweetspire	X		
Grasses			
Calamagrostis canadensis		X	
Fescue var. Bullseye or Spider LSTall Fescue*			X
Puccinella distans / Alkali Grass			X
Perennials			
Acorus calamus / Sweet Flag		X	
Anemone canadensis / Canadian Anemone			X
Asclepias incarnata – Swamp Milkweed	X		
Eupatorium purpureum – Joe Pye Weed			X
Hibiscus moscheutos / Swamp rose-mallow	X		
Iris vericolor / Blue Flag	X		
Osmunda cinnamone / Cinnamon Fern		X	

*	>90% Endophyte Infection
OBL	Obligate Wetland species: Occur almost always in wetlands
FACW	Facultative Wetland species: Usually occur in wetlands, but occasionally found in non-wetlands.
FAC	Facultative species: Equally likely to occur in wetlands or non-wetlands.

LAWN

Select Tall Fescue cultivars that can thrive on low nutrient, low water availability and that are

“90% endophyte enhanced” variety. NO exceptions.

IRRIGATION

1. Seasonal display areas and landscaped areas adjacent to pedestrian nodes should be irrigated with automatic sprinklers that are controlled by computerized controllers connects to weather stations and soil sensors.

2. Trees, shrubs and groundcover may be irrigated with automatic sprinklers. Trees not handled by automatic sprinklers should be irrigated with TreeGaters for the first two years after installation.

3. Lawn and mature grass may not necessarily be irrigated after the initial six months after germination.

4. Water supply will be from connections to the existing water mains. The water will be metered and supplied with a backflow preventer.

5. Water supply should consider alternative sources such as roof storm water runoff and gray water.

6. Roofwater runoff may be collected in cisterns and used as a non-potable source of irrigation water.

7. Planted swales and infiltration trenches located in landscape areas carrying roadway storm water runoff.

HARDSCAPE

1. Salt splash paver - Salt splash consisting of eight-inch hexagonal asphalt pavers laid out in a random pattern composed of two different color aggregates as is evident at JFK. At EWR, the salt splash paver is composed of three different colored concrete pavers.

2. Gravel mulch is a blend of red, white and brown washed river stone., such a the Delaware River Blend.

3. Stabilized crushed stone screenings is beige, gray or a blend of crushed stone screenings treated with a stabilizer to create a semi-solid pavement.

4. Permeable concrete, asphalt pavement systems should be considered.

MAINTENANCE - THE IPM APPROACH

The goal of the Integrated Pest Management (IPM) approach is to manage pests and the environment to balance costs, benefits, public health and environmental quality. The Contractor shall employ as supervisor for the installation and maintenance a New York State Certified Arborist (represented by an individual certified and qualified to evaluate horticulture requirements). Additionally the Landscape Architect, the Facility Maintenance staff and the Contractor shall take periodic and regular walk-throughs to access the Contractor's performance and workmanship.

REDUCING CONSTRUCTION IMPACTS

Airspade – An airspade is a tool that uses compressed air to alleviate soil compaction without causing any damage to the tree roots. This method calls for the use of an air spade to loosen the soil around the tree roots and fortifying the existing soil with compost and bio-stimulants, adding no more than two inches of mulch to the surface and irrigating.

Micro-tunneling – Tunneling equipment involves a cutting tool, connecting rods and/or hoses, a unit that provides thrust or torque, and a field power unit. Tunneling can provide holes in diameter of 47 inches. Many communities now have provisions in their ordinance that address the use of tunneling rather than trenching when trees in excess of 5" DBH in public areas are encountered.

Structural Soil – Structural soil is a medium composed primarily of crushed stone, clay loam and a hydrogel stabilizing agent. The material can be compacted to meet all relevant pavement design requirements yet allow for sustainable root growth.

Silva Cell – Made of an ultra high-strength compound of primarily recycled content, this modular building block prevents soil compaction under pavements supporting traffic loads, while still providing a suitable environment for street tree growth.

Tree Protection – Tree protection measures must be implemented during construction. This means that prior to construction a suitable barrier must be erected around the existing tree zone as determined by the certified arborist. Tree protection measures include but are not limited to protecting the entire tree from mechanical damage and the roots from mechanical damage and compaction. Trees must be irrigated regularly and biostimulants and IPM practices must be conducted on a regular basis throughout the construction period. Roots must never be left exposed and allowed to desiccate.

REFERENCES

JFK Redevelopment Program Investigational Studies: Bird Hazards, Soils, Irrigation, Hanna/Olin, Ltd. December 1988

JFK International Airport Central Terminal Area: Parking Lot Perimeter, Port Authority Engineering Dept., February 1993

Vegetation Management Successfully Reduces ON-Airport Bird Attractants at John F. Kennedy International Airport, Steven D. Garber, Ph.D., The Port Authority of New York and New Jersey, 1996

Landscaping Plants and Techniques that Reduce Bird Attractants at John F. Kennedy International Airport, Steven D. Garber, Ph.D., The Port Authority of New York and New Jersey, 1997

Federal Aviation Administration – Advisory Circular No. 150/5200-33B, Hazardous Wildlife Attractants On or Near Airports, August 28, 2007

Tree Planting Guidelines, New York City Parks & Recreation, February 2003

Alternative Stormwater Management Practices, New York State Department of Environmental Conservation, 2006

Stormwater Management Practices, New Jersey Department of Environmental Protection, 2005

New York State Stormwater Management Design Manual

PORT AUTHORITY SPECIFICATIONS

02920 – Soil Testing

02921 – Screened Loam Soil

02930 – Seeding

02940 – Trees, Shrubs and Ground cover (NY)

02954 – Trees, Shrubs and Ground cover (NJ)

02958 – Tree Pruning and Removal

02959 – Tree Protection During Construction

02960 – Adding Compost

02961 – Air- Spading

02971 – Maintenance of Permanent Landscaping

APPENDIX 07

Past Projects Credit Achievement

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Berth 6 Wharf Reconstruction
FACILITY:	Port Newark
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	07195000
CONTRACT #	
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

Type digital signature here

I certify that the information contained in this document is correct and accurate.

Principal digital signature (Stage 3):

Type digital signature here

I certify that the information contained in this document is correct and accurate.

PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☑
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☐
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1		Utilize Integrated Team Approach	☐		☐
IS-2		Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5		Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6		Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8		Utilize Appropriate Vegetation	☐		☐
IS-9		Use Turfgrass Appropriately	☐		☐
IS-10		Amend and Reuse Existing Soils	☐		☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12		Coordinate Utility Work	☐		☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3		Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4		Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☑		☐
	IE-3		Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3		Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5	1	Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7		Enhance Pavement Lifecycle	☐		☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☐
	IC-2	2	Protect Existing Natural Systems	☐		☐
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5	1	Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1		Implement Sustainable Landscape Maintenance	☐		☐
	IO-2		Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **16**

RATING		POINTS	
CERTIFIED	7	to	9
GOLD	10	to	12
PLATINUM	13	to	16

POINTS ACHIEVED: **8**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Bound Creek Stormwater Mitigation
FACILITY:	Port Newark
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	PH 654.020
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☑
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☑
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	**2**	Utilize Integrated Team Approach	☑	**2**	☑
IS-2	**2**	Prepare a Site Assessment	☑	**2**	☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5	**2**	Protect the Ecological Health of Wetlands and Floodplains	☑	**2**	☐
IS-6	**1 to 3**	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8	**2**	Utilize Appropriate Vegetation	☑	**2**	☐
IS-9	**1**	Use Turfgrass Appropriately	☑	**1**	☐
IS-10	**1**	Amend and Reuse Existing Soils	☑	**1**	☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12	**2**	Coordinate Utility Work	☐		☐
IS-13	**1 to 3**	Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1	1 to 3	Implement Stormwater Best Management Practices			☑
			Project site in New Jersey (1 point)	☑	1	
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3	2	Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4	2	Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☐		
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3	1	Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7		Enhance Pavement Lifecycle	☐		☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☑
	IC-2	2	Protect Existing Natural Systems	☑	2	☑
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☐		☐
	IO-2	2	Maintain Soil Quality	☑	2	☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **46**

RATING		POINTS	
CERTIFIED	21	to	27
GOLD	28	to	34
PLATINUM	35	to	46

POINTS ACHIEVED: **21**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Rehab of CTA Roadways
FACILITY:	JFK
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	JFK 184.016
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☑
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☑
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	2	Utilize Integrated Team Approach	☑	2	☑
IS-2	2	Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4	3	Maximize Use of Known Contaminated Sites	☐		☑
IS-5	2	Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6	1 to 3	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8	2	Utilize Appropriate Vegetation	☑	2	☐
IS-9	1	Use Turfgrass Appropriately	☑	1	☐
IS-10	1	Amend and Reuse Existing Soils	☑	1	☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12		Coordinate Utility Work	☐		☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16	1 to 3	Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17	2	Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3	2	Reduce Use of Potable Water for Irrigation	☑	2	☐
	IW-4	2	Utilize End Use Metering - Water	☑	2	☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3		Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☑	1	
			Specify three (3) types of materials (2 points)	☐		
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3	1	Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☐		☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☐
	IM-8	1 to 2	Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9	2	Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☑
	IC-2	2	Protect Existing Natural Systems	☐		☐
	IC-3	1	Utilize Transportation Management During Construction	☑	1	☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☑	2	☐
	IO-2	2	Maintain Soil Quality	☑	2	☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **49**

RATING	POINTS		
CERTIFIED	22	to	29
GOLD	30	to	36
PLATINUM	37	to	49

POINTS ACHIEVED: **22**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Rehab/Replace Center Ave Ramp Extension Joints
FACILITY:	GWB
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	08506000
CONTRACT #	
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☑
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☐
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1		Utilize Integrated Team Approach	☐		☐
IS-2		Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5		Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6		Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8		Utilize Appropriate Vegetation	☐		☐
IS-9		Use Turfgrass Appropriately	☐		☐
IS-10		Amend and Reuse Existing Soils	☐		☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12		Coordinate Utility Work	☐		☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17	**2**	Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3		Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4		Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☑		☐
	IE-3		Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3		Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☑
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☐		☐
	IC-2		Protect Existing Natural Systems	☐		☐
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5	1	Reduce Noise and Vibration During Construction	☑	1	☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1		Implement Sustainable Landscape Maintenance	☐		☐
	IO-2		Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **16**

RATING		POINTS	
CERTIFIED	7	to	9
GOLD	10	to	12
PLATINUM	13	to	16

POINTS ACHIEVED: **8**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Outfalls Rehabilitation
FACILITY:	JFK
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

Type digital signature here

I certify that the information contained in this document is correct and accurate.

Principal digital signature (Stage 3):

Type digital signature here

I certify that the information contained in this document is correct and accurate.

PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☑

Choose Type of Additional Work to be Undertaken

Landscaping	☐
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1		Utilize Integrated Team Approach	☐		☐
IS-2		Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5		Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6		Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8		Utilize Appropriate Vegetation	☐		☐
IS-9		Use Turfgrass Appropriately	☐		☐
IS-10		Amend and Reuse Existing Soils	☐		☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12	**2**	Coordinate Utility Work	☐		☐
IS-13	**1 to 3**	Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3		Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4	2	Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☑
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3	1	Reuse Materials	☑	1	☑
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7		Enhance Pavement Lifecycle	☐		☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☑
	IC-2	2	Protect Existing Natural Systems	☑	2	☑
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1		Implement Sustainable Landscape Maintenance	☐		☐
	IO-2		Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **24**

RATING	POINTS		
CERTIFIED	11	to	14
GOLD	15	to	18
PLATINUM	19	to	24

POINTS ACHIEVED: **11**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Redneck Roadway Alignment
FACILITY:	Teterboro Airport
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

Type digital signature here

I certify that the information contained in this document is correct and accurate.

Principal digital signature (Stage 3):

Type digital signature here

I certify that the information contained in this document is correct and accurate.

PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☑
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☑
Exterior Lighting	☑
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	**2**	Utilize Integrated Team Approach	☑	**2**	☐
IS-2	**2**	Prepare a Site Assessment	☑	**2**	☐
IS-3	**2**	Maximize Use of Previously Developed Land	☐		☐
IS-4	**3**	Maximize Use of Known Contaminated Sites	☐		☑
IS-5	**2**	Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6	**1 to 3**	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8	**2**	Utilize Appropriate Vegetation	☑	**2**	☐
IS-9	**1**	Use Turfgrass Appropriately	☑	**1**	☐
IS-10	**1**	Amend and Reuse Existing Soils	☑	**1**	☐
IS-11	**1 to 3**	Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☑		
		50% less removal of material or less new material required (2 points)	☑	**2**	
		75% less removal of material or less new material required (3 points)	☐		
IS-12	**2**	Coordinate Utility Work	☑	**2**	☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14	**1 to 3**	Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15	**2**	Minimize Light Pollution	☑	**2**	☐
IS-16	**1 to 3**	Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☑	**1**	
		Bicycle amenities (2 points)	☐		
IS-17	**2**	Optimize Traffic Safety	☑	**2**	☐
IS-18	**2**	Optimize Roadway Alignment Selection	☐		☐
IS-19	**2**	Expand or Enhance Intermodal Connection	☐		☐
IS-20	**2**	Use Transportation System Management	☐		☐
IS-21	**1**	Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1	1 to 3	Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☑	1	
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3	2	Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4	2	Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1	2 to 6	Optimize Energy Performance			☐
			10% reduction (2 point)	☑	2	
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☐		☐
	IE-4	2	Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☐		
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☐		☐
	IM-3	1	Reuse Materials	☑	1	☐
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☐
	IC-2	2	Protect Existing Natural Systems	☑	2	☐
	IC-3	1	Utilize Transportation Management During Construction	☑	1	☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5	1	Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☑	2	☐
	IO-2	2	Maintain Soil Quality	☑	2	☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **78**

RATING		POINTS	
CERTIFIED	34	to	46
GOLD	47	to	58
PLATINUM	59	to	78

POINTS ACHIEVED: **34**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Rehab Runway 13R-31L (Bay Runway)
FACILITY:	JFK
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	7901000
CONTRACT #	JFK 1030
DATE:	

PROJECT CERTIFICATION SIGNATURES

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LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☑
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☑
Exterior Lighting	☑
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	**2**	Utilize Integrated Team Approach	☑	**2**	☐
IS-2	**2**	Prepare a Site Assessment	☑	**2**	☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4	**3**	Maximize Use of Known Contaminated Sites	☑	**3**	☑
IS-5	**2**	Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6	**1 to 3**	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8	**2**	Utilize Appropriate Vegetation	☑	**2**	☐
IS-9	**1**	Use Turfgrass Appropriately	☑	**1**	☐
IS-10	**1**	Amend and Reuse Existing Soils	☑	**1**	☐
IS-11	**1 to 3**	Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☑		
		50% less removal of material or less new material required (2 points)	☑	**2**	
		75% less removal of material or less new material required (3 points)	☐		
IS-12	**2**	Coordinate Utility Work	☑	**2**	☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14	**1 to 3**	Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☑		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☑	**2**	
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15	**2**	Minimize Light Pollution	☑	**2**	☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1	1 to 3	Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☑	3	
	IW-2	3	Implement Rainwater Neutrality	☐		☐
	IW-3	2	Reduce Use of Potable Water for Irrigation	☑	2	☐
	IW-4	2	Utilize End Use Metering - Water	☑	2	☐
ENERGY	IE-1	2 to 6	Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☐		☐
	IE-4	2	Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☑		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3	1	Reuse Materials	☑	1	☐
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☐
	IC-2	2	Protect Existing Natural Systems	☑	2	☐
	IC-3	1	Utilize Transportation Management During Construction	☑	1	☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☐		☐
	IO-2	2	Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **66**

RATING		POINTS	
CERTIFIED	30	to	39
GOLD	40	to	49
PLATINUM	50	to	66

POINTS ACHIEVED: **39**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Rehab of Runway 6-24
FACILITY:	Teterboro Airport
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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I certify that the information contained in this document is correct and accurate.

PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☑
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☑
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1		Utilize Integrated Team Approach	☑		☐
IS-2	**2**	Prepare a Site Assessment	☑	**2**	☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4	**3**	Maximize Use of Known Contaminated Sites	☑	**3**	☑
IS-5	**2**	Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6	**1 to 3**	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8	**2**	Utilize Appropriate Vegetation	☑	**2**	☐
IS-9	**1**	Use Turfgrass Appropriately	☑	**1**	☐
IS-10	**1**	Amend and Reuse Existing Soils	☑	**1**	☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☑		
		50% less removal of material or less new material required (2 points)	☑		
		75% less removal of material or less new material required (3 points)	☐		
IS-12	**2**	Coordinate Utility Work	☑	**2**	☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3	2	Reduce Use of Potable Water for Irrigation	☑	2	☐
	IW-4	2	Utilize End Use Metering - Water	☑	2	☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3		Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☑		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3	1	Reuse Materials	☑	1	☐
	IM-4		Use Durable Materials	☐		☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☐
	IM-8	1 to 2	Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1		Minimize Pollution from Construction Activity	☐		☐
	IC-2	2	Protect Existing Natural Systems	☑	2	☐
	IC-3		Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☐		☐
	IO-2	2	Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **38**

RATING		POINTS	
CERTIFIED	17	to	22
GOLD	23	to	28
PLATINUM	29	to	38

POINTS ACHIEVED: **24**

RATING ACHIEVED: **GOLD**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Sanitary Sewer Rebab
FACILITY:	SWF
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	SW 005
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☑

Choose Type of Additional Work to be Undertaken

Landscaping	☐
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1		Utilize Integrated Team Approach	☐		☐
IS-2		Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5		Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6		Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8	**2**	Utilize Appropriate Vegetation	☑	**2**	☑
IS-9	**1**	Use Turfgrass Appropriately	☑	**1**	☑
IS-10	**1**	Amend and Reuse Existing Soils	☑	**1**	☑
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12	**2**	Coordinate Utility Work	☑	**2**	☐
IS-13	**1 to 3**	Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☑	**2**	
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17		Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3		Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4	2	Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1		Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☐		
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3		Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☐		☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7		Enhance Pavement Lifecycle	☐		☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1		Minimize Pollution from Construction Activity	☐		☐
	IC-2		Protect Existing Natural Systems	☐		☐
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1		Implement Sustainable Landscape Maintenance	☐		☐
	IO-2		Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **20**

RATING	POINTS		
CERTIFIED	9	to	12
GOLD	13	to	15
PLATINUM	16	to	20

POINTS ACHIEVED: **11**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Sump Pump Room Repairs at Center Tube
FACILITY:	Lincoln Tunnel
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	LT 234-054
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☑
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☐
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1		Utilize Integrated Team Approach	☐		☐
IS-2		Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5		Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6		Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8		Utilize Appropriate Vegetation	☐		☐
IS-9		Use Turfgrass Appropriately	☐		☐
IS-10		Amend and Reuse Existing Soils	☐		☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12		Coordinate Utility Work	☐		☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14		Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17	**2**	Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3		Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4		Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1		Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☑		☐
	IE-3		Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3		Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☑	1	☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☑	1	☑
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☐
	IC-2	2	Protect Existing Natural Systems	☑	2	☑
	IC-3	1	Utilize Transportation Management During Construction	☑	1	☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5	1	Reduce Noise and Vibration During Construction	☑	1	☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1		Implement Sustainable Landscape Maintenance	☐		☐
	IO-2		Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **18**

RATING	POINTS		
CERTIFIED	8	to	11
GOLD	12	to	13
PLATINUM	14	to	18

POINTS ACHIEVED: **13**

RATING ACHIEVED: **GOLD**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Parking Lot Replacement
FACILITY:	SWF
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	SWF 164.007
DATE:	

PROJECT CERTIFICATION SIGNATURES

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LEA (stage 3) or RE (stage 4) digital signature:

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Principal digital signature (Stage 3):

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PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☐
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☑
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☑
Exterior Lighting	☑
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	**2**	Utilize Integrated Team Approach	☑	**2**	☐
IS-2	**2**	Prepare a Site Assessment	☐		☐
IS-3	**2**	Maximize Use of Previously Developed Land	☐		☐
IS-4	**3**	Maximize Use of Known Contaminated Sites	☐		☐
IS-5	**2**	Protect the Ecological Health of Wetlands and Floodplains	☑	**2**	☐
IS-6	**1 to 3**	Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☑	**2**	
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7	**1 to 3**	Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☑	**3**	
IS-8	**2**	Utilize Appropriate Vegetation	☐		☐
IS-9	**1**	Use Turfgrass Appropriately	☑	**1**	☐
IS-10	**1**	Amend and Reuse Existing Soils	☑	**1**	☐
IS-11	**1 to 3**	Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12		Coordinate Utility Work	☑		☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14	**1 to 3**	Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15	**2**	Minimize Light Pollution	☐		☐
IS-16	**1 to 3**	Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17	**2**	Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19	**2**	Expand or Enhance Intermodal Connection	☐		☐
IS-20		Use Transportation System Management	☐		☐
IS-21		Use Transportation Technologies	☐		☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1	1 to 3	Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☑	1	
			Project site in New York (3 points)	☐		
	IW-2	3	Implement Rainwater Neutrality	☑	3	☐
	IW-3	2	Reduce Use of Potable Water for Irrigation	☑	2	☐
	IW-4	2	Utilize End Use Metering - Water	☑	2	☐
ENERGY	IE-1	2 to 6	Optimize Energy Performance			☐
			10% reduction (2 point)	☑	2	
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2		Commissioning Electrical and Mechanical Systems	☐		☐
	IE-3	2	Utilize End Use Metering - Energy	☑	2	☐
	IE-4	2	Use On-Site Renewable Energy	☑	2	☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6	2	Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1	1 to 3	Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☑	2	
			Specify five (5) types of materials (3 points)	☐		
	IM-2	1	Use Local / Regional Materials	☑	1	☐
	IM-3	1	Reuse Materials	☐		☐
	IM-4	1	Use Durable Materials	☐		☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7	1	Enhance Pavement Lifecycle	☐		☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9	2	Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1	2	Minimize Pollution from Construction Activity	☑	2	☐
	IC-2	2	Protect Existing Natural Systems	☑	2	☐
	IC-3	1	Utilize Transportation Management During Construction	☐		☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☐
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1	2	Implement Sustainable Landscape Maintenance	☑	2	☐
	IO-2	2	Maintain Soil Quality	☑	2	☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **80**

RATING	POINTS		
CERTIFIED	36	to	47
GOLD	48	to	59
PLATINUM	60	to	80

POINTS ACHIEVED: **38**

RATING ACHIEVED: **CERTIFIED**

SUSTAINABLE DESIGN PROJECT MANUAL FOR INFRASTRUCTURE PROJECTS **PORT AUTHORITY OF NY & NJ**

PROJECT CREDIT CHECKLIST FORM

GENERAL PROJECT INFORMATION

PROJECT NAME:	Rehab of Traffic Signal System
FACILITY:	
LE/A or RE:	
PHONE NUMBER:	
EMAIL ADDRESS:	
PID #	
CONTRACT #	JFK-134.388
DATE:	

PROJECT CERTIFICATION SIGNATURES

By entering the names below as a digital signature, the LEA and Principal Engineer certify that all information in this document is correct and accurate.

LEA (stage 3) or RE (stage 4) digital signature:

Type digital signature here

I certify that the information contained in this document is correct and accurate.

Principal digital signature (Stage 3):

Type digital signature here

I certify that the information contained in this document is correct and accurate.

PROJECT TYPE

Choose a Project Type

Airfield New Construction / Reconstruction	☐
Airfield Pavement Rehabilitation	☐
Bridge - New	☐
Bridge and Tunnel Rehabilitation	☐
Civil - Work Orders	☐
Intelligent transportation System	☑
Marine Structures - Docks, Wharves, Bulkheads, etc.	☐
Parking Lot New Construction / Reconstruction	☐
Parking Lot Rehabilitation	☐
Port Site Work	☐
Roadway New Construction / Reconstruction	☐
Roadway Pavement Rehabilitation	☐
Trackwork	☐
Utility New Construction	☐
Utility Rehabilitation	☐

Choose Type of Additional Work to be Undertaken

Landscaping	☐
Exterior Lighting	☐
MECH / EL / Fire Suppression System Installation	☐

SITE

CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT?	POINTS ACHIEVED	INCLUDE CREDIT
IS-1	2	Utilize Integrated Team Approach	☐		☐
IS-2		Prepare a Site Assessment	☐		☐
IS-3		Maximize Use of Previously Developed Land	☐		☐
IS-4		Maximize Use of Known Contaminated Sites	☐		☐
IS-5		Protect the Ecological Health of Wetlands and Floodplains	☐		☐
IS-6		Protect and Maintain Absorbent Landscapes			☐
		15% of absorbant landscape protected and maintained (1 point)	☐		
		30% of absorbant landscape protected and maintained (2 points)	☐		
		45% of absorbant landscape protected and maintained (3 points)	☐		
IS-7		Utilize Pervious Pavements			☐
		25% of total pavement area utilizes pervious pavement (1 point)	☐		
		50% of total pavement area utilizes pervious pavement (2 points)	☐		
		75% of total pavement area utilizes pervious pavement (3 points)	☐		
IS-8		Utilize Appropriate Vegetation	☐		☐
IS-9		Use Turfgrass Appropriately	☐		☐
IS-10		Amend and Reuse Existing Soils	☐		☐
IS-11		Balance Earthwork			☐
		25% less removal of material or less new material required (1 point)	☐		
		50% less removal of material or less new material required (2 points)	☐		
		75% less removal of material or less new material required (3 points)	☐		
IS-12	2	Coordinate Utility Work	☑	2	☐
IS-13		Utilize Trenchless Technology			☐
		Rehabilitation of existing pipe (2 points)	☐		
		Replacement of pipe (1 point)	☐		
IS-14	1 to 3	Mitigate Heat Island Effect			☐
		50% of site area utilizes heat island effect mitigation strategies (1 point)	☐		
		75% of site area utilizes heat island effect mitigation strategies (2 points)	☐		
		95% of site area utilizes heat island effect mitigation strategies (3 points)	☐		
IS-15		Minimize Light Pollution	☐		☐
IS-16		Optimize Public Environments - Bicycles and Pedestrians			☐
		Pedestrian amenities (1 point)	☐		
		Bicycle amenities (2 points)	☐		
IS-17	2	Optimize Traffic Safety	☐		☐
IS-18		Optimize Roadway Alignment Selection	☐		☐
IS-19		Expand or Enhance Intermodal Connection	☐		☐
IS-20	2	Use Transportation System Management	☑	2	☑
IS-21	1	Use Transportation Technologies	☑	1	☐

	CREDIT NUMBER	POINTS ACHIEVABLE	CREDIT NAME	PURSUING CREDIT Y / N	POINTS ACHIEVED	INCLUDE CREDIT
WATER	IW-1		Implement Stormwater Best Management Practices			☐
			Project site in New Jersey (1 point)	☐		
			Project site in New York (3 points)	☐		
	IW-2		Implement Rainwater Neutrality	☐		☐
	IW-3		Reduce Use of Potable Water for Irrigation	☐		☐
	IW-4		Utilize End Use Metering - Water	☐		☐
ENERGY	IE-1	2 to 6	Optimize Energy Performance			☐
			10% reduction (2 point)	☐		
			20% reduction (4 points)	☐		
			30% reduction (6 points)	☐		
	IE-2	3	Commissioning Electrical and Mechanical Systems	☑	3	☐
	IE-3		Utilize End Use Metering - Energy	☐		☐
	IE-4		Use On-Site Renewable Energy	☐		☐
	IE-5		Protect Ozone Layer	☐		☐
	IE-6		Provide Alternative Fueling Stations	☐		☐
MATERIAL	IM-1		Use Recycled Materials			☐
			Specify one (1) type of material (1 point)	☐		
			Specify three (3) types of materials (2 points)	☐		
			Specify five (5) types of materials (3 points)	☐		
	IM-2		Use Local / Regional Materials	☐		☐
	IM-3		Reuse Materials	☐		☐
	IM-4		Use Durable Materials	☐		☐
	IM-5		Use Sustainably Harvested Wood	☐		☐
	IM-6		Minimize Use of Toxic and / or Hazardous Materials	☐		☐
	IM-7		Enhance Pavement Lifecycle	☐		☐
	IM-8		Utilize Thin Surface Paving			☐
			Use of thin surface paving (1 point)	☐		
			Use of thin asphalt concrete overlay < 1" thick (1 point)	☐		
	IM-9		Utilize Warm Mix Asphalt Technology	☐		☐
CONSTRUCTION	IC-1		Minimize Pollution from Construction Activity	☐		☐
	IC-2		Protect Existing Natural Systems	☐		☐
	IC-3	1	Utilize Transportation Management During Construction	☑	1	☐
	IC-4	1	Utilize Green Construction Equipment	☑	1	☐
	IC-5		Reduce Noise and Vibration During Construction	☐		☐
	IC-6	1 to 2	Implement Construction Waste Management			☑
			75% diversion - all required materials (1point)	☑	1	
			75% diversion - all recommended materials (1 point)	☐		
	IC-7	1	Implement Integrated Pest Management During Construction			☐
O + M	IO-1		Implement Sustainable Landscape Maintenance	☐		☐
	IO-2		Maintain Soil Quality	☐		☐

TOTAL POINTS

TOTAL POINTS ACHIEVABLE: **26**

RATING		POINTS		
CERTIFIED	11	to	15	
GOLD	16	to	19	
PLATINUM	20	to	26	

POINTS ACHIEVED: **11**

RATING ACHIEVED: **CERTIFIED**

APPENDIX 08

Infrastructure Project Type Definitions

INFRASTRUCTURE PROJECT TYPES

Airfield New Construction /Reconstruction
The construction of new runway/taxiway or apron construction or the complete reconstruction of a runway, taxiway or apron. An example of reconstruction would be the Bay Runway project.

Airfield Rehabilitation
The milling and overlaying of a runway, taxiway or apron with airfield lighting work included.

Bridges New Construction/Reconstruction
The construction of a new bridge.

Bridge and Tunnel Rehabilitation
The rehabilitation of bridge and tunnel structures. This would not include roadway or deck pavement rehabilitation.

Civil Work Orders
Unit price contract to implement routine pavement and utility repair at each facility.

Intelligent Transportation Systems
Transportation technology implementations, e.g., electronic highway signs, surveillance cameras, roadway sensors, etc., generally intended to improve traffic flow, promote safety, reduce emissions, improve traveler information and travel reliability, and enhance overall transportation system network performance.

Marine Structures (Docks, Wharves, Bulkheads, etc.)
The rehabilitation /replacement /or new construction of docks, wharves, piers, decks or bulkheads.

Parking Lot New Construction/Reconstruction
The construction of a new parking lot or the complete reconstruction of an existing lot. Complete reconstruction would involve full depth pavement rehabilitation and major changes to the drainage system.

Parking Lot Rehabilitation
The milling and overlaying of an existing parking lot.

Port Site Work
A major Port sitework project involving roadways, significant utility work and possibly container areas. This type could potentially also include intermodal yards with significant utility work.

Roadway New Construction / Reconstruction
The construction of a new roadway or the reconstruction of an existing roadway. Reconstruction would generally entail full depth pavement replacement and major changes to the drainage system.

Roadway Pavement Rehabilitation
The milling and overlay of an existing roadway including tunnel and bridge roadways.

Utility New Construction
The construction of new subsurface utility systems.

Utility Rehabilitation
The rehabilitation or replacement of a subsurface utility system.

Trackwork
The construction of new or the removal and replacement of existing trackwork.

Associated Infrastructure Scopes of Work

Exterior Lighting
The rehabilitation /replacement /or new construction of exterior lighting for airfield*, parking lot, roadway and general site lighting.
**Airfield lighting can be exempt if efficient lighting is not permitted due to regulations*.

Landscaping
1. Runway Safety Areas

- Runway Tree Obstructions – perform tree crown reductions (pruning) and tree removals in order to remove obstructions, which have grown into the runway, approach as per FAA requirements.
- Airside Seeding – provide appropriate tall fescue seed and installation practices that reduce hazards to aviation as per FAA requirements.

2. Stormwater Landscape BMP's

- Seeding – provide appropriate tall fescue seed and installation practices that provide soil erosion and sediment control.
- Absorbent Landscapes – provide appropriate plants, pervious pavement and installation practices that provide storm water infiltration and filtration.

3. Wetland Mitigation

- Intertidal Wetland enhancement – Provide conceptual design, contract drawings and maintenance and monitoring program per permit requirement.

4. Landscape /Hardscape

- Landscape plants – provide appropriate landscape plants and maintenance requirements.
- Hardscape – provide permeable pavement systems, ornamental fence other site furnishings.

Mechanical/Electrical/Fire Suppression Systems

Traffic Safety and Public Environments
Projects that reduce the frequency and severity of motor vehicle, pedestrian and bicyclist crashes and improve public environmental quality as well as pedestrian and bicyclist safety, health and accessibility by providing dedicated pedestrian and bike zones and amenities, such as secure public bike racks, and convenient access to mass transit.