

Massachusetts Port Authority

Capital Programs and Environmental Affairs Department



Sustainable Design Standards and Guidelines

Version 1
June 2009



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Section 1 - Introduction

1.1 Description of Massport

The Massachusetts Port Authority (Massport) is an independent public authority which develops, promotes and manages airports, the seaport and transportation infrastructure to enable Massachusetts and New England to compete successfully in the global marketplace. Massport's portfolio includes Logan Airport, Hanscom Field, Worcester Airport (operated, not owned, by Massport), the Boston-area public Maritime ports, Tobin Memorial Bridge, four parks, and numerous development properties in South Boston, East Boston, and Charlestown.

Massport's mission is to promote economic growth and vitality throughout Massachusetts and New England by operating many of the region's largest transportation facilities safely, securely and efficiently while being mindful of the environment and our neighboring communities.

Whether by air, sea or land, the Massachusetts Port Authority is New England's Gateway to the world.

By air, Massport operates Boston Logan International Airport, with 26.1 million passengers served in 2008. Some 50 airlines provide Logan's passengers with more than 100 nonstop domestic and international destinations. In the last decade, Massport and its airline partners have invested more than \$4.4 billion to build a new runway, roadways, and terminals.

Massport operates two other airports in the region: L.G. Hanscom Field in Bedford and Worcester Regional Airport. L.G. Hanscom Field is the region's largest general aviation airport and "the face of corporate Massachusetts," providing services to private and corporate aircraft and limited commercial service. Worcester Regional Airport, also providing limited commercial service, is operated by Massport and is in a position to play an important part in the regional transportation network and Central Massachusetts' economic development strategy.

By sea, more than one million tons of cargo pass through Massport's terminals in the Port of Boston each year. The Port of Boston provides the shipping facilities New England needs to be a major international trader. Massport's Black Falcon Cruise Terminal is a favorite port-of-call with luxury cruise passengers, who have rewarded Boston with a string of record-breaking seasons over the past decade.

By land, Massport also runs the Tobin Memorial Bridge, which is the link between Boston and the North Shore for 36,000 commuters each day.

Altogether, these facilities form an integrated transportation network that serves as the foundation of economic prosperity in a global economy.



Massport is governed by a seven member Board appointed by the Governor. The authority is self-supporting and receives no state tax funds to support its operations or facilities. A recent economic impact report estimates that Massport contributes \$8.7 billion a year in total economic impact.

Massport has received recognition for excellence across the spectrum of its operational and management responsibilities. It is one of only a handful of airports earning AA ratings from the national bond rating agencies, has been recognized for leading the country's airports in security initiatives since 9-11, and has won national awards in operational categories from snow removal to revenue and concession innovations to environmental and planning initiatives. With a comprehensive \$4.5 billion modernization of most of its facilities over the last decade, and plans for more improvements in the years to come, Massport is poised to play an even more significant role in the region's economy.

1.2 Massport's Commitment to Sustainability

These Sustainable Design Standards and Guidelines are one component of Massport's overall sustainability program, which include diverse sustainability initiatives ranging from facilities maintenance to innovative partnerships and public incentives. All aspects of Massport's sustainability program are based upon a foundational definition of sustainable development determined by the Brundtland Commission and the "triple bottom line" (TBL) approach to applied sustainability, as describe below.

The Brundtland Commission, also known as the World Commission on Environment and Development, was convened by the United Nations (UN) in 1983 to address a growing concern "about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development." In 1987, the Brundtland Commission released their report, entitled *Our Common Future*, in which they defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Seven years later in 1994, businessman and entrepreneur John Elkington coined the phrase "the triple bottom line" (TBL) to describe a practical approach to sustainability. The TBL has since become a widely accepted concept for sustainability management around the world. The TBL states that success is measured not only by financial performance (the traditional bottom line), but by balanced achievements in environmental stewardship, economic growth and social responsibility. The TBL is achieved when an integrated solution is found that simultaneously achieves excellence in these components, as opposed to finding tradeoffs among these areas.

The findings of the Brundtland Commission and the TBL approach to sustainability serve as the foundational basis and driver for the development of Massport's sustainability program. Although the need for sustainable development is global in nature, responses begin on a local and regional level. The Standards will enhance Massport's response in addressing this challenge.

Massport has a long history of sustainable achievements, recognized most recently by the Airport Council International – North America and the Commonwealth of Massachusetts's "Leading by Example" Program.



Some examples of past and present sustainable initiatives undertaken by the Authority and resulting in clear benefits to the environment, community, and regional economy include:

- Implementation of a comprehensive solid waste and recycling program
- Development of an Energy Master Plan
- Development and documentation of greenhouse gas and emissions inventories for Logan Airport and the Port properties
- Deployment of a CNG bus fleet at Logan Airport
- Participation in the City of Boston's Clean Cabs Program
- Management of ISO 14001 Certified Environmental Management Systems at Logan Airport, Conley Terminal, Hanscom Field, and the Tobin Bridge
- Renewable energy pilot projects
- Comprehensive annual environmental data reporting for Logan Airport
- Development of the first LEED® Certified airport terminal in the world
- Noise Abatement program
- Parks and Edge Buffer development and management, including the support of community programs on those properties
- Operational programs, such as a green cleaning program, nighttime shutdown of the moving walkways at Logan Airport, and the installation of Eco-Start motors on all moving walkways and escalators at Logan Airport.

Massport is committed at all management levels to continue its pursuit in improving overall sustainability performance of its organization's operations and projects.



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Message from the Director of Capital Programs and Environmental Affairs

The Massachusetts Port Authority's Capital Programs and Environmental Affairs Department has developed these Sustainable Design Guidelines and Standards (Standards) with input and support from all Massport Departments. This was a successful collaboration that was designed to ensure that sustainable design and construction objectives are appropriately incorporated into the implementation of Massport's Capital Program. These Standards will be applicable to all Projects within the Capital Program, horizontal and vertical, and we look forward to working with our Tenants and other stakeholders to expand our sustainability efforts.

These Standards are consistent with Massport's mission to strive to minimize the impact of its operations on the environment through the continuous improvement of its environmental performance and the implementation of pollution prevention measures, including energy efficiency programs, both to the extent feasible and practicable in a manner that is consistent with Massport's overall mission and goals.

Although there are a number of "Green Guidelines" around the United States, including the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) Green Building Rating System and the Massachusetts Leading By Example Program, among others, there are issues that are unique to transportation agencies that suggest strategies and guidelines that go beyond individual buildings.

Recognizing that sustainability is a process rather than an endpoint, Massport expects to continuously review and update these Standards. We will be tracking our progress as the Standards are implemented to ensure that sustainable design measures are incorporated in every element of Massport's Capital Program to the maximum practicable extent.

We encourage you to adopt and treat these standards as an integral part of your projects and we look forward to working with you in making sustainability a way of life at Massport

Sincerely,

Houssam H. Sleiman, P.E., CCM
Director of Capital Programs and Environmental Affairs

1.3 Acknowledgements

This document was developed by an interdepartmental working group formed with the goal of developing a Massport-wide Sustainable Design Guidelines and Standards as well as a Documentation System that would result in the most sustainable projects possible for all capital projects undertaken by Massport. The committee spent many hours drafting, reviewing, and discussing documents and each member deserves special recognition and appreciation.

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Particular appreciation is extended to the Los Angeles World Airports (LAWA) for their support and cooperation. Massport used the LAWA Sustainable Planning, Design, and Construction Guidelines, Sustainable Design Guidelines for New Construction by the Port Authority of New York and New Jersey Engineering Department, and the O'Hare Modernization Program Sustainable Design Manual extensively as references.

1.4 Use of this document

These Sustainable Design Guidelines and Standards (“Standards”) are intended to be used by architects, engineers, and planners working on capital projects for the Massachusetts Port Authority (Massport). The Standards apply to both new construction and rehabilitation projects (building and non-building) of any square footage or monetary value. The document may also be used by architects, engineers, and planners working on tenant alterations or development projects on Massport property. Massport’s Standard Professional Services Agreement and Capital Programs – Manual II – Guidelines for Consultants have been updated to reflect the development and implementation of the Standards on all Capital Projects.

The Standards are tailored to Massport’s operations, facilities, and geography. They are not intended to supplant LEED® or other third-party verifications where applicable but rather to ensure Massport’s leadership in sustainable development for of its projects and properties. The Standards were drafted to allow and encourage innovation and incorporation of new technologies wherever possible rather than be prescriptive with solutions.

This document is meant to be used in coordination with and not to supersede any other standards, codes, or regulations applicable to Massport capital projects.



Detailed Instructions

General

Each section is structured to give the general intent of the design standard, required actions, required documentation, and suggested strategies for achieving the topic's intent. The document is designed to encourage innovation. If the architect, engineer or planner feels that it is possible to meet a topic's intent outside of the required actions or with an emerging technology, the user may submit an Innovation Worksheet to Massport for approval. See Appendix B for a sample Innovation Worksheet.

Step 1

Review document sections and topics to determine which topics are applicable within the project scope and boundaries.

Step 2

After the preliminary project definition meeting, document the applicable topics on a rating checklist (see Appendix A). Submit an electronic copy of the rating checklist to the Project Manager and Sustainability Program Manager.

Step 3

As the design progresses, implement as many sustainable design strategies as possible within the project scope and budget. The project is required to implement at least 40% of the applicable topics. Electronically submit updated rating checklist reflecting the applicable topics and achieved strategies to the Project Manager and Sustainability Program Manager at the 30% and 60% design stages.

Step 4 (discretionary)

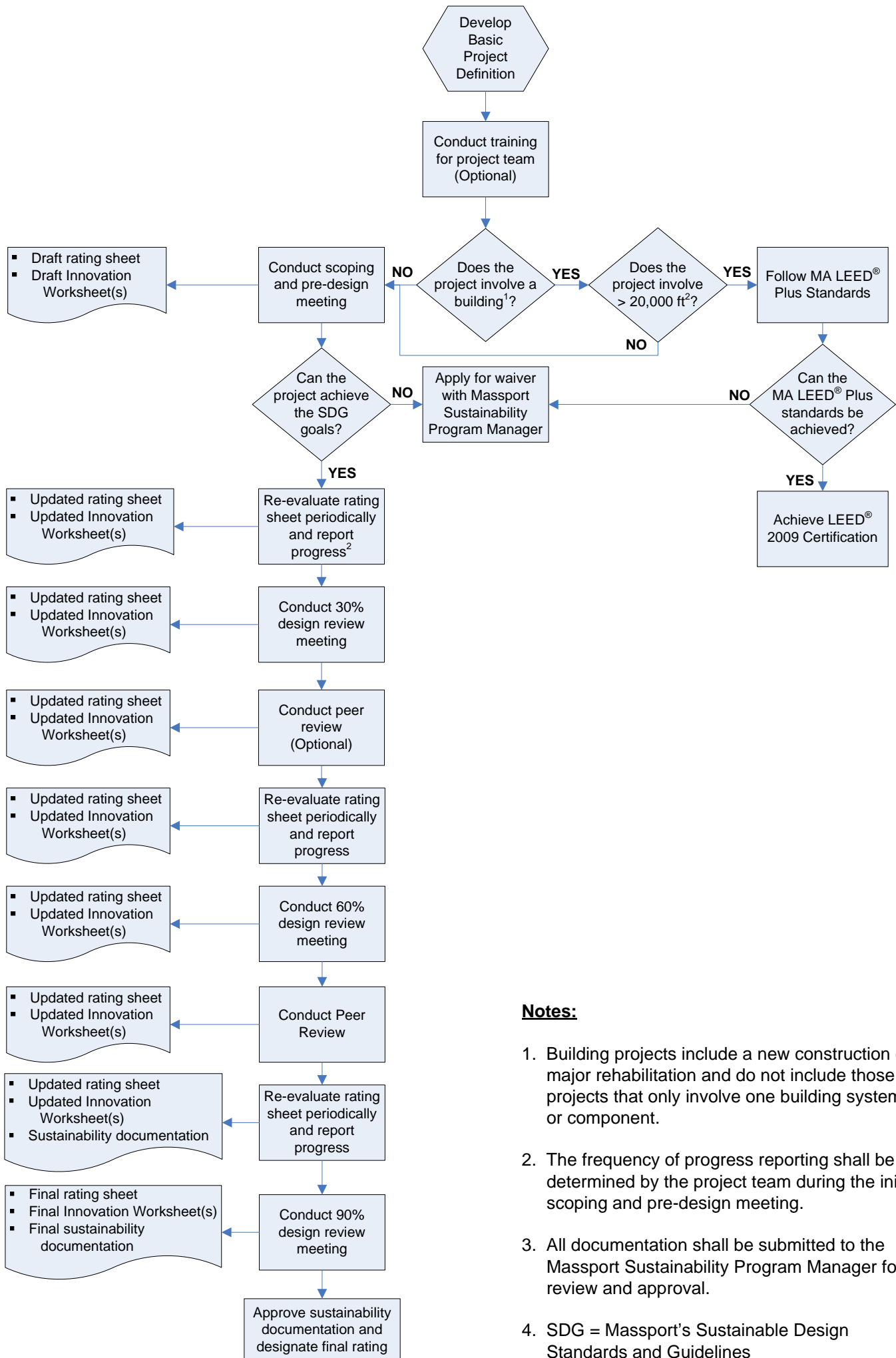
The Project Manager or Sustainability Program Manager may call for an outside sustainability peer review of the design, usually at the 60% design stage.

Step 5

Submit the final, completed rating checklist and all required documentation to the Project Manager with the 90% design submittal.

The final project rating will be based off of the 90% design submittal unless substantial changes are made prior to the issuance of the bid documents. If the Consultant is unable to implement at least 40% of the identified applicable design topics, a waiver form must be submitted to the Sustainability Program Manager as early in the design process as possible. See Appendix C for the Waiver Form. Submission of a waiver form will automatically trigger a sustainability peer review of the project.

Implementation Process for Massport's Sustainable Design Standards and Guidelines



Notes:

1. Building projects include a new construction or major rehabilitation and do not include those projects that only involve one building system or component.
2. The frequency of progress reporting shall be determined by the project team during the initial scoping and pre-design meeting.
3. All documentation shall be submitted to the Massport Sustainability Program Manager for review and approval.
4. SDG = Massport's Sustainable Design Standards and Guidelines

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Section 2 - Performance Standards

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2.1 GENERAL

Project Definition

Intent Clearly state intent, goal and scope of project and receive approvals from all project stakeholders, including but not limited to Massport Capital Programs Department, key operators of the facility, tenants, the FAA, federal, state and local regulators, and community groups.	
Required Actions for Credit <ul style="list-style-type: none">■ Pre-design meeting with project stakeholders to define project intent, scope, goals and boundaries	Strategies <ul style="list-style-type: none">■ Develop a project charter■ Conduct a stakeholder identification process prior to project definition meeting■ Utilize the rating checklist (Appendix A) to establish scope and goals of the project.
Required Documentation <ul style="list-style-type: none">■ Dated project statement with intent, scope, goals, and boundaries outlined and signed-off on by all project stakeholders	
Benefits <ul style="list-style-type: none">■ Best project outcome due to clear scope definition■ Early identification and involvement of all stakeholders■ Fewer design and construction changes, saving time and money■ Clear scope for sustainability initiatives	

Project Sustainability Progress Meetings

<p>Intent</p> <p>Involve all project stakeholders in the development of sustainability goals and innovative ideas for the project and keep all stakeholders updated and engaged on progress toward these goals throughout design.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Conduct initial Sustainability Project Planning Meeting <ol style="list-style-type: none"> 1. Engage all project stakeholders 2. Set expectations for the level of sustainability performance on the project 3. Identify sustainability goals for the project and identify any potential barriers ■ Conduct regular Sustainability Progress Meetings <ol style="list-style-type: none"> 1. At a minimum, progress meetings should be held at 30%, 60%, and 90% design stages 2. Engage all project stakeholders 3. Review sustainability performance expectation as established at the initial Sustainability Project Planning Meeting 4. Review progress toward project sustainability goals 5. Identify and work to overcome obstacles 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Provide training on Massport's sustainability vision and design standards and requirements ■ Review all Massport sustainability requirements ■ Designate a sustainability lead for the project team ■ Establish a meeting schedule at the start of the project ■ Establish a tracking system to record completion of project milestones.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Meeting agendas and minutes, including names and organizations of all participants ■ Updated rating checklist for the project after each meeting 	<p>Additional Credits</p> <ul style="list-style-type: none"> ■ 1 point for each sustainability progress meeting beyond the 30%, 60%, and 90% design reviews. Maximum of 2 additional points.
<p>Benefits</p> <ul style="list-style-type: none"> ■ Reinforces Massport's Sustainability Vision and Principles. ■ Sets expectations for the level of sustainability performance throughout the project. ■ Gains active participation from all stakeholders. ■ Identifies barriers early and helps to determine the best resolution(s). ■ Promotes innovative ideas and concepts to be integrated into the project. ■ Reduces the need for redesign during the various design stages. 	



Benefits (cont.)

- Enables open and clear communication with the project team to facilitate completion of project tasks.
- Provides a forum to obtain and disseminate information on the status of project-specific tasks and goals.
- Identifies obstacles to achieving milestones and develops solutions.
- Develops a clearly defined set of action items and assignments.
- Reinforces life-cycle benefits of sustainable design
- Encourages interdisciplinary coordination

Design Documents and Construction Submittals

Intent Minimize waste and resource consumption and foster awareness of sustainability.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Project Paper-Saving Plan incorporating, at a minimum: <ol style="list-style-type: none"> 1. Electronic Submissions <ul style="list-style-type: none"> – Electronic submittals of documents accompanied by a maximum of three printed copies – Where appropriate, technology to enable electronic viewing and commenting on submittals. 2. Recycled and bleach-free paper <ul style="list-style-type: none"> – Submit all printed project deliverables on recycled content paper, with the exception of those with specialized graphics. – Paper products used shall be manufactured from a bleach free process. – Paper products used shall be at least 30% recycled. 3. Double-sided printing <ul style="list-style-type: none"> – Submit all project deliverables, with the exception of project Plans and those with specialized graphics, in double-sided format. – Extend these required actions and targets to print shops when printing needs are sourced out. ■ Include above requirements in construction specifications for construction submittals 	Strategies <ul style="list-style-type: none"> ■ Utilize CDs, FTP sites, eRooms, project websites, and other innovative information technology exchanges. ■ Identify all recycled content paper product lines that are available. ■ Use “printed on recycled content and bleach free paper” on footers of all documents. ■ When purchasing new copiers or printers, purchase machines that offer double- sided printing. ■ Set the default settings for all printers and copiers to print double-sided. ■ Provide training materials to facilitate the use of double-sided printing capabilities.
	Additional Credits 1 point for the creation of a project website

Required Documentation

- Construction specifications stating use of recycling paper, double-sided submittals, and electronic submissions
- Design document paper-saving plan that outlines project use of recycled paper, double-sided printing, and electronic submissions
- List of all project documents that indicate whether each met the required actions.

Benefits

- Reduces paper usage
- Minimizes resource consumption
- Reduces the environmental impacts from the paper manufacturing and bleaching process.
- Saves purchasing cost of paper
- Reduces consumption and waste associated with standard printing, including paper, ink, and plastics
- Avoids use of fossil fuels associated with couriers and standard mailing
- Reduces costs of deliverable production and delivery
- Electronic submission allows the reader to customize the use of print media to review specific aspects of documents.
- Electronic submission allows quick access to documents while enabling confidentiality.
- Streamlines communication through electronic submittals of revisions, amendments, etc.
- Reduces physical space needed to house document submittals

Systems Commissioning

Intent

Verify systems have been installed, calibrated, and performed according to design specifications.

Required Actions for Credit

- Develop a Project Commissioning Plan in the early stages of design, including commissioning requirements for the following systems, as applicable:
 - Central Building Automation system
 - All HVAC system equipment
 - Lighting controls and sensors
 - Site Lighting
 - Refrigeration systems
 - Vertical Transport
 - Building Envelope
 - Uninterruptible Power Supply systems
 - Lightning Protection
 - Domestic and Process water pumping and mixing systems
 - Equipment sound control systems
 - Data and Communication systems
 - Paging systems
 - Security systems
 - Irrigation systems
 - Plumbing
 - Emergency Power generators and automated power transfer switching
 - Life Safety Systems
 - Runway lighting and illuminated signage
 - Runway NAVAIDS
 - Traffic systems
 - Pump systems
 - Oil/Water separators
 - Backup energy supply systems
- Incorporate project commissioning into the project specifications
- Engage an independent Commissioning Agent
- Verify all systems have been commissioned according to the Project Commissioning Plan
- Conduct training for operators of the final project

Strategies

- Identify an individual to lead commissioning process early on.
- Develop Owner's project requirement early on.
- Review the design intent and the basis of design documentation.
- Incorporate commissioning requirements into the construction documents.
- Develop and utilize a commissioning plan, including long term periodic assessments of building systems functioning.
- Verify installation, functional performance, training, operations and maintenance documentation.
- Evaluate whether energy systems have been sized appropriately

Additional Credits

- 1 additional point for every certified commissioning agent on the project team. Maximum of 2 additional points



Required Documentation

- Project Commissioning Plan
- Commissioning Report with test results and any corrective actions documented
- O&M training sign-in sheets

Benefits

- Ensures optimal performance of building systems
- Ensures training of facility personnel on operations and maintenance
- Reduces operation and maintenance costs
- Reduces energy consumption
- Decreases carbon footprint
- Reduces environmental impact related to energy production
- Potentially reduces warranty calls

Water Reduction and Recycling Infrastructure

Intent Incorporate Massport's waste reduction and recycling programs into every project.		
Required Actions for Credit <ul style="list-style-type: none"> ■ Designate locations for recycling receptacles on project plans ■ Designate locations for recycling dumpsters on project plans 	Strategies <ul style="list-style-type: none"> ■ Locate receptacles in high-traffic areas ■ Create "recycling stations" with special signage ■ Co-locate recycling receptacles with trash barrels ■ Locate receptacles where waste is generated ■ Consider both back-of-house recycling and public recycling programs ■ Recycling receptacles should be visible from all areas of the building ■ Consider ease of use and access when situating recycling dumpsters ■ Allow for program expansion ■ Consider mixed paper, cardboard, plastic, aluminum, glass, and composting programs ■ Consider single-stream recycling 	
Required Documentation <ul style="list-style-type: none"> ■ Project plan clearly designating locations for recycling receptacles and recycling dumpsters 		
Benefits <ul style="list-style-type: none"> ■ Improves recycling participation ■ Reduces waste disposal costs ■ Reduces single-use consumption ■ Fosters awareness of recycling benefits and programs ■ Decreases need for virgin nature resources ■ Reduces environmental impact from nature resource extraction and processing ■ Reduces energy consumption from processing of virgin materials 		



Deconstruction and Material Re-use Considerations

Intent

Design so that materials can be salvaged and reused on- or off-site when the project is at the end of its useful life. Design for disassembly rather than demolition.

Required Actions for Credit

- Consider future value of materials during selection
- Consider future uses of project components
- Detail connections for disassembly

Required Documentation

- Summary of project considerations for deconstruction, including all detail connections for disassembly

Strategies

- Design for efficient reuse of structures/spaces – flexible materials and dimensions
- Consider structure and component lifecycle.
- Refer to King County Guide to Design for Deconstruction (http://www.metrokc.gov/dnrp/swd/greenbuilding/documents/Design_for-Disassembly-guide.pdf)
- Use homogenous materials whenever possible.

Benefits

- Decreases landfill needs and costs
- Decreases costs for re-use of salvaged materials
- Increases revenues from sale of salvaged materials
- Decreases need for virgin nature resources
- Reduces environmental impact from nature resource extraction and processing
- Reclaims some of the project's embodied energy

Operations & Maintenance Program

Intent

Establish a clear and effective operations and maintenance program and ensure that all facilities personnel are trained in proper operations and maintenance procedures.

Required Actions for Credit

- Specify the development of a comprehensive operation and maintenance (O&M) Manual, including record logs, for all systems and operations. Manual must provide a summary of step-by-step instructions for operation and maintenance, checklists, schedules, and data log sheets to facilitate the proper operation and maintenance of the systems and a description of how each system affects other systems. The following must be included (as applicable):
 1. Central Building Automation System
 2. All HVAC system equipment
 3. Lighting controls and sensors
 4. Refrigeration systems
 5. Vertical Transport
 6. Building Envelope
 7. Emergency Power Generators & Automatic Transfer Switching
 8. Uninterruptible Power Supply systems
 9. Life Safety systems
 10. Lightning Protection
 11. Domestic and Process water pumping and mixing systems
 12. Equipment sound control systems
 13. Data and Communication systems
 14. Paging systems
 15. Security systems
 16. Irrigation systems
 17. Plumbing and fixtures
- Specify the maintenance program(s) to incorporate features of reactive, preventative, predictive and reliability centered maintenance, depending on the criticality of the system or equipment.
- Specify comprehensive training to all appropriate personnel.

Strategies

- Engage operators in start-up and commissioning to help them develop the understanding they need to operate the system in accordance with the design intent.
- Provide a full set of design and construction documents to the system operators.
- Evaluate each component of each system and incorporate the proper maintenance strategy to minimize unnecessary maintenance while maximizing system up-time.
- Use of low maintenance/durable materials to minimize maintenance/replacement costs.
- In the O&M Manual, include a requirement and comprehensive instructions for displaying a hard copy of the Manual for all interested parties and updating the Manual annually.



Required Documentation

- O&M program specifications for all systems

Benefits

- Reduces energy costs
- Increases the safety of all staff
- Improves the comfort, health and safety of users
- Confirms the design life expectancy of equipment is achieved.
- Facilitates the compliance with federal legislation such as the Clean Air Act and the Clean Water Act.
- Decreases environmental footprint of operations.
- Increases system efficiency
- Decreases system downtime

Professional Certification

Intent Ensure project team has expertise in sustainable design and construction.	
Required Actions for Credit <ul style="list-style-type: none"> At least one principal member of project team must be a LEED® Accredited Professional or hold an equivalent certification. 	Strategies <ul style="list-style-type: none"> Assign one or more project team member to take the LEED® Professional Accreditation Exam (or equivalent), if not certified already. Assign the LEED® AP (or equivalent) to review with project team members' information regarding sustainable concepts and practices including green building design and construction and the application of Massport's Sustainability Program early in the project life cycle. Assign the LEED® AP (or equivalent) as a facilitator of an integrated design and construction process to ensure the dynamic monitoring of sustainability goals and conflict resolutions. Designate a LEED® AP (or equivalent) from the beginning that has experience in airport and/or maritime planning. Involve LEED® AP (or equivalent) at all levels of planning and design.
Required Documentation <ul style="list-style-type: none"> Documentation of sustainable design professional certification 	
Benefits <ul style="list-style-type: none"> Provides experience and expertise in sustainable design concepts Provides in-house expertise and past experiences in coordinating documentation processes similar to that required for Massport's Sustainability Program. Monitors progress through the planning, design and construction phases and identifies conflicts early to reconcile overall project and sustainability objectives. Reduces the need for redesign during the various design stages. 	Additional Credits <ul style="list-style-type: none"> 1 additional point for each certified professional on the project team. Maximum of 2 additional points.



Social Responsibility & Community Involvement

Intent Present project intent, scope and features to impacted communities and stakeholders in an open and trustworthy manner. Conduct all meetings and discussions in good faith.	
Required Actions for Credit <ul style="list-style-type: none"> Work with Massport's Office of Government and Community Affairs (OGCA) to present the project at community meetings per permitting requirements and Massport policy. 	Strategies <ul style="list-style-type: none"> Enable success of discussions by recognizing potential conflicts and being prepared to address them. Provide means of transportation to meetings as appropriate. Provide language translation as needed. Ensure meetings are at varied locations within the community. Ensure meetings are at varied times (day/evening). Provide child care during meetings. Enter into a partnership with community groups or local businesses to mitigate adverse effects of the project, if any. Conduct meetings beyond the requirements of the permitting process.
Required Documentation <ul style="list-style-type: none"> Agendas and minutes of all community meetings 	
Benefits <ul style="list-style-type: none"> Develops the community's trust and support for projects. Reduces conflicts Encourages community investment in project. Streamlines permitting processes Builds lasting relationships with the surrounding community 	

Public Education

Intent Leverage Massport sustainability initiatives as a catalyst for change in the larger community through awareness, education, and engagement in Authority goals.	
Required Actions for Credit <ul style="list-style-type: none"> Public signage highlighting project sustainability features Publicly accessible performance measurement for renewable energy projects Discussion of project sustainability features in community forums 	Strategies <ul style="list-style-type: none"> Include employees in briefings and education on sustainable features in projects, buildings and values Place power converters or meters in public areas with explanatory signage Allocate space in public buildings for sustainability displays Make sustainability a topic at public meetings Work with Massport Communications to draft and distribute press releases on project's sustainability features Coordinate with local schools to arrange field trips or presentations to provide education on project sustainability features. Host a meeting or panel discussion for affected communities, separate from the public hearing, as an opportunity for questions and education about the project sustainability features and goals. Include all appropriate personnel. Engage Massport customers and tenants in sustainability goals Tap into Massport employees as members of local community.
Required Documentation <ul style="list-style-type: none"> Sustainability signage schedule with locations and layouts For projects with a renewable energy component, location and design of publicly accessible performance measurement display Documentation of community outreach, forum discussions, and press releases, as applicable 	
Benefits <ul style="list-style-type: none"> Inspires change beyond Massport operations Increases awareness of Massport projects, operations and best management practices Avoids misconceptions and incorrect information on Massport operations and projects Informs and engages the community in sustainability projects that benefit them. Establishes trust and emotional investment from the community in Massport as local business, employer, and source of revenue for community. 	



2.2 PROJECT SITE DESIGN

Airfield Design and Layout

Intent Reduce taxiing distances and time, enable aircraft to get off of the airfield quickly, and reduce delay in order to reduce greenhouse gas emissions and air toxins and enhance operations, customer service, and safety.	
Required Actions for Credit <ul style="list-style-type: none">■ Design for most efficient and safe aircraft movement■ Design for minimum taxiing distances■ Design for reduced aircraft delay	Strategies <ul style="list-style-type: none">■ Minimize/eliminate taxiway crossings of runways■ Runways with high speed exits■ End-around taxiways■ Parallel taxiways■ Provide room to hold without delaying other aircraft, including during inclement weather and deicing season■ Runway-end bypass taxiways■ Plug-ins at hold areas■ Airfield simulation to quantify efficiencies
Required Documentation <ul style="list-style-type: none">■ Report summarizing design features to reduce taxiing and delay with expected benefits quantified.	
Benefits <ul style="list-style-type: none">■ Reduces greenhouse gas emissions■ Improves safe movement of aircraft■ Reduces air toxin emissions■ Reduces fuel consumption and associated costs■ Improves customer experience■ Reduces aircraft noise■ Increases schedule and airport efficiencies	

Airport Ramp Infrastructure

Intent Reduce air emissions and fuel consumption by providing infrastructure enabling the use of electric Ground Service Equipment (GSE) and pre-conditioned air (PCA) for parked aircraft.	
Required Actions for Credit <ul style="list-style-type: none">■ Installation of 400 Hz ground power at all newly constructed or rehabilitated gates to support pre-conditioned air for aircraft■ Installation of electric charging stations for GSE at all newly constructed or rehabilitated gate areas.	Strategies <ul style="list-style-type: none">■ Procure mobile 400 Hz ground power units for non-terminal areas■ Provide ground power infrastructure in airfield penalty box areas■ Work with airlines, other tenants and local air quality regulatory agencies, as appropriate, to reach agreement concerning conversion of GSE to electricity or alternative fuels.
Required Documentation <ul style="list-style-type: none">■ Plan marking locations of all 400 Hz ground power supplies and all GSE electric charging stations.	
Benefits <ul style="list-style-type: none">■ Reduces or eliminates air emissions from APUs and GPUs.■ Decreases fuel usage and costs for running APUs and GPUs■ Reduces or eliminates air emissions from non-electric GSE■ Lowers fuel costs for GSE■ Reduces risk of fuel spills from APUs, GPUs, and non-electric GSE	

Roadway Layout and Design

Intent Minimize congestion, minimize idling, reduce future maintenance, and extend pavement life to reduce air emissions from vehicles and improve customer experience.		
Required Actions for Credit <ul style="list-style-type: none">■ Signage indicating regulatory 5-minute idling limit at curbsides, pick-up/drop-off areas, etc.■ Design for 20-year traffic forecasts■ Design for Level of Service C for forecasted volumes		Strategies <ul style="list-style-type: none">■ Traffic flow modeling■ Site delivery areas to decrease roadway congestion and limit allowable delivery times■ Conduct pavement life-cycle analysis■ Utilize rubberized pavements or other life-extending technologies■ Fully actuated signals■ Signal coordination
Required Documentation <ul style="list-style-type: none">■ Plan showing location of all idling limit signage■ Report summarizing design elements to reduce congestion, future maintenance, and extend pavement life, including confirmation of design for 20-year traffic forecasts and Level of Service C for forecasted volumes.		
Benefits <ul style="list-style-type: none">■ Reduces air emissions associated with idling■ Increases customer satisfaction■ Decreases driving time and associated cost savings■ Decreases fuel consumption and associated cost savings■ Decreases life-cycle costs■ Decreases maintenance activities		

Access to Public Transportation

Intent

Encourage the use of public transit, including subway, buses, Silver Line, and water transportation, and discourage use of personal vehicles to reduce air emissions, pollution, and roadway congestion.

Required Actions for Credit

- Logan Airport: Design for 35.2% HOV use by 37.5 million air passengers
- Infrastructure to support shuttle buses from transit stations
- Improvements to existing pedestrian environments to improve safety, wayfinding and customer experience.
- Walking/biking path from public transit stops
- Limit employee parking

Required Documentation

- Plans and documentation summarizing infrastructure to support applicable HOV goals and encourage transit use. Confirm shuttle bus infrastructure, improvements to pedestrian environments, walking/biking paths, and employee parking limits.

Strategies

- Design to LEED-Plus for Massachusetts
- Coordinate with the Massachusetts Office of Transit to determine opportunities related to the 20-year "Urban Ring" plan
- Coordinate with new/existing Transportation Management Associations (TMAs)

Benefits

- Reduces roadway congestion
- Reduces air pollution
- Increases savings to travelers
- Reduces water pollution



Parking

Intent Reduce air emissions by decreasing personal vehicle use and increasing usage of High Occupancy Vehicles (HOV).	
Required Actions for Credit <ul style="list-style-type: none"> ■ Preferred parking for van pools: work with facility TMA or Massport Economic Planning and Development to determine appropriate number of spaces ■ Minimize number of parking spaces available to employees 	Strategies <ul style="list-style-type: none"> ■ Locate preferred parking in high profile areas to increase visibility of benefit ■ Develop and implement a shared parking plan <ol style="list-style-type: none"> 1. Day/night 2. Weekday/weekend 3. Office/residential ■ Design signage and public outreach to increase program participation
Required Documentation <ul style="list-style-type: none"> ■ Project parking report documenting total number of facility parking spaces, spaces allocated for employee parking, and van pool goal ■ Site plan confirming conformance with van pool parking goal 	
Benefits <ul style="list-style-type: none"> ■ Reduces air emissions ■ Reduces water pollution ■ Reduces congestion ■ Cost savings for traveler ■ Enhances customer service ■ Encourages use of mass transit 	

Site Selection

Intent Conservation of undeveloped land, reuse of contaminated or brownfield sites, and preservation of rare or valuable site resources through proper project site selection.	
Required Actions for Credit <ul style="list-style-type: none">Choice of site that is classified as a brownfield or has been previously developedRemediation or encapsulation of existing site contamination, with a preference for use of in-situ site remediation technologiesRemediate site for future as well as immediate useDo not develop: farmland, parkland, or endangered/protected species habitatProtect or restore wetlands in compliance with the wildlife management plans for Logan Airport, Hanscom Field and Worcester Airport.	Strategies <ul style="list-style-type: none">Practice infill developmentDevelop a site remediation planDevelop Risk Balance AssessmentConduct life cycle assessments to determine the best remediation planCoordinate site development and remediation plans to minimize construction costs and coordination.Pursue government grants in coordination with Massport for remediation
Required Documentation <ul style="list-style-type: none">Narrative and pertinent maps confirming that the project site is not in a category listed above.Narrative documenting that the site has been previously developed or designated as a Brownfield by local, state or government agencies.Narrative describing the site contaminants and remediation efforts undertaken by the project.	
Benefits <ul style="list-style-type: none">Limits environmental impact of developmentIncreases public support of development projectsConforms to permitting requirementsPreserves undeveloped land and greenfieldsIncreases land value of brownfieldsRemediates sites to decrease environmental damagePreserves/restores habitats and resources	

Site Protection and Restoration – non-Airfield

Intent Preserve and restore habitat, vegetation, and existing natural resources at risk from development.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Limit disturbed area to only what is needed for construction ■ Restore 75% of disturbed vegetated area either onsite, through a green roof, or off-site 	Strategies <ul style="list-style-type: none"> ■ Incorporate green roofs into project ■ Define work sites to only areas necessary and clearly define work areas in construction drawings ■ Use previously developed sites ■ Early in design, identify site features to remain undisturbed ■ Specify clean-cut or trenchless construction technologies ■ When opting for off-site mitigation, locate mitigation site as close to disturbed area as possible and choose a site that closely resembles lost habitat ■ Specify the reuse or donation of healthy trees and plants removed from the site ■ Incorporate native plants and sustainable landscape design ■ Make habitat and wildlife visible to site users
Required Documentation <ul style="list-style-type: none"> ■ A site plan showing limits of disturbance and development. ■ A narrative and calculations describing the restoration of disturbed areas. 	
Benefits <ul style="list-style-type: none"> ■ Minimizes need for erosion control measures ■ Preserves animal habitat for healthy ecosystem ■ Eliminates need to restore vegetation ■ Increases community support ■ Improves aesthetics ■ Reduces heat island effect ■ Reduces air pollution ■ Increases natural stormwater filtration 	Additional Credits <ul style="list-style-type: none"> ■ 1 additional point for each additional 10% of restored vegetated area.

Future Land Use

Intent Maximize flexibility for redevelopment and future changes in site use.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Analysis of limitations of future use created by current development ■ Ensure that project plan conforms to facility master plan 	Strategies <ul style="list-style-type: none"> ■ Review facility master plan ■ Consider long-term environmental impact of project ■ Anticipate future site needs and uses ■ Conduct a “climate change impacts” review to determine if adaptations are necessary to ensure functional use of land following occurrences such as sea level rise, increased storm intensity and frequency, increased temperatures, drought conditions, etc.
Required Documentation <ul style="list-style-type: none"> ■ Narrative describing the analysis for future land use and the design components to address obstacles and opportunities. 	Additional Credits <ul style="list-style-type: none"> ■ 1 point for conducting a Climate Change Impact Analysis
Benefits <ul style="list-style-type: none"> ■ Decreases future development costs ■ Minimizes long-term environmental impact of development 	



Vegetation and Wildlife Management

Intent Preserve, protect, or restore vegetation and wildlife on Massport property. When necessary, manage wildlife and vegetation hazards to aviation responsibly through an integrated management plan that complies with FAA standards.	
Required Actions for Credit <ul style="list-style-type: none"> Analyze and document existing wildlife and vegetation For airports: delineate hazardous from non-hazardous wildlife and vegetation Produce wildlife and vegetation management plan to preserve non-hazardous wildlife and vegetation and manage hazards 	Strategies <ul style="list-style-type: none"> Vegetation and wildlife management plan must be in compliance with FAA approved airport plan (for airports) At airports, choose appropriate vegetation that does not attract hazardous wildlife Avoid pesticides and herbicides where possible, instead manage through choice of vegetation For areas with height restrictions, choose low-growth shrubs or meadow grasses rather than trees In areas where wildlife hazards are a concern, avoid creating wetland habitats for stormwater management. Follow urban/curbside planting best management practices Utilize salt/drought tolerant species
Required Documentation <ul style="list-style-type: none"> Integrated vegetation and wildlife management plan 	
Benefits <ul style="list-style-type: none"> Protects vegetation and wildlife where not a hazard to aviation Integrated approach minimizes environmental impact and costs Avoids unintended consequences stemming from uncoordinated vegetation and wildlife management 	

Pest Management

Intent

Maximize the effectiveness of pest control measures while minimizing the environmental, health and safety impacts of pest control procedures.

Required Actions for Credit

- Integrated pest management plan for construction, including:
 1. Focus on pest prevention
 2. Incorporate best management practices for pest prevention
 3. Target control measures for specific pests
 4. Prioritize natural measures over synthetic pesticides
 5. Estimate reduction in chemical use to measure progress

Strategies

- Follow LEED-EB SSc1.1 and 1.2

Required Documentation

- Integrated pest management plan

Benefits

- Reduces human exposure to chemical pesticides
- Reduces impact of pest control chemicals on the environment
- Reduces risk and liability due to chemical exposure and potential pollution

2.3 PROJECT MATERIALS

Heat Island Effect – Roof

Intent Minimize warming of micro climate and minimize impact of urban/rural heat differential on humans and wildlife.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Option 1 – Installation of a vegetated roof covering at least 50% of the available roof area. ■ Option 2 – Choice of roofing material with initial reflectance rating of at least 0.70 and emittance value of at least 0.75 covering at least 75% of the available roof area. Roofing material must be non-glare for use at Logan Airport, Hanscom Field and Worcester Airport. ■ Option 3 – Combine options 1 and 2 to cover at least 75% of the available roof area. 	Strategies <ul style="list-style-type: none"> ■ Obtain Cool Roof Rating Council certification ■ Choose roofing materials with high emittance properties ■ Coat conventional roof membranes and metal roofs with high emittance coating ■ Install vegetated “green” roof ■ Use EnergyStar compliant materials ■ For vegetated roofs at airports, plant sedum to deter birds ■ Demonstrate the life-cycle benefit cost ratio
Required Documentation <ul style="list-style-type: none"> ■ Roof plan showing areas of vegetated and high reflectance roofing ■ Calculation of total roof area, available roof area, and area covered by vegetated and/or high reflectance roofing ■ If high reflectance roofing material is selected, provide manufacturer’s initial reflectance rating and emittance value of the material. 	Additional Credits <ul style="list-style-type: none"> ■ 1 point for each additional 10% of available roof area covered by Options 1, 2, or 3.
Benefits <ul style="list-style-type: none"> ■ Reduces ambient air temperature ■ Reduces urban heat island effect ■ Potential air conditioning cost savings of up to 10% ■ Reduces energy consumption and associated emissions reduction. ■ Interior noise reductions of up to 40 decibels with installation of a vegetated roof ■ Increases roof lifespan through protection from weather, UV rays, physical damage, and extreme temperatures with installation of a vegetated roof 	

Heat Island Effect – Non-Roof

Intent Minimize warming of micro climate and minimize impact of urban/rural heat differential on humans and wildlife.	
Required Actions for Credit <ul style="list-style-type: none"> 50% of non-roof areas must incorporate one or more of the following heat island mitigation strategies <ul style="list-style-type: none"> Vegetated areas Shaded areas (within 5-years) High albedo materials (reflectance of at least 0.30) Open grid pavement system with net impervious area 50% or less Underground or structured parking with top level/exposed areas having Solar Reflectance Index (SRI) of at least 29 or be fully vegetated 	Strategies <ul style="list-style-type: none"> Minimize total paved areas Utilize high albedo pavements Provide shade using appropriate vegetated structures, including trees, large shrubs, vegetated trellises, or other vegetated screens Maximize landscaped and vegetated areas Utilize open grid pavement systems Utilize structured or underground parking Install vegetated roofs on structured or underground parking Install structured canopies to provide shade and a platform for photovoltaic arrays or other sustainable design strategies
Required Documentation <ul style="list-style-type: none"> Site plan showing areas of heat island mitigation strategies Calculation of total site area, available site area, and area covered by heat island mitigation strategies Confirmation that implemented heat island mitigation strategies meet requirements as shown above. 	Additional Credits <ul style="list-style-type: none"> 1 point for each additional 10% of non-roof areas incorporating heat island mitigation strategies.
Benefits <ul style="list-style-type: none"> Reduces ambient air temperature Reduces urban heat island effect Reduces cooling costs due to smaller temperature gradient Improves stormwater handling requirements and costs with the installation of vegetated cover or open-grid paving system Reduces global warming effect with installation of vegetated cover due to carbon capture 	

Material Durability

Intent Maximize durability of materials to minimize maintenance and replacement and maximize material life.	
Required Actions for Credit <ul style="list-style-type: none">■ Evaluate and prioritize materials based on lifespan and lifecycle maintenance costs■ Develop life-cycle-cost analysis for project materials	Strategies <ul style="list-style-type: none">■ Avoid products that require frequent replacement or maintenance■ Prioritize materials that can be recycled■ Evaluate state-of-the-art materials and best practices■ Adjust standard capital project budget estimating norms to account for higher material first costs, if applicable.
Required Documentation <ul style="list-style-type: none">■ Life-cycle-cost analysis for project■ List of materials evaluated based on lifespan and lifecycle maintenance costs. Note materials chosen for incorporation into the project. Provide justification for highly rated materials not chosen for the project.	
Benefits <ul style="list-style-type: none">■ Reduces life-cycle-costs■ Reduces solid waste over the project lifecycle■ Reduces operational disruptions due to maintenance and replacement	

Flexible Building Re-use

Intent Extend life cycle of existing and future buildings to reduce construction and demolition waste and facilitate future re-use		
Required Actions for Credit <ul style="list-style-type: none">■ Review and design to facility master plan■ Prioritize re-use of existing building stock		Strategies <ul style="list-style-type: none">■ LEED-NC MRc1.1 or 1.2■ Evaluate reuse of existing structures, comparing performance, costs, environmental, and social benefits on a project specific basis■ Consider future re-use when designing (see Design for Deconstruction section) and build in functional flexibility for future use.
Required Documentation <ul style="list-style-type: none">■ Summary of building stock re-use and how facility fits into existing master plan		
Benefits <ul style="list-style-type: none">■ Decreases capital expenditures over facility life cycle■ Reduces construction and demolition waste■ Reduces environmental impact of manufacture and transport of materials■ Retains cultural resources■ Extends the life of the facility		

Material Use and Re-use

Intent Reduce solid waste and minimize environmental impact of manufacturing and transporting materials by encouraging re-use of materials	
Required Actions for Credit <ul style="list-style-type: none">■ Specify return of unused materials to manufacturer or contractor for use on another project■ Specify quantity of materials to be turned over to Massport for use as attic stock■ List materials in project documents that must be reused to extent practicable■ Decommissioned items in good working order must be salvaged rather than disposed of	Strategies <ul style="list-style-type: none">■ LEED-NC MRc3.1 or 3.2■ Provide references in specs for local salvaged materials co-ops
Required Documentation <ul style="list-style-type: none">■ Specification regarding return of unused materials■ List of required attic materials■ List of materials that are specified for re-use or salvage	
Benefits <ul style="list-style-type: none">■ Diverts solid waste from landfills and incinerators■ Potential capital cost savings■ Reduces environmental impact of manufacturing and transporting materials■ Reduces environmental impact of harvesting virgin materials■ Conserves natural resources	

Recycled Content

Intent Reduce impacts of extracting and processing virgin materials by specifying materials with recycled content	
Required Actions for Credit <ul style="list-style-type: none"> Specify products with recycled content to maximum extent practicable Set project-specific goal for recycled-content based on total value of materials. Goal should be a minimum of 10%. Specify asphalt (airfield and non-airfield) with a minimum of 18% recycled content. 	Strategies <ul style="list-style-type: none"> LEED-NC MRc4.1 or 4.2 Provide references in specifications to suppliers of goods with recycled content Consider furniture and fixtures when specifying materials with recycled content Consider civil and structural elements of the project when specifying recycled content and developing project specific goals
Required Documentation <ul style="list-style-type: none"> Document project-specific recycled content goal List of materials and products that are specified with recycled content and include percentage of recycled content per manufacturer. 	Additional Credits <ul style="list-style-type: none"> 1 point for each additional 5% added to the project recycled-content goal.
Benefits <ul style="list-style-type: none"> Increases market demand for recycled materials Diverts solid waste from landfills and incinerators Minimizes environmental impact of extraction and processing of virgin materials 	

Construction Waste Management

Intent Divert construction and demolition (C&D) debris from solid waste facilities and incinerators by material re-use, salvaging materials, reducing total C&D debris, and recycling materials.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Create Balanced Earthwork Plan ■ Establish a project specific goal for waste diversion ■ Specify the creation of a Construction Waste Management Plan ■ Identify on-site uses for decommissioned materials 	Strategies <ul style="list-style-type: none"> ■ Meet/exceed requirements of Balanced Earthwork Plan ■ Evaluate recycling opportunities for the following materials, at a minimum: <ul style="list-style-type: none"> – Cardboard – Glass – Metal – Gypsum wallboard – Brick – Carpet – Concrete – Insulation – Asphalt – Cable/wire – Plastic – Land-clearing debris – Clean wood ■ Require haulers to cover truck beds ■ Identify project waste that can be reused at other site or facilities, including: <ul style="list-style-type: none"> – Concrete – Fill – Asphalt – Land-clearing debris – Small buildings or structures – Building components ■ Designate site area for recycling and salvaging ■ Reference construction waste recycling facilities ■ Identify salvageable items for sale or donation and strategy for their release ■ Identify facilities that will take difficult-to-recycle materials ■ Specify securing all recycling areas to decrease contamination
Required Documentation <ul style="list-style-type: none"> ■ Balanced Earthwork Plan ■ Document project specific goal for waste diversion and on-site uses for decommissioned materials ■ Construction Waste Management Plan 	
Benefits <ul style="list-style-type: none"> ■ Regulatory compliance with 310 CMR 19.017 ■ Reduces waste ■ Reduces demand for new materials ■ Reduces impacts of producing new materials ■ Reduces need for new landfills and extends life of existing landfills ■ Decreases disposal costs ■ On-site reuse reduces waste transportation impacts ■ Potential cost savings from material reuse ■ Potential income from recyclable materials 	

Regional Materials

Intent Support use of indigenous resources and economic development goals	
Required Actions for Credit <ul style="list-style-type: none">■ Establish project specific goal for materials extracted, harvested, recovered and /or manufactured within New England■ Specify materials that are extracted, harvested, recovered and/or manufactured within New England, to the extent practicable	Strategies <ul style="list-style-type: none">■ LEED-NC MRc5.2 or 5.2■ Allow longer lead-time in project schedule for regionally-produced materials■ Consider site and civil materials for regional production
Required Documentation <ul style="list-style-type: none">■ Document the achievement of project special goal for regional materials, including a list of regional materials that are specified for use in the project	
Benefits <ul style="list-style-type: none">■ Supports the regional economy and foster job creation■ Increases demand for locally produced resources■ Fosters community pride■ Creates a social connection between user and facility■ Reduces environmental impact of long-distance transportation of materials■ Creates regional identity to facilities■ Reduces material transportation costs	

Rapidly Renewable Materials

Intent Reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials	
Required Actions for Credit <ul style="list-style-type: none">■ Establish project specific goal for use of rapidly renewable materials■ Specify rapidly renewable materials to the extent practicable	Strategies <ul style="list-style-type: none">■ Consider temporary construction materials■ Reference the following project specifications:<ol style="list-style-type: none">1. GreenSpec from BuildingGreen, Inc. (www.buildinggreen.com/menus/index.cfm)2. Oikos (www.oikos.com)■ Identify materials and suppliers■ Consider the following materials, at a minimum:<ul style="list-style-type: none">– Concrete formwork– Poplar OSB– “agriboard”– Sunflower seed board– Bamboo flooring– Cork– Wool carpets and fabrics– Cotton batt insulation– Linoleum flooring– Bio-based plastics– Wheatgrass or straw board carpentry
Required Documentation <ul style="list-style-type: none">■ Document the achievement of project special goals for rapidly renewable materials, including a list of rapidly renewable materials that are specified for use in the project	
Benefits <ul style="list-style-type: none">■ Reduces depletion of long-cycle materials	

Certified Wood

Intent Encourage sustainable forest management practices	
Required Actions for Credit <ul style="list-style-type: none">■ Project specific goal for use of Forest Stewardship Council (FSC) certified wood■ Specify FSC certified wood to the extent practicable	Strategies <ul style="list-style-type: none">■ Include FSC contact information in specifications (www.fscus.org/green_building)■ Consider temporary materials■ Develop list of wood components potentially obtained from FSC certified forests■ Consider wood components of furnishings
Required Documentation <ul style="list-style-type: none">■ Document the achievement of the project special goal for Forest Stewardship Council (FSC) certified wood, including a list of compliant materials that are specified for use in the project	
Benefits <ul style="list-style-type: none">■ Ensures future supply of wood and other forest-based products and materials■ Combats global warming■ Reverses current trend toward deforestation■ Helps curb greenhouse gases in atmosphere■ Microclimate cooling at point of well managed forest■ Aids carbon sequestering■ Curbs air pollution through natural air filtering	

2.4 ENERGY MANAGEMENT AND EFFICIENCY

Energy Efficiency

Intent Reduce Massport's overall energy consumption by 20% by Fiscal Year 2012 and 35% by 2020.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Achieve energy efficiencies of a minimum of 20% below energy code or 15% below existing consumption (if applicable), whichever is lower ■ Specify EnergyStar qualified equipment, where applicable ■ Comply with Utility Department submittals, metering and meter socket specifications as found in <i>Capital Programs Manual II: Guidelines for Consultants</i> ■ Determine and document project energy usage baseline and benchmark against the following: <ul style="list-style-type: none"> – Existing facility/system demand – Massachusetts Energy Code – International code – 20% below Massachusetts Energy Code – 10% below Existing facility/system demand – Energy Star (if applicable) – Comparable facility/system demand (where available) 	Additional Credits <ul style="list-style-type: none"> ■ 1 point for each additional 5% efficiency below the energy code or existing consumption, whichever is applicable.
Required Documentation <ul style="list-style-type: none"> ■ Energy report confirming achievement of efficiency goal and performance against benchmarks, including: <ol style="list-style-type: none"> 1. A table of all energy efficiency design elements that were evaluated for inclusion in the project with associated capital costs, annual operating costs, annual maintenance costs, total energy load and final design status. Identify which elements were installed as part of the design. 2. Where applicable, existing systems and energy consumption patterns using any of the following methodologies: engineering design combined with existing conditions statement combined with existing metering history, or computer programs such as Energy-10 or eQuest, or other as approved by Massport 3. ComCheck Web analysis documenting compliance with MA state energy codes 4. List of EnergyStar equipment installed as part of the project 	
Benefits <ul style="list-style-type: none"> ■ Reduces energy consumption ■ Reduces energy costs 	

Benefits (cont.)

- Buffers against volatile energy markets
- Decreases carbon footprint
- Reduces consumption of natural and non-renewable resources
- Reduces environmental impacts related to energy extraction and production
- Plans for continual improvement as new technologies become available
- Ensures systems are designed to reduce energy consumption
- Lowers facility life-cycle-costs
- Integrates building systems to achieve optimum efficiency

Strategies

- Facility Energy Plan
 1. Create an inventory of energy use processes, building electrical uses, and energy exchanging process. Examples include HVAC system, boilers, steam generators, heat exchangers, lighting system, appliances, fenestration, building insulation, motors, etc.
 2. Determine the rated amount of energy in watts used in each process, transferred, or lost.
 3. List the inventory from highest energy usage to lowest energy usage.
 4. Develop a plan to evaluate how energy can be reduced from highest energy usage processes. This should include a periodic review of the processes to look for new technologies or ideas to reduce energy consumption.
 5. Develop targets to reduce energy usage for high energy processes with set targets and deadlines.
- Develop baseline energy consumption by itemizing sources of energy use.
- Develop computer energy simulation model to assess energy performance and identify the most cost effective energy measures.
- Design building envelope, HVAC, and lighting system with reduced energy use in mind.
- Use a maintenance log to track energy use processes, problems, and ideas.
- Gather input from maintenance staff to develop energy management plans.
- Develop an energy use budget for the project for the first year.
- Identify strategies that can be used to reduce energy consumption below the energy use budget established for the first year.
- Review the design intent and the basis of design documentation.
- Incorporate advanced lighting to reduce energy usage.
- Use light colored paints and interiors to reflect lighting.
- Incorporate larger windows on the Northern face of a building.
- Southern facing windows should be shaded with overhangs or deciduous vegetation.
- Coniferous trees planted to block northwest winds in the winter may reduce heating costs.
- Incorporate overhead sky lighting and/or solar tubes.

Strategies (cont.)

- Incorporate sensors that adjust lighting based on incoming light levels.
- Use efficient HVAC systems
- Improve building envelope to reduce energy losses.
- Develop open office plan.
- Provide high-efficiency motors and systems.
- Organize circuiting of lighting and building systems so that individual areas may be separately controlled.
- Orient buildings for passive solar/daylight penetration.
- Include architectural features for daylighting and glare.
- Install motion sensors in stairs, toilets, storage & equipment rooms.
- Quantify energy performance after mitigation component design and compare to a baseline evaluation without mitigation components.
- Carefully define lighting requirements.
- Specify a strict quality control program for system component storage and installation.
- Consider ease of maintenance when designing lighting and HVAC systems.
- Specify the use of infrared imaging during construction to identify issues with thermal leaks from buildings.
- Use variable-air-volume systems for cooling to reduce energy use during part-load conditions.
- Evaluate a multiple-chiller system with units of varying size.
- Utilize absorption cooling.
- Tie lighting, temperature and ventilation in public areas of terminals to flight/ship schedules.
- Design terminal areas with a variety of light and sound levels.
- The following technologies and strategies should be included:

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Specify Variable Frequency Drive (VFD) motors 2. Energy efficiency upgrades to renovated facilities. 3. Use LED “exit” signs in buildings. 4. Provide daylight harvesting control systems. 5. Optimize lighting controls. 6. Integrate lighting systems with BAS. 7. Use high performance glazing and window systems. 8. Utilize under floor air distribution systems. 9. Design for high levels of thermal insulation. | <ol style="list-style-type: none"> 10. Utilize premium efficiency motors. 11. Ground-source heat pumps. 12. Utilize LED lighting for lighting, signage and signals, including for taxiways and runways. 13. Include compact fluorescent light bulbs for lighting. 14. Employ heat recovery from equipment rooms (i.e. in-line baggage room) and apply to other areas of the site. 15. Utilize thermal storage to decrease peak loading. |
|--|---|

Strategies (cont.)

- Investigate non-electrified snowmelt procedures, including Hydronic runway pavement for snowmelt and Epoxy overcoat with glycol for controlling snow on runways.
- Apply for Energy Star Rating
- Ensure that energy systems are not oversized.
- Incorporate cogeneration systems into the design

Interior and Exterior Lighting

Intent

Reduce light trespass from facility and site or project boundary to surrounding area and night sky and reduce energy consumption and environmental impact related to interior and exterior light fixtures while increasing the quality of light

Required Actions for Credit

- Maximum candela value of all interior lighting must fall within the building
- Maximum candela value of all exterior lighting must fall within the site limits
- Specify recyclable lamps
- Recycle existing lamps
- Use incandescent lamps only in applications for which no compact fluorescent or LED alternative is available
- Coordinate lighting with daylighting strategies

Required Documentation

- Site plan and calculations showing lighting footprint with areas of maximum candela value clearly delineated
- Specifications requiring recyclable lamps and recycling of existing lamps and confirming the elimination of incandescent lamps.
- Documentation of coordinated lighting/daylighting strategy

Benefits

- Improve night sky access
- Reduce impact of development
- Increase safety by decreasing glare impacts at night
- Reduce development impact on nocturnal species
- Increase quality of life of surrounding community
- Reduce energy consumption
- Reduce life cycle costs

Strategies

- Supplement ambient lighting with multi-level task lighting
- Utilize LED lighting for signs, stairs and signals, and where applicable for exterior applications
- Install high efficiency lighting systems, Super T8, T5, and LED systems.
- Utilize Compact fluorescent light bulbs in lieu of incandescent lamps for areas with low ceiling heights and minimal light requirements.
- Install photocell control strategies for daylighting.
- Identify independent building control strategies or integrate new lighting circuits into current control mechanisms
 1. Programmable breakers
 2. Building control systems
 3. High low ballast combinations
- Provide low mercury/low lead lamps.
- Specify strict site lighting criteria.
- Conduct a light modeling study.
- Coordinate electrical lighting scenarios with daylighting strategies.
- Specify recyclable lamps.
- Minimize site lighting where possible.
- Design for monitoring of maximum candela value
- Install motion sensors to turn lights off when the space is unused.

<p>Benefits (cont.)</p> <ul style="list-style-type: none"> ■ Improve safety through better distinction between airfield signage and runway and taxiway lighting ■ Maximize comfort and productivity of facility users and occupants ■ Reduce mercury and lead in landfills ■ Reduce inventory of hazardous materials ■ Increase landfill life ■ Reduce environmental impact and costs associated with energy consumption for lighting ■ Reduce pollution 	<p>Strategies (cont.)</p> <ul style="list-style-type: none"> ■ Minimize site lighting where possible while still meeting safety and security requirements ■ Limit lighting in sensitive ecological areas to mitigate lighting impacts on wildlife ■ Model site lighting through a computer model ■ Use full cutoff luminaries ■ Use low reflectance, non-specular surfaces ■ Use low-angle spotlights ■ Consider construction and temporary lighting
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Alternative and Renewable Energy

Intent

Install new renewable energy generation resources or procure energy produced through renewable sources to meet approximately 15% of Massachusetts Port Authority total electrical load by 2012 and 30% of electrical load by 2020.

Required Actions for Credit

- Investigate the feasibility of supplying, at a minimum, 2.5% of the project's power with on-site renewable energy systems. Consider readily available sources of renewable or alternative energy, such as but not limited to: biogas, solar, wind, tidal power, geothermal, sewer heat recovery, fuel cell technology and coal gasification. Feasibility study should consider at a minimum capital cost, power production potential, payback period, spatial requirements, and design considerations, including metering strategies to measure energy supplied over time.
- Incorporate feasible renewable energy technology into project systems

Required Documentation

- Energy report summarizing renewable energy goal and renewable energy feasibility assessment, including:
 1. A table of all renewable energy strategies that were evaluated for inclusion in the project with associated system rating, capital costs, annual operating costs, annual maintenance costs, total annual energy production and final design status. Identify renewable energy strategies that were installed as part of the project.

Strategies

- Determine readily available sources of renewable or alternative energy such as but not limited to biogas, solar, wind, tidal, geothermal, sewer heat recovery or coal gasification.
- Investigate cogeneration of power.
- Implement discrete photovoltaic power source for outlying equipment, ancillary buildings, and parking and site lighting.
- Use solar powered signs and lighting.
- Utilize solar powered water heaters.
- Include solar trombe-walls for passive solar heating.
- Investigate geothermal heating and cooling systems.
- Install rooftop micro-turbines for wind power
- Utilize wind power where appropriate.
- Design for building-integrated photovoltaic cells.
- Utilize fuel cells.
- Conduct lifecycle assessment of potential technologies to facilitate selection of strategies and equipment based on overall environmental impact.

Additional Credits

1 point for each additional 2.5% of renewable energy installed above the basic requirements

Benefits

- Reduced energy costs
- Life-Cycle-Cost savings

Benefits (cont.)

- Increased reliability due to reduced reliance on grid-sourced power
- Buffer against volatile energy markets
- Decreased carbon footprint
- Decreased air pollution
- Decreased reliance on foreign fuel sources
- Reduces environmental impacts related to energy production.
- Increases economy of scale to reduce costs of alternative energy.
- Encourages research in additional alternative energy production.

2.5 AIR EMISSIONS

Infrastructure to Encourage Walking and Biking

<p>Intent</p> <p>Increase opportunities for and encourage walking, biking, and use of other human-powered vehicles at Massport facilities by providing necessary on-campus infrastructure and connections to neighboring facilities and communities.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Provide covered centralized facility(s) for secure bicycle storage (within 100 yards of a building entrance) designed to accommodate 5% of facility employees measured at peak periods. ■ Include in site plans the ability to expand bicycle facilities in future years. ■ Provide changing/showering facilities designed to accommodate 0.5% of facility employees measured at peak periods. ■ Include plans for future expansion of changing/shower facilities to match growth. ■ Develop a transportation plan including comprehensive bike lane and trail requirements to provide safe efficient access to and around the facility by bike and foot. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Provide safe bicycle lanes/paths ■ Provide safe walking paths and sidewalks. ■ Partner with transit agencies to provide bicycle friendly transit vehicles (e.g. buses and trains). ■ Conduct neighborhood outreach on bicycle- and pedestrian-friendly commuting options. ■ Provide a centralized facility(s) for secure bicycle storage with convenient changing/shower areas. ■ Exceed requirements of LEED®-NC SSc4.2
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Project plans showing compliance with bike storage, showering facilities, and accommodations for future expansion ■ Facility transportation plan for human-powered vehicles and foot-traffic 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Health benefits to employees and facility users. ■ Community building. ■ Reduces carbon emissions. ■ Reduces natural resources consumption. ■ Reduces environmental impacts from oil extraction and refinement. 	<ul style="list-style-type: none"> ■ Reduces land development impacts from automobile use and infrastructure. ■ Reduces parking space requirements. ■ Reduces air and water pollution from combustion process. ■ Minimizes traffic congestion. ■ Reduces dependency on foreign oil.

Alternative Fuel Vehicles

Intent Reduce environmental impact of automobile use by promoting the use of low-polluting hybrid and alternative fuel vehicles by employees and facility users	
Required Actions for Credit <ul style="list-style-type: none"> ■ Designate 1% of all parking spaces as hybrid/alternative fuel parking ■ Investigate feasibility of providing or expanding alternative fuel stations for public use. 	Strategies <ul style="list-style-type: none"> ■ Publicize hybrid/alternative fuel parking program through work with Massport Communications and signage ■ Locate preferred parking in high profile areas to increase visibility of benefit ■ Provide fueling stations for alternative fuel for public use. ■ Provide plug-ins for electric vehicles ■ Design signage and public outreach to increase program participation ■ Consider ethanol-based gasoline, biodiesel, compressed natural gas, Hythane, hybrid electric vehicles, electric vehicles or fuel-cell vehicles.
Required Documentation <ul style="list-style-type: none"> ■ Project parking report documenting total number of facility parking spaces, hybrid/alternative fuel parking goal, total number of hybrid/alternative fuel parking spaces provided, and feasibility analysis of alternative fuel fueling stations ■ Site plan confirming conformance with hybrid/alternative fuel parking goal ■ Description of alternative fuel stations included in the project, if applicable. 	Additional Credits <ul style="list-style-type: none"> ■ 1 point for each alternative fuel station installed or expanded
Benefits <ul style="list-style-type: none"> ■ Reduces air pollution ■ Visual prominence of the program increases awareness of the benefits of hybrid and alternative fuel vehicles ■ Advances the demand for alternatively fueled vehicles 	



Refrigerant Management

Intent

Reduce the use of gases and chemicals that contribute to ozone depletion and support early compliance with the Montreal Protocol.

Required Actions for Credit

- If upgrading an existing building that currently uses non-compliant refrigerants and equipment, replace such equipment to achieve compliance
- Determine feasibility of designing HVAC&R equipment that makes use of alternative or substitute refrigerants
- Comply with the requirements of 40 CFR Part 82: Refrigerant Management for applicable equipment. Develop and implement a centralized recordkeeping system to ensure compliance.

Required Documentation

- List of replacement of non-compliant refrigerants and equipment. Confirmation of the installation of equipment that uses alternative or substitute refrigerants.
- Records documenting compliance with 40 CFR Part 82.

Strategies

- Eliminate equipment that utilizes chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) refrigerants.
- Use evaporative cooling.
- Select HVAC&R with reduced refrigerant charge.
- Specify new base building HVAC equipment that uses no CFC or HCFC refrigerants.
- Consider fire suppression systems

Benefits

- Reduces ozone destruction.
- Creates a healthier ozone layer to block out harmful ultraviolet (UV) rays and electromagnetic (EM) radiation.
- Reduces greenhouse gases (GHG) emissions, commonly used in refrigeration systems, with high global warming potentials (GWP).

Greenhouse Gas Impact Evaluation and Mitigation

Intent

Better understand potential greenhouse gas (GHG) emissions from Massport properties and develop mitigation measures to reduce any potential new or cumulative impacts

Required Actions for Credit

- Conduct a GHG impact evaluation of potential GHG emissions from all direct and indirect emission sources (Scope 1 and Scope 2 as defined by the World Resources Institute (WRI)), to be included in the Authority's site-wide inventory, making use of the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) GHG Policy and The Climate Registry's (TCR) General Verification and Reporting Protocols. Estimate potential electricity consumption expected from the completed project.
- Assess feasibility of including GHG reduction measures in the project design, specifically energy consumption reduction, reuse, or alternatives such as solar energy generation.
- Incorporate any reduction strategies into the project that are identified as feasible and estimate total GHG reduction.

Strategies

- Identify design changes to mitigate GHG emission.
- Obtain and implement an FAA VALE grant (for airport facilities) or EPA Air Emissions Reduction Grant in coordination with Massport.
- Provide 400 Hz power at all airport contact gates
- Consider mobile power supply for all airport non-contact gates
- Include a transportation and trucking plan for use by contractor, subcontractors and suppliers during construction

Required Documentation

- GHG impact evaluation following the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) GHG Policy and The TCR's General Verification and Reporting Protocols
- Estimate of energy consumption for completed project
- Feasibility study of GHG reduction measures, including capital cost, annual operating cost, GHG reduction benefit and final design status. Identify reduction strategies included in the design and the projected GHG reduction.

Benefits

- Facilitates updating of Authority-wide GHG inventory
- Reduces overall GHG emissions from the final project.
- Streamlines compliance with any national, state, regional, or local mandatory or voluntary annual GHG reporting that may be required for the Authority's facilities.
- Streamlines compliance with any voluntary or mandatory cap and trade program.
- Potential for cost-effective, energy-efficient alternatives that can reduce long term operational costs.



Air Toxins

Intent

Understand potential criteria and air toxics emissions from proposed designs and structures and develop mitigation measures to reduce any potential new or cumulative impacts.

Required Actions for Credit

- Conduct an emissions impact evaluation for the future designed build-out for criteria emissions
- Assess feasibility of including criteria emissions reduction measures in the project design.
- Incorporate any reduction strategies into the project that are identified as feasible and estimate total criteria emissions reduction.
- Determine if potential emissions from new, modified or reconstructed stationary emissions units could exceed the Plan Approval applicability requirements of 310 CMR 7.00, and if so, apply for the appropriate level of pre-construction Plan Approval. Employ Best Available Control Technology (BACT) for all pollutants with potential emission rates exceeding one ton/year. Evaluate and mitigate air quality impacts, as required by 310 CMR 7.00. Include in this evaluation all toxic air pollutants for which the MADEP has set an Allowable Ambient Level (AAL).

Strategies

- Conduct an emission impact evaluation for build out of operations based on known emissions sources, or base on land-use if details not available.
- Identify operational changes to mitigate air emissions such as alternative fueled equipment, connections to transit and pedestrian/bike paths, improved/available parking, reduced truck-trips required for operations.
- Use warm mix asphalt paving
- Obtain and implement an FAA VALE grant (airports) or an EPA Clean Air grant in coordination with Massport.

Required Documentation

- Impact Evaluation
- Feasibility study of criteria emissions reduction measures, including capital cost, annual operating cost, estimate reduction benefit and final design status. Identify reduction strategies included in the design and the projected emissions reduction.
- Documentation confirming compliance with 310 CMR 7.00.

Benefits

- Reduces overall air toxin emissions
- Streamlines compliance with current air quality regulations and requirements
- Public health benefits related to cleaner air

2.6 WATER MANAGEMENT, QUALITY, AND EFFICIENCY

Water Management and Efficiency

Intent Optimize the management and utilization of site water resources, including maximizing water use efficiency and minimizing potable water use.	
Required Actions for Credit <ul style="list-style-type: none">■ Water Management Plan, including:<ol style="list-style-type: none">1. Evaluate projected use of potable water and wastewater resources as well as stormwater management quantity and quality, and develop a coordinated management plan for full site water resources.2. Identify strategies for water conservation and onsite reclamation of wastewater.3. Evaluate and include at least four (4) Federal Energy Management Program (FEMP) Best Management Practices for water conservation.■ Reduce water use by 20% below Massachusetts Plumbing code baseline by designing fixtures and strategies to use less water.	Strategies <ul style="list-style-type: none">■ Evaluate projected operation and maintenance needs, utility information, facility information, emergency response information, and planning considerations.■ Evaluate on-site stormwater and graywater reclamation for non-potable uses such as landscape irrigation and building flush systems.■ Incorporate the use of high-efficiency plumbing fixtures such as those recommended by the USEPA WaterSense program.■ Evaluate on-site wastewater treatment technologies such as rain gardens and bio-swales■ Educate maintenance staff and building occupants about the strategies and practices to make water efficiency a success.■ Develop a schedule to track life-cycle water usage and cost savings■ Install high-efficiency fixtures and valves.■ Utilize low- or dual-flush water closets.■ Utilize occupant sensors in urinals and faucets.■ Evaluate using reclaimed water for cooling tower makeup.■ Evaluate high-efficiency products certified by USEPA WaterSense program.■ Evaluate pulsed-power electromagnetic water treatment, ultraviolet treatment, or ozone treatment for cooling tower water.■ Establish a separate non-potable water supply system for vehicle maintenance.
Required Documentation <ul style="list-style-type: none">■ Water Management Plan for project, including:<ol style="list-style-type: none">1. Confirmation of achievement of water efficiency goal2. Projected use of potable water and wastewater resources and stormwater management quantities and qualities.3. Coordinated management plan for full site water resources4. Incorporated Best Management Practices for water conservation	

<p>Required Documentation (cont).</p> <p>5. A table of all water efficiency design elements that were evaluated for inclusion in the project with associated capital costs, annual operating costs, annual maintenance costs, water usage and reduction, and final design status. Identify those strategies that were installed as part of the project.</p>	<p>Additional Credits</p> <ul style="list-style-type: none"> 1 point for each additional 5% reduction in water use beyond minimum requirements.
<p>Benefits</p> <ul style="list-style-type: none"> Minimizes the depletion of water sources. Improves the integrity and recharge of watershed catchments. Reduces burden on public infrastructure by minimizing energy use to draw, treat and distribute water unnecessarily. Reduces potable water demand by reclaiming and reusing stormwater and graywater. Increases cost savings on water utilities. Reduces on-site stormwater runoff and related management infrastructure costs. Tracks usage and costs to monitor progress and develop further baselines for improvement in the future. Minimizes long-term operations costs by reducing potable water demand. 	

Stormwater Treatment

Intent

Improve water quality by reducing or eliminating stormwater pollution, increasing on-site infiltration, and eliminating contaminants

Required Actions for Credit

- Reuse, treat, or provide for on-site infiltration for 50% of mean annual rainfall
- Any stormwater discharge leaving the site must be treated to be below the National Pollutant Discharge Elimination System (NPDES) permit limits.
- Develop collection systems for de-icing runoff, where applicable

Required Documentation

- Estimate of mean annual rainfall for project site
- Confirmation and summary of strategies to meet reuse, treatment, and/or onsite infiltration goal
- Stormwater treatment plans to meet TSS goals
- Site plan indicating de-icing runoff collection systems, where applicable

Additional Credits

- 1 point for each additional 10% of mean annual rainfall reused, treated or infiltrated above minimum requirements

Strategies

- Minimize impervious areas on project site
- Utilize porous pavement technologies
- Evaluate first flush systems connected to underground storage tanks (USTs)
- Evaluate bio-swales to encourage groundwater infiltration of runoff. In airfield applications, ensure bio-swale does not encourage animal habitat
- Evaluate vegetated roofs to detain and treat stormwater
- Evaluate rain gardens and constructed wetlands where appropriate, also providing aesthetic benefits
- Harvest stormwater for irrigation or other operational uses (car washes, building wash, etc.)
- Use detention basins, detention ditches, ditch checks, and other BMPs for effective first flush treatment
- For airfield projects, incorporate underground infiltration BMPs such as dry wells or perforated drain pipe to avoid creating inundated areas and attracting wildlife
- Include nitrogen-fixing vegetation in fertilized areas
- Develop stormwater collection and rain harvesting systems for treatment prior to reuse or discharge

Benefits

- Reduces discharge of high concentrations of contamination and sedimentation into local waterways
- Reduces development impact on downstream water bodies
- Replenishes groundwater
- Potentially reduces offsite flooding impacts



Benefits (cont.)

- Potentially reduces need and cost for stormwater conveyance infrastructure
- Reduces development impact on fish, wildlife, vegetation, and aquatic plants
- Aesthetic improvements through use of green roofs, rain gardens, and bio-swales

Landscaping

Intent

Lessen impact of development on environment by reducing water use and use of chemicals in landscaping while maintaining facility beautification and carbon sequestering goals.

Required Actions for Credit

- Perform soil and climate analysis at beginning of design and base plantings, irrigation, and fertilizers off results
- Include signage to share achievements and strategies with public
- Include nitrogen-fixing vegetation in fertilized areas.
- Specify non-toxic, bio-based materials for initial planting and fertilization.
- Develop an operating and maintenance manual for landscaping staff detailing methods of reducing fertilizer impact, include safe storage, minimal and precise application and safe clean up procedures.
- Include 3 inches of mulch covering any exposed earth in planting beds.
- Use native plants that are suited to the soil and require less or no fertilization.
- Provide or expand on-site facilities for composting of all landscaping waste.
- Implement integrated pest management strategies into the design
- Link irrigation systems to soil moisture content sensors to avoid unnecessary watering or design landscaping that does not require permanent irrigation
- Use captured and metered rainwater, graywater, wastewater or other non-potable water source for irrigation

Strategies

- Evaluate stormwater and/or graywater cisterns for collecting rainwater from facility roofs
- Utilize native vegetation
- Specify drought-tolerant plants, including that they should not be located with non-drought tolerant vegetation.
- Employ high-efficiency irrigation systems with a slow-drip, sub-soil irrigation and automated linkages to meteorological data.
- Do not install a permanent irrigation system
- Use mulch or compost to increase water retention
- Increase plant shade
- Include nitrogen-fixing vegetation in fertilized areas.
- Specify non-toxic, non-chemical materials for initial planting and fertilization.
- Avoid vegetation that requires regular maintenance with pesticides.
- Specify organic or biobased fertilizers and pesticides.
- Top-dress soil with compost to decrease fertilizer and irrigation needs.

Required Documentation

- Soil and climate analysis
- Site landscaping plan indicating all sustainable landscaping techniques and educational signage
- Specification for Operation and Maintenance Manual for landscaping staff.

Benefits

- Reduces maintenance costs
- Reduces detention requirements
- Decreases impact of development on environment
- Conserves water resources
- Reduces demand on water treatment facilities
- Improves groundwater quality
- Limits Authority liability for chemical exposure and contamination
- Limits employee and public exposure to chemicals
- Improves soil quality
- Reduces runoff
- Diverts waste from landfills
- Reduces waste disposal fees

Stormwater/Wastewater Re-use

Intent Reclaim and reuse wastewater and stormwater effluents to both reduce potable water demand and preserve natural water resources.	
Required Actions for Credit <ul style="list-style-type: none">Reduce potable water use through the reclamation and applicable reuse of graywater and/or stormwater for non-potable water needs such as building sewage conveyance, irrigation, and vehicular maintenance.	Strategies <ul style="list-style-type: none">Use reclaimed graywater and/or harvested stormwater for non-potable needs like building sewage conveyance, cooling tower make-up, vehicle maintenance, and landscape irrigation.Evaluate wastewater treatment opportunities to reduce the amount of potable water used in the facility for conveying sewage.Develop stormwater collection/rain-harvesting systems for reuse.
Required Documentation <ul style="list-style-type: none">Stormwater/wastewater re-use plan	
Benefits <ul style="list-style-type: none">Reduces unnecessary potable water demand and usage.Conserves and preserve integrity of the local aquifer.Promotes wetland habitats and groundwater recharge.Reduces on-site stormwater runoff through harvest for non-potable needs.Saves costs on potable water by reusing stormwater and graywaterMinimizes energy used to treat water that is used for non-potable needs.Minimizes burden on municipal sewer infrastructure.	

Impervious Surfaces

Intent

Minimize site area covered by impervious surfaces such as concrete, asphalt, and conventional roofs in order to reduce runoff and maximize infiltration. Where pavement is necessary, maximize the use of pervious pavement.

Required Actions for Credit

- For previously developed sites, decrease impervious area by at least 25%
- For newly developed sites, limit impervious area to a maximum of 50%

Strategies

- Use pervious pavements for roadways, shoulders, non-traffic pavements, maintenance roads, utility yards, airside and landside parking facilities.
- Build vertically rather than horizontally to minimize building footprint, to the extent practicable.
- Use vegetated roofs and bioswales to intercept and treat stormwater.
- Locate parking areas below building footprint.
- Remove unnecessary pavement from site.
- Include canopies with green roofs or solar panels over surface parking lots

Required Documentation

- Site plan marking pervious and impervious areas with a calculation of total percentage impervious area and, if applicable, decrease in impervious area for a previously developed site.

Additional Credits

- 1 point for each additional 5% decrease in impervious area on previously developed sites and each additional 5% pervious area above 50% on newly developed sites.

Benefits

- Reduces potential for erosion and flooding on and off-site.
- Good site infiltration helps to keep groundwater stable and moderates surface water levels.
- Pervious area decreases heat island effect.
- Reduces on-site stormwater runoff and related management infrastructure costs.
- Minimizes burden on municipal sewer infrastructure.
- Reduces detention requirements.
- Decreases impact of development on environment
- Reduces demand on water treatment facilities
- Reduces runoff

2.7 INDOOR AIR QUALITY AND OCCUPANT COMFORT

Indoor Air Quality

Intent

Construct and operate facilities to promote clean air, prevent indoor air quality problems, and avoid exposure of building occupants to potentially hazardous chemicals, fuel vapors, particulates and pollutants.

Required Actions for Credit

- Meet ASHRAE 62-1999, Vent for Acceptable Indoor Air Quality and approved addenda using the Ventilation Rate Procedure
- Locate air intakes away from contaminant sources
- Locate exterior smoking areas away from entryways and operable windows
- For areas with occupant density greater than 25 people per 1,000 sf, install a permanent carbon dioxide monitoring system between 3 and 6 feet above the floor and integrate with Building Automation System
- Provide for real-time control of terminal unit flow rates and total outdoor air flow rates
- Install permanent features at entryways to prevent occupant-borne dirt and contaminants from entering building
- Building Automation System to notify operators when air flow, temperature, humidity, and carbon dioxide (where monitored) vary by greater than 10% from the design standard
- Provide isolated and enclosed cabinets for storage of chemicals and hazardous products
- For spaces potentially impacted by aircraft or ship emissions, install fuel vapor monitors and integrate with Building Automation System.

Strategies

- Design separate plumbing or exhaust systems for areas where chemicals or contaminants are used to isolate from the rest of the building
- Evaluate carbon or electrostatic filters for air intakes
- Install CO2 monitors to automatically adjust HVAC ventilation system
- Provide real time control of terminal unit (VAV box) flow rates and total outdoor air flow rates based on CO2 levels.
- Provide doors for all spaces to avoid high exhaust rates.
- Evaluate drains plumbed for appropriate disposal of liquid wastes.
- Consolidate central locations for storage of concentrated cleaning chemicals and other pollutant sources.
- Ensure proper ventilations, such as fume hoods, for activities that produce hazardous gasses.
- Prohibit the indoor use of combustion engine-based devices without direct exterior exhaust and make-up air.
- Utilize finish materials and assemblies that resist mold growth.

<p>Required Actions for Credit (cont.)</p> <ul style="list-style-type: none"> ■ For spaces designed for non-industrial uses where chemicals and hazardous products are used or contained such as janitorial closets, garages, laundry areas, printing rooms, or maintenance bays: <ol style="list-style-type: none"> 1. Provide additional exhaust rates of .50 cfm/sq. ft. with no air re-circulation 2. Seal off space with deck to deck partitions or hard lid ceilings and self-closing doors <ul style="list-style-type: none"> – If doors cannot be provided ensure sufficient exhaust so negative pressure is created in the space with a 10 Pa pressure difference 	<p>Strategies (cont.)</p> <ul style="list-style-type: none"> ■ Determine potential indoor air quality problems on the site and locate air intakes away from contaminants such as loading areas, exhaust fans, cooling towers, air pollution sources, and potential attacks.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Ventilation Rate Procedure calculations to meet ASHRAE 62-1999 ■ Site plan with all air intakes, smoking areas, chemical storage areas, and entryway features clearly delineated ■ Confirmation of Building Automation System integration for monitoring of carbon dioxide, fuel vapors, air flow, temperature, and humidity ■ For non-industrial spaces where chemicals and hazardous products are used, provide confirmation of exhaust rate goals. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Improves occupant health and comfort ■ Improves productivity ■ Reduces health risks associated with pollutants and particulates 	

Ventilation

Intent

Improve indoor air quality and occupant comfort by providing effective delivery and mixing of fresh air through the building ventilation.

Required Actions for Credit

- For mechanical ventilated spaces, increase outdoor air intake flow by 30% above minimum ASHRAE 62.1 standards.

OR

- For naturally ventilated spaces, follow the 8 design steps from the Carbon Trust Good Practice Guide 237.

Required Documentation

- Outdoor air intake flow calculations showing ASHRAE 62.1 standard minimum and project value

OR

- 8 design steps from Carbon Trust Good Practice Guide 237

Strategies

- Select and place air diffusers for all mechanically ventilated spaces following the recommended design approaches in the ASHRAE 2001 Fundamentals, Chapter 32, Space Air Diffusion.
- Analyze use of heat recovery devices for exhaust air to heat additional outdoor air intake.
- Increase air change effectiveness using:
 1. Displacement ventilation
 2. Underfloor air distribution
 3. Operable windows and skylights
- Increase air movement in cargo facilities and hangars with ceiling fans
- Evaluate trickle ventilators in cargo facilities and hangars.
- Evaluate relief vents or operable skylights in cargo facilities and hangars.
- Use a heat recovery system to mitigate additional energy for additional ventilation.

Benefits

- Increases occupant comfort
- Increases productivity
- Reduces health risks associated with stagnant air
- Better occupant experience
- Ensures adequate airflow to circulate out stagnant and unclean air



Thermal Comfort

Intent Provide thermally comfortable environment for all building occupants.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Comply with ASHRAE Standard 55-2004, Thermal Comfort Conditions and include pertinent information (e.g. set points) in Operations and Maintenance Program ■ Provide adjustable thermostats for all HVAC zones ■ Provide thermostats for all individual partitioned spaces utilized by Massport employees ■ Provide operable windows where feasible 	Strategies <ul style="list-style-type: none"> ■ Integrate micro switches of operable windows with HVAC operation. ■ Consider under floor air distribution system. ■ Add under floor vents for individual work spaces. ■ Include thermal controls for large rooms. ■ Use direct digital control systems for greater accuracy, flexibility, and operator interface compared to pneumatic systems. ■ Integrate occupancy sensors with HVAC operation. ■ Avoid condensation problems by designing mechanical systems to deal with part-load cooling ■ Allow for adjustments to thermal conditions to address season changes ■ In cargo spaces, provide ceiling fans or natural ventilation to increase air movement ■ Incorporate air curtains or revolving doors at entrances. ■ Evaluate humidification in HVAC systems serving office and terminal areas. ■ For spaces with humidification, install humidistats. ■ Analyze the use of heat recovery systems or economizers to recover and reduce energy use while maintaining a comfortable thermal environment. ■ Incorporate air curtains or revolving doors at entrances.
Required Documentation <ul style="list-style-type: none"> ■ Confirmation of compliance with ASHRAE Standard 55-2004 ■ Site plan with all thermostats and operable windows clearly marked 	
Benefits <ul style="list-style-type: none"> ■ Increases occupant productivity ■ Increases occupant comfort ■ Improves user experience 	

Indoor Lighting Control

Intent Provide occupants with a high level of lighting control.	
Required Actions for Credit <ul style="list-style-type: none"> ■ Energy-efficient task lighting for 100% of workspaces ■ Occupancy sensors with manual override in all indoor areas (In public areas, occupancy sensors may vary light levels according to occupancy). ■ Provide varied light levels in public areas to accommodate user needs ■ Ensure sufficient light for safety and security at all times 	Strategies <ul style="list-style-type: none"> ■ Tie lighting in terminals to flight and cruise schedules ■ Maximize use of natural daylight ■ Provide a variety of light levels in various areas of public spaces ■ Install controls that dim or turn lights off at times when daylight is sufficient, such as photoelectric controls. ■ Use direct digital control systems for greater accuracy, flexibility, and operator interface compared to pneumatic systems. ■ Include task lighting for all cubicles. ■ Design terminal areas with a variety of light and sound levels. ■ Maximize the use of natural daylighting. ■ Install motion sensors to turn lights off when the space is unused.
Required Documentation <ul style="list-style-type: none"> ■ Facility plan showing lighting levels for each area, minimum lighting required for safety and security, and location of all occupancy sensors. 	
Benefits <ul style="list-style-type: none"> ■ Increases occupant comfort ■ Increases occupant productivity ■ Improves user experience ■ Increases safety of facility ■ Promotes vision wellbeing 	

Daylighting and Views

Intent Provide a connection between building occupants and outdoor spaces by introducing natural daylight and views to the building interior	
Required Actions for Credit <ul style="list-style-type: none"> ■ Orient spaces that are occupied by 90% of building occupants such that direct views of the outdoors exist. ■ 50% of fenestration area should be completely unobstructed with no partitions greater than 4 feet (opaque or transparent) separating fenestration from continuous spaces greater than 500 square feet. ■ Provide for every 10 square feet of floor space a minimum of 1 square feet of fenestration, skylights, clerestory lighting, or solar tubes ■ Integrate daylighting strategy into building automation system and lighting controls 	Strategies <ul style="list-style-type: none"> ■ Maximize natural daylighting to reduce lighting needs. Consider building orientation, shallow floor plates, increased building perimeter, floor-to-ceiling heights, and ceiling configurations. ■ Provide photo-integrated light sensors to dim artificial lights when sufficient daylight is penetrating building. ■ Develop lighting and day lighting model. ■ Design partitioned offices in center of floor plans with windows so a direct view of fenestration can be achieved. ■ Use open workstation cubicles or cubical walls lower than 4 feet. ■ Avoid HVAC or electrical wiring within 5 feet of outer walls so that ceiling height can be modified to increase viewable fenestration. ■ Design building to maximize view opportunities. ■ Provide exterior and interior permanent shading devices. ■ Use shallow floor plates. ■ Orient building to maximize amount of daytime sunlight through windows. ■ Use light colored interior decoration to reflect light. ■ Provide spectrally selective glazing to maximize daylight and minimize heat gain. ■ Provide insulated windows to improve thermal performance and reduce heat gain. ■ Use daylighting model or calculations to assess foot-candle levels and daylight factors achieved.
Required Documentation <ul style="list-style-type: none"> ■ Daylighting Strategy Report documenting conformance with standards 	
Benefits <ul style="list-style-type: none"> ■ Increases productivity ■ Improves user experience ■ Reduces energy use by day lighting instead of using artificial light sources 	

Low-Emitting Materials

Intent Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	
Required Actions for Credit <ul style="list-style-type: none">■ Specify low-VOC (or, where applicable, no-VOC) sealants, adhesives, paints, coatings, carpet systems, composite wood and agrifiber products.■ Specify that all shop finished materials are to meet the VOC emission requirements, including where applicable, primed steel, finished metals including aluminum, finished millwork and finished steel and wood doors, frames and windows.■ Specify wood and agrifiber products with no added urea-formaldehyde resins.	Strategies <ul style="list-style-type: none">■ Ensure VOC limits are clearly specified where carpet systems are addressed■ For carpet standards refer to the Carpet and Rug Institute “Green Label” standard.■ Utilize low-VOC field applied paints and coating.■ Materials to consider include: primed steel, finished metals including aluminum, finished millwork, finished steel and wood doors and windows.
Required Documentation <ul style="list-style-type: none">■ List of all sealants, adhesives, paints, coatings, carpet systems, composite wood, agrifiber products, and show finished materials specified for the project and VOC/urea-formaldehyde status	
Benefits <ul style="list-style-type: none">■ Reduces risk of occupant respiratory disease■ Reduces emissions into the atmosphere of volatile organic compounds (VOCs) that have a negative impact on indoor air quality and the Earth’s atmosphere.■ Potentially reduces absenteeism due to respiratory-related illness.■ Increases occupant comfort■ Improves user experience	

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Appendix A
Massachusetts Port Authority
Sustainable Design Standards and Guidelines
Rating Checklist
June 2009

Project Number and Title	
Project Type	
Square Footage	
Summary Description and Scope	

		Applicable			Achieved (Insert number of credits achieved within project design)	Summary (Short summary of achievement and/or strategy)
		Yes	Maybe	No		
General						
	Project Definition					
	Project Sustainability Progress Meetings					
	Design Documents and Construction Submittals					
	Systems Commissioning					
	Waste Reduction and Recycling Infrastructure					
	Design for Deconstruction					
	Operations and Maintenance Program					
	Professional Certification					
	Social Responsibility & Community Involvement					
	Public Education					
Project Site Design						
	Airfield Design & Layout					
	Airport Ramp Infrastructure					
	Roadway Layout and Design					
	Access to Public Transportation					
	Parking					
	Site Selection					
	Site Protection & Restoration - non-Airfield					
	Future Land Use					
	Vegetation & Wildlife Management					
	Pest Management					
Project Materials						
	Heat Island Effect - Roof					
	Heat Island Effect - Non-Roof					
	Material Durability					
	Flexible Building Re-Use					
	Material Use & Re-Use					
	Recycled Content					
	Construction Waste Management					
	Regional Materials					
	Rapidly Renewable Materials					
	Certified Wood					
Energy Management and Efficiency						
	Energy Efficiency					
	Interior & Exterior Lighting					
	Alternative & Renewable Energy					
Air Emissions						
	Infrastructure to Encourage Walking & Biking					
	Alternative Fuel Vehicles					
	Refrigerant Management					
	Greenhouse Gas Impact Evaluation and Mitigation					
	Air Toxins					
Water Management, Quality, and Efficiency						
	Water Management & Efficiency					
	Stormwater Treatment					
	Landscaping					
	Stormwater/Wastewater Re-use					
	Impervious Surfaces					
Indoor Air Quality & Occupant Comfort						
	Indoor Air Quality					
	Ventilation					
	Thermal Comfort					
	Lighting Control					
	Daylighting & Views					
	Low-Emitting Materials					
	Total	0	0	0	0	
		Rating Calculation:			#DIV/0!	#DIV/0!

Certified 40%-55%
Silver 56%-70%
Gold 71%-85%
Platinum 86%-100%

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Appendix B: Innovation Worksheet

Project: _____

Sustainable Design Criteria: _____

Topic Intent: _____

Requirement to be Waived: _____

Replacement Innovation (including description and benefits): _____

Approvals:

Peer Review

Project Manager

Sustainability Program Manager



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Appendix C: Waiver Form

Project: _____

Project Description: _____

Reason for Waiver Request (must attach completed rating checklist):

Peer Review Complete: _____
Date Consultant

Approvals:

Project Manager

Sustainability Program Manager



Massachusetts Port Authority

Sustainable Design Standards and Guidelines

Application for AAPA Annual Award in
Comprehensive Environmental Management



Massachusetts Port Authority
Catherine Wetherell, Deputy Director,
Capital Programs and Environmental Affairs
June 24, 2009

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Goals and Objectives	5
Discussion	6
Background.....	6
Objectives and Methodology	9
Award Criteria Fulfillment	11
Conclusion	14

Introduction

The Massachusetts Port Authority (Massport) is pleased to submit this application to the American Association of Port Authorities (AAPA) for the 2009 Environmental Awards Competition in the “Comprehensive Environmental Management” category. This application showcases Massport’s ***Sustainable Design Standards and Guidelines (SDSG)***, which were formally rolled out on June 1, 2009 and are currently being implemented for six port projects. The SDSG is a certification program that consists of a set of performance standards and guidelines for sustainable design, a process for implementation, and a documentation system to track progress and determine certification level. The SDSG is required to be used by architects, planners and engineers to consistently integrate sustainable technologies and practices into all of Massport’s capital projects. The intent of the SDSG is to provide innovative guidance for sustainable design that goes ***beyond*** existing programs for buildings (such as the United States Green Building Council’s (USGBC’s) Leadership in Energy and Environmental Design (LEED®) program and the Port Authority of New York and New Jersey’s (PANYNJ’s) Sustainable Project Design Manual) and addresses the unique obstacles and opportunities encountered for port projects, specifically the non-building projects that are typical for the port industry.

The SDSG covers a variety of topics including community involvement, public education, energy and water management, project site design, project materials, air emissions, and indoor air quality. Use of the SDSG will improve port projects by further minimizing negative impacts and maximizing the benefits to the environment, the

surrounding community and the economy while ensuring, and possible enhancing, the financial viability of the port. The SDSG also showcases the importance of being sustainable and educates and empowers users to incorporate sustainability into their day-to-day activities and business strategies.

Massport is an independent public authority which develops, promotes and manages the public port infrastructure in the Port of Boston in addition to other key transportation infrastructure that enables Massachusetts and New England to compete successfully in the global marketplace. Massport's port-related portfolio includes the Conley Container Terminal, the Black Falcon Cruise Terminal, the Boston Fish Pier, Boston Autoport, the Massport Marine Terminal, four parks, and numerous other maritime and commercial development properties in South Boston, East Boston, and Charlestown. Massport's mission is to promote economic growth and vitality throughout Massachusetts and New England by operating many of the region's largest transportation facilities safely, securely and efficiently while being mindful of the environment and our neighboring communities.

Massport has a long history of achievements in sustainability and implements a comprehensive sustainability program that includes initiatives ranging from an ISO 14001 Certified Environmental Management System at Conley Terminal and several other facilities, shore power at several of its port berths, development of a port baseline emission inventory, a green equipment purchasing program, recycling of pavement during Conley Terminal improvements, various energy efficiency initiatives, a community outreach program, and development and management of a number of parks

and green spaces. As part of this overall sustainability program, Massport developed and implemented the SDSG for capital projects with input and support from all Massport departments. This was a successful collaboration that was designed to ensure that sustainable design and construction objectives are appropriately incorporated into the implementation of Massport's Capital Program. These standards and guidelines will be applied to all projects within the Capital Program, both horizontal and vertical, and we look forward to working with our tenants and other stakeholders to expand our sustainability efforts.

Goals and Objectives

The main goal of the SDSG is to consistently incorporate sustainable design techniques and concepts into all capital projects at Massport facilities, including the Conley Container Terminal, the Black Falcon Cruise Terminal, the Boston Fish Pier, the Boston Autoport, and the Massport Marine Terminal. By providing a set of prescriptive but flexible design standards for building and non-building projects, as well as a corresponding implementation process and documentation system, Massport's architects, engineers, planners, and project managers will be able to minimize the environmental, social and economic impacts of its port projects while allowing for innovation and cross-departmental collaboration. Other objectives of the SDSG include:

- 🌱 Providing awareness training to Massport staff and tenants on applied sustainability to start discussions and create urgency about the importance of sustainable facilities and operations;
- 🌱 Encouraging the development and implementation of cutting-edge technologies;

- 🌱 Measuring sustainability performance so that progress can be communicated, knowledge can be transferred and gaps can be identified; and
- 🌱 Providing the port community with a resource that accounts for unique sustainability opportunities and obstacles faced by building and non-building projects typical to the port industry.

The SDSG is a living document that will be regularly updated to incorporate new techniques and “lessons learned.” Massport is committed to being transparent regarding the SDSG program so that others can benefit from this resource.

Discussion

This section describes the background of the SDSG, the objectives and methodology for the development and implementation of the SDSG, and how the SDSG program fulfills the Award Criteria for the 2009 Environmental Awards Competition.

Background

The concept of using a succinct set of performance standards to improve sustainability performance became engrained in our culture in 1993, through the United USGBC’s LEED® program. The success of the LEED® program reinforces that this type of tool is an effective means of modifying our traditional methods of designing buildings to yield smaller impact on the environment. However, there are issues that are unique to transportation agencies that necessitate strategies and guidelines that go beyond individual buildings. To address this gap, Massport developed and implemented the SDSG, which is customized for Massport’s specific operations, facilities, geographic characteristics and regulatory requirements.

The SDSG contains forty-nine performance standards organized in seven categories (see the Rating Checklist presented on the next page). For each performance standard, the SDSG provides the following information:

- 🌱 The general intent or purpose of the standard;
- 🌱 Required actions and targets to receive credit for achieving the standard;
- 🌱 Required documentation to prove that the required actions and targets were met; and
- 🌱 Suggested strategies for achieving the standard's intent.

The SDSG is designed to encourage innovation; if the architect, engineer or planner feels that it is possible to meet a topic's intent outside of the required actions or with an emerging technology, the user may submit an Innovation Worksheet to receive credit.

To implement the SDSG, the Massport project manager and the design team follow the implementation process that includes the steps outlined below:

- 1) Integrate sustainability language into the basic project definition.
- 2) Conduct awareness training on sustainability and the SDSG for the design team.
- 3) Complete the Rating Checklist to determine which standards are applicable to the port project and identify those that will be incorporated into the design.
- 4) Update the Rating Checklist at project milestones and continually compile the required documentation to achieve credit for achieving the standards.
- 5) At project completion, submit all documentation to Massport's Sustainability Program Manager for review and determination of certification level, which will be based on the number of performance standards achieved.

**Massachusetts Port Authority
Sustainable Design Standards and Guidelines
Rating Checklist
June 2009**

Project Number and Title	
Project Type	
Square Footage	
Summary Description and Scope	

		Applicable			Achieved	Summary
		(Insert X)			(Insert number of credits achieved within project design)	(Short summary of achievement and/or strategy)
		Yes	Maybe	No		
General						
	Project Definition					
	Project Sustainability Progress Meetings					
	Design Documents and Construction Submittals					
	Systems Commissioning					
	Waste Reduction and Recycling Infrastructure					
	Design for Deconstruction					
	Operations and Maintenance Program					
	Professional Certification					
	Social Responsibility & Community Involvement					
	Public Education					
Project Site Design						
	Airfield Design & Layout					
	Airport Ramp Infrastructure					
	Roadway Layout and Design					
	Access to Public Transportation					
	Parking					
	Site Selection					
	Site Protection & Restoration - non-Airfield					
	Future Land Use					
	Vegetation & Wildlife Management					
	Pest Management					
Project Materials						
	Heat Island Effect - Roof					
	Heat Island Effect - Non-Roof					
	Material Durability					
	Flexible Building Re-Use					
	Material Use & Re-Use					
	Recycled Content					
	Construction Waste Management					
	Regional Materials					
	Rapidly Renewable Materials					
	Certified Wood					
Energy Management and Efficiency						
	Energy Efficiency					
	Interior & Exterior Lighting					
	Alternative & Renewable Energy					
Air Emissions						
	Infrastructure to Encourage Walking & Biking					
	Alternative Fuel Vehicles					
	Refrigerant Management					
	Greenhouse Gas Impact Evaluation and Mitigation					
	Air Toxins					
Water Management, Quality, and Efficiency						
	Water Management & Efficiency					
	Stormwater Treatment					
	Landscaping					
	Stormwater/Wastewater Re-use					
	Impervious Surfaces					
Indoor Air Quality & Occupant Comfort						
	Indoor Air Quality					
	Ventilation					
	Thermal Comfort					
	Lighting Control					
	Daylighting & Views					
	Low-Emitting Materials					
Total		0	0	0	0	

Rating Calculation:

Certified 40%-55%
Silver 56%-70%
Gold 71%-85%
Platinum 86%-100%

To support implementation, Massport has selected an outside consultant to assist with additional awareness training, project planning and technical research.

Objectives and Methodology

In the development of the SDSG, the main objective was to provide a comprehensive, prescriptive set of performance standards specific to the port industry that guides the project teams to the actions and targets that must be achieved while also allowing flexibility for innovation, as well as an implementation process and a documentation system to track progress. In addition, a conscious effort was made to ensure that Massport was not “reinventing the wheel”, but rather was compiling existing, applicable performance standards and providing supplemental standards that do not yet exist for the non-building components of port projects. The SDSG was also designed to be practical and implementable to improve the sustainability performance of port projects without insurmountable impacts to the project’s scope, schedule and budget.

The SDSG was developed internally by a diverse, interdepartmental working group that allowed all perspectives to be represented in the document and assisted in achieving early buy-in for the document throughout all facets of the organization. The working group spent many hours drafting, reviewing, debating, and discussing content, and the document was reviewed by senior management and an outside consultant.

To test the implementability of the SDSG, “table top” exercises were conducted for projects that were currently underway to confirm that the requirements of the SDSG

were practical and would result in the improvement of the sustainability of our capital projects. The table top projects included:

- 🌱 Fender replacement at Black Falcon Cruise Terminal;
- 🌱 Office alterations;
- 🌱 Lighting and communication upgrades for the Tobin Bridge; and
- 🌱 Modification of the Delta Taxiway at Logan International Airport.

The results of the table top exercises indicated that it was possible for capital projects to achieve the requirements of the SDSG without undue hardship and, most importantly, that the SDSG provides the design teams with the information and processes they need to consistently improve the projects and make them more sustainable.

The SDSG program was rolled out through two training sessions with Massport project managers and its outside consultants, engineers, planners, architects, and contractors. The SDSG is currently being implemented on the following six port projects:

- 🌱 Coastal Oil Property Acquisition and Remediation –The remediation program for this former oil terminal that Massport recently acquired to facilitate future expansion of our container terminal includes solar-powered product recovery systems, in-situ bioremediation and on-property biopiles to reduce the carbon footprint associated with off-site transportation and disposal of contaminated soils.
- 🌱 Conley Heavy Duty Pavement Rehabilitation – Old pavement will be recycled.
- 🌱 Rehabilitation of Existing Cranes at Conley – Goal is to improve energy efficiency.

- 🌱 Additional Conley Dock Cranes – Purchase and re-use of pre-owned electric-powered pier cranes from the Port of Oakland.
- 🌱 Refrigerated Containers Racks at Conley – Plug-in infrastructure for new reefers to replace diesel generators.
- 🌱 Tractor Replacement – Goal is to improve energy efficiency.

Award Criteria Fulfillment

1) The level and nature of benefits to environmental quality, beautification or community involvement

Because certification through the SDSG program is required for capital projects at all Massport facilities, the level of benefits to the environment, facility users and the community will be improved. The SDSG ensures that the team understands the potential environmental, social and economic impacts of the port project and offers solutions to minimize these impacts and improve the project. The SDSG is written to ensure that integrated solutions will be reached that simultaneously achieve excellence in environmental stewardship, economic growth and social responsibility, so the benefits are more holistic and synergistic in nature.

2) The level of independent involvement and effort by the port

The SDSG was developed through a diverse, interdepartmental working group with minimal involvement of an outside consultant. The implementation of the SDSG is being led by Massport's Sustainability Program Manager as well as the individual project managers with supporting assistance from an outside consultant.

3) *The creativity of the solution or programs*

The SDSG is unique in that it looks beyond building design to provide standards and guidelines for non-building projects that are typical of the port industry.

Although the SDSG includes existing standards that historically have been applied for buildings, it also provides guidance on how the design team can apply these standards in a different way as well as supplemental standards that have not existed until now. In addition, the technologies recommended in the SDSG represent emerging and innovative solutions or modifications to the traditional methods of design and construction for a broad range of topics.

4) *Whether the project or program results are apparent*

The results of the table top exercises demonstrated that the SDSG is both practical and implementable and will improve port projects and yield enhanced benefits for the environment, community and the economy. Project improvements identified through the table top exercises included opportunities for energy efficiency through equipment selection, improved material durability to increase product lifespan and decrease maintenance requirements, enhanced occupant comfort and productivity, decreased GHG emissions, and increased pervious surfaces to improve stormwater management. Preliminary results from the implementation of the SDSG on current port projects also demonstrate success in improving sustainability performance.

In addition, the success of the training sessions demonstrates the initial progress of the SDSG program. A majority of internal and external architects, designers, and planners have a common understanding of the definition of sustainability and the importance of improving the sustainability performance of Massport's capital projects. Each trainee was challenged to take this information and apply it not only in their project work, but in day-to-day management practices and overall business strategies. The positive feedback and excitement about the program indicates that the SDSG will continue to be a successful initiative that will greatly enhance the sustainability of Massport's port facilities and operations.

5) The cost effectiveness of the activity or the program

The SDSG allows for coordinated efforts toward integrating sustainable practices and techniques into the capital projects. The consistency that is provided by the program will streamline the cost- and time-effectiveness of Massport's efforts to include sustainable technologies in its projects by making these efforts less ad hoc and providing for enhanced quality control. In addition, technical resources will be made available to all project teams to prevent duplicate efforts in researching emerging technologies. The implementation process also allows for project teams to share technical information and lessons learned so that future projects can be improved with minimal cost.

In addition, the results of integrating sustainable technologies will likely reduce operating costs for the final projects. For instance, focusing on energy efficiency

measures during the project design will decrease the electricity and fuel usage for the final project. Another potential cost savings comes from the improvement of indoor air quality and occupant comfort, which has been shown to increase employee productivity.

6) *The transferability of the technology or idea to the port industry*

Although the performance standards included in the SDSG are tailored for Massport's specific needs, a large portion of the content is directly transferable to port projects around the world. The concept that a set of sustainability performance standards can be successfully implemented by a port is also directly transferable to other port authorities. Massport is committed to sharing the content of the SDSG and its experiences with implementation with the port industry as well as other related industries. Massport encourages others to use the SDSG and invites comments and suggestions for improvements so that each updated version of the document contains innovative solutions that may be used by all.

Conclusion

Massport's Sustainable Design Standards and Guidelines will ensure that sustainable techniques and concepts are consistently integrated into all capital projects at Massport's facilities, including its port facilities. As a result, the environmental, economic and social impacts of the projects will be minimized and integrated solutions will enhance the positive benefits and leverage the synergies that exist between environmental stewardship, economic growth and social responsibility. The SDSG also

provides awareness training on the definition and importance of sustainability to a broad and diverse group of Massport employees and consultants who will use this information in all facets of their work.

Massport's methodology for developing and implementing the SDSG included comprehensive stakeholder engagement. The SDSG was developed by an internal working group in order to include many perspectives in the document, facilitate cross-departmental collaboration and achieve early buy-in. During implementation, cross-departmental collaboration and stakeholder engagement are also an important part of the process. Technical support is provided to all teams to streamline the implementation and to facilitate the sharing of information and lessons learned.

The results of the table top exercises and the current implementation prove that the SDSG is both practical and implementable to improve a port project without overwhelming changes to the project's scope, schedule or budget. The rating system allows Massport to measure and communicate progress in incorporating sustainable practices into their capital projects. Implementation of the SDSG also encourages innovation through the development and execution of cutting-edge technologies. Because of these benefits of the SDSG program, Massport believes that this program is a strong candidate for the Comprehensive Environmental Management category for the 2009 Environmental Awards Competition.



MASSACHUSETTS PORT AUTHORITY SUSTAINABLE DESIGN STANDARDS & GUIDELINES 2009 AWARD COMPEITION – FACT SHEET

The Massachusetts Port Authority (Massport) has developed and implemented its **Sustainable Design Standards and Guidelines (SDSG)**. The SDSG is a certification program that includes performance standards for sustainable design, an implementation process and a documentation system that is required for all Massport capital projects at its port and other facilities. The SDSG assists project teams to minimize negative impacts and maximize positive benefits to the environment, the surrounding community and the economy while ensuring financial viability of the port. Additional objectives include:

- Provide awareness training on applied sustainability and emphasize the importance of being sustainable;
- Measure sustainability performance so that progress can be communicated, knowledge can be transferred and gaps can be identified; and
- Encourage the development and implementation of cutting-edge technologies.

The SDSG is currently being implemented for six port projects.

Massport believes that this program is a strong candidate for the Comprehensive Environmental Management category for the 2009 Environmental Awards Competition by meeting all six criteria:

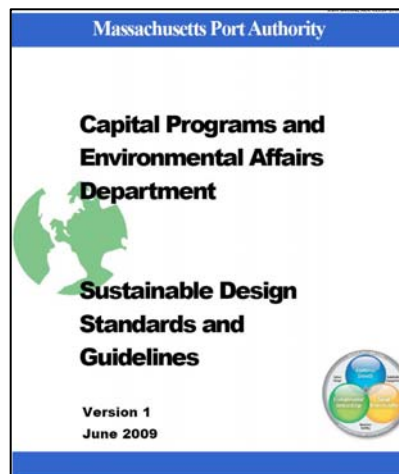
- Because certification through the SDSG program is required, the **level and nature of benefits** to the environment, facility users and the community is continually enhanced.
- The SDSG was developed internally through a **diverse, interdepartmental working group** of Massport staff.

- The SDSG is innovative in that it goes **beyond buildings** to address unique obstacles and opportunities faced by port projects. The technologies recommended in the SDSG represent **creative, emerging and innovative solutions** to improve upon traditional design practices in a broad range of topics.
- “Table top” exercises and implementation on current projects demonstrate that the SDSG is both **practical and implementable and will yield measurable benefits for the environmental, community and economy**.
- The SDSG allows for coordination toward integrating sustainable techniques into capital projects in order to **streamline the cost- and time-effectiveness of Massport’s sustainability efforts**. In addition, the results of including sustainable technologies will **reduce operating costs** for the final project.
- The SDSG is designed so that **the content is directly transferable to ports around the world**. Massport is committed to sharing its program with the port industry and invites suggestions for improvements so that each

updated version of the document contains innovative solutions that may be used by all.

For more information, please contact:

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Director of Capital Programs
Massachusetts Port Authority
One Harborside Drive
Suite 200S
East Boston, MA 02128-2909



Massport

Sustainable Design Guidelines (SDG) Workshop



CDM
APRIL 2009

Massport Sustainability Program

CDM

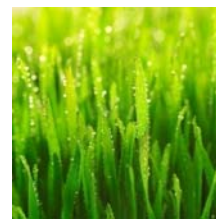
■ Sustainability Programs

- Solid Waste & Recycling
- Mobile Fleet & Equipment
- Energy and Alternative Energy
- Office Initiatives
- Purchasing
- Development & Design
- Construction
- Facilities Maintenance and Asset Management
- Existing Facilities Performance and Upgrades
- Grounds Maintenance, including snow removal and landscaping
- Social Responsibility and Community Involvement
- Information Technology
- Water Resources
- Employees and Diversity
- Industry Trend Setting and Leadership
- Innovative Partnerships
- User/Public Incentives
- Tenant Incentives

Meeting Purpose

CDM

- New Sustainable Design Guidelines (SDG) for Capital Projects
- Introduce SDG content and how to work within these guidelines
- Your responsibilities



Use of SDG

CDM

- SDG are intended to be used by all architects, engineers, and planners working on CPs for Massport.
- SDG apply to all CPs:
 - new construction and rehabilitation
 - building and non-building
 - any square footage or monetary value
- SDG are tailored to Massport to ensure leadership in sustainable development.

Roots of Sustainability

CDM

Sustainable development ... meets the needs of the present without compromising the ability of future generations to meet their own needs.

Bruntland Commission, 1987

The Triple Bottom Line

CDM



ECONOMIC GROWTH

+ ENVIRONMENTAL STEWARDSHIP

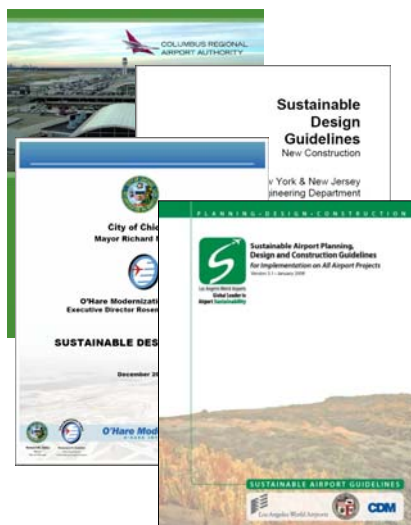
+ SOCIAL RESPONSIBILITY

The “Triple Bottom Line”

- Sustainability is not just being “green”

Development of SDG

CDM



- ✓ Identified as key opportunity by Capital Programs Department
- ✓ Reviewed sustainability programs at other port authorities
- ✓ Developed by an inter-departmental Sustainability Working Group



- ✓ SDG is Massport's tool to achieve sustainable design

Content of SDG

CDM

- 7 categories of performance standards
- 49 performance standards in total
- All CPs must achieve a minimum rating of 'Certified'

Rating System

Level	% of applicable points
Certified	40-55%
Silver	56-70%
Gold	71-85%
Platinum	86-100%

SDG Content

CDM

Each performance standard includes:

- ✓ Intent
- ✓ Benefits
- ✓ Required for Credit
- ✓ Additional Credits
- ✓ Required Documentation
- ✓ Strategies

- Material Durability
 - Intent
 - Maximize durability of materials to minimize maintenance and replacement and maximize material life
 - Benefits
 - Reduced life-cycle-costs
 - Reduced solid waste over the project lifecycle
 - Reduced operational disruptions due to maintenance and replacement
 - Required for Credit
 - Evaluate and prioritize materials based on lifespan and lifecycle maintenance costs
 - Develop life-cycle-cost analysis for project materials
 - Required Documentation
 - Life-cycle-cost analysis for project
 - List of materials evaluated based on lifespan and lifecycle maintenance costs. Note materials chosen for incorporation into the project. Provide justification for highly rated materials not chosen for the project.
 - Strategies
 - Avoid products that require frequent replacement or maintenance
 - Prioritize materials that can be recycled
 - Evaluate state-of-the-art materials and best practices
 - Adjust standard capital project budget estimating norms to account for higher material first costs, if applicable.

SDG Categories

CDM

1. General
2. Project Site Design
3. Project Materials
4. Energy Management and Efficiency
5. Air Emissions
6. Water Management, Quality, and Efficiency
7. Indoor Air Quality & Occupant Comfort



SDG Categories

CDM

1. **General**
2. Project Site Design
 - Project Definition
 - Project Sustainability Progress Meetings
 - Design Documents and Construction Submittals
3. Project Materials
 - Systems Commissioning
 - Waste Reduction and Recycling Infrastructure
4. Energy Management and Efficiency
 - Design for Deconstruction
 - Operations and Maintenance Program Professional Certification
5. Air Emissions
 - Social Responsibility & Community Involvement
6. Water Management, Quality, and Efficiency
 - Public Education
7. Indoor Air Quality & Occupant Comfort

SDG Categories

CDM

1. General
2. **Project Site Design**
 - Airfield Design & Layout
 - Airport Ramp Infrastructure
 - Roadway Design
 - Access to Public Transportation
 - Parking
 - Site Selection
 - Site Protection & Restoration – non-Airfield
 - Future Land Use
 - Vegetation & Wildlife Management
 - Pest Management
3. Project Materials
4. Energy Management and Efficiency
5. Air Emissions
6. Water Management, Quality, and Efficiency
7. Indoor Air Quality & Occupant Comfort

SDG Categories

CDM

1. General
2. Project Site Design
3. **Project Materials**
4. Energy Management and Efficiency
5. Air Emissions
6. Water Management, Quality, and Efficiency
7. Indoor Air Quality & Occupant Comfort

- Heat Island Effect - Roof
- Heat Island Effect - Non-Roof
- Material Durability
- Flexible Building Re-Use
- Material Use & Re-Use
- Recycled Content
- Construction Waste Management
- Regional Materials
- Rapidly Renewable Materials
- Certified Wood

SDG Categories

CDM

1. General
2. Project Site Design
3. Project Materials
4. **Energy Management and Efficiency**
5. Air Emissions
6. Water Management, Quality, and Efficiency
7. Indoor Air Quality & Occupant Comfort

- Energy Efficiency
- Interior & Exterior Lighting
- Alternative & Renewable Energy

SDG Categories

CDM

1. General
2. Project Site Design
3. Project Materials
4. Energy Management and Efficiency
5. **Air Emissions**
 - Infrastructure to Encourage Walking & Biking
 - Alternative Fuel Vehicles
 - Refrigerant Management
 - Greenhouse Gas Impact Evaluation & Mitigation
 - Air Toxins
6. Water Management, Quality, and Efficiency
7. Indoor Air Quality & Occupant Comfort

SDG Categories

CDM

1. General
2. Project Site Design
3. Project Materials
4. Energy Management and Efficiency
5. Air Emissions
6. **Water Management, Quality, and Efficiency**
 - Water Management & Efficiency
 - Stormwater Treatment
 - Landscaping
 - Stormwater/Wastewater Re-use
 - Impervious Surfaces
7. Indoor Air Quality & Occupant Comfort

SDG Categories

CDM

1. General
2. Project Site Design
3. Project Materials
4. Energy Management and Efficiency
5. Air Emissions
6. Water Management, Quality, and Efficiency
7. **Indoor Air Quality & Occupant Comfort**

- Indoor Air Quality
- Ventilation
- Thermal Comfort
- Lighting Control
- Daylighting & Views
- Low-Emitting Materials

Implementation

CDM



1. Determine sustainability goals
 - What level rating can the project achieve?
 - Which performance standards will be included in the design?
 - Are there any additional points that could be achieved with an **Innovation Worksheet**?



2. Keep on target
 - Fill out the **Rating Sheet** at the beginning of the design process
 - Revise the rating sheet and innovation worksheets at 30%, 60% and 90% design stages



3. Massport designates final rating
 - Provide documentation for approval

Implementation – Rating Sheet

CDM

- Mark whether each performance standard applies to the project
- Mark performance standards included in the design 'achieved'
- Calculate projected rating
- Revise at 30%, 60% and 90% stages, and if project changes
- Use Rating Sheet to stay on target for desired rating

Implementation – Rating Sheet

CDM

- Mark whether each performance standard applies to the project
- Mark performance standards included in the design 'achieved'
- **Calculate projected rating**
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- Use Rating Sheet to stay on target for desired rating

Level	% of applicable points
Certified	40-55%
Silver	56-70%
Gold	71-85%
Platinum	86-100%

- Mark whether each performance standard applies to the project
- Mark performance standards included in the design ‘achieved’
- Calculate projected rating
- Revise at 30%, 60% and 90% stages, and if project changes
- Use Rating Sheet to stay on target for desired rating

Implementation – Innovation Worksheets

- Purpose is to encourage “thinking outside the box”
- Three ways to use the innovation worksheets:
 1. Innovation not included in SDG
 2. Exceeding requirements
 3. Meet intent without meeting exact requirements

Table Top Exercises

CDM



- Tested the SDG
- Looked at four examples of current CPs
 - Tobin Bridge Lighting
 - Delta Taxiway
 - LOC Office Renovations
 - Black Falcon Fenders
- Would these projects have achieved certification?

Table Top Exercises – Tobin Lighting (Phase I)

CDM



Lower deck lighting, communication and power systems replacement

- 16 performance standards were applicable
- 11 were achieved

11/16 = 69% → **Silver Rating**

Highlights:

Energy Management & Efficiency

Reuse of existing handrails as wiring conduit

Table Top Exercises – Delta Taxiway

CDM



Expand and realign Delta Taxiway

- 23 performance standards were applicable
- 19 were achieved

$19/23 = 83\% \longrightarrow$ **Gold Rating**

Highlights:

Project Site Design

30% Energy Savings

★ Awarded innovation point for going above savings requirement

Table Top Exercises – LOC Office Alterations

CDM



Renovations to 1st and 3rd Floors of LOC

- 19 performance standards were applicable
- 11 were achieved

$11/19 = 58\% \longrightarrow$ **Silver Rating**

Highlights:

Indoor Air Quality & Occupant Comfort

Project Materials

Water Efficiency

Table Top Exercises – Black Falcon Fenders

CDM



Replace camels, dolphins, and fenders for Black Falcon docking terminal

- 16 performance standards were applicable
- 6 were achieved

$6/16 = 38\%$ → **Not Rated**

Highlights:

General

Project Materials

Summary

CDM

- SDG are prescriptive but flexible
- SDG must be integrated into project from the very beginning
- SDG are practical and implementable



Your Role with SDG

CDM

- Understand the SDG document
- Integrate SDG into design schedule and budget from day one
- Engage stakeholders and Massport PM to stay on target

Take Ownership of the SDG



Questions?



CDM
APRIL 2009