# OPERATIONS & MAINTENANCE TABLE OF CONTENTS

## OPERATIONS & MAINTENANCE INTRODUCTION

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Sustainable Sites</td>
<td>OM-3</td>
</tr>
<tr>
<td>1.1</td>
<td>Equipment Maintenance</td>
<td>OM-9</td>
</tr>
<tr>
<td>1.2</td>
<td>LEED Certified Project</td>
<td>OM-11</td>
</tr>
<tr>
<td>1.3</td>
<td>Exterior Facilities Management</td>
<td>OM-12</td>
</tr>
<tr>
<td>1.4</td>
<td>Hardscape Grounds Management</td>
<td>OM-14</td>
</tr>
<tr>
<td>1.5</td>
<td>Integrated Pest Management and Wildlife Deterrence</td>
<td>OM-16</td>
</tr>
<tr>
<td>1.6</td>
<td>Erosion Control</td>
<td>OM-18</td>
</tr>
<tr>
<td>1.7</td>
<td>Landscape Management</td>
<td>OM-20</td>
</tr>
<tr>
<td>1.8</td>
<td>Alternative Commuting Transportation for Employees</td>
<td>OM-23</td>
</tr>
<tr>
<td>1.9</td>
<td>Stormwater Management</td>
<td>OM-26</td>
</tr>
<tr>
<td>1.10</td>
<td>Heat Island Reduction</td>
<td>OM-30</td>
</tr>
<tr>
<td>1.11</td>
<td>Light Pollution Reduction</td>
<td>OM-33</td>
</tr>
<tr>
<td>2.0</td>
<td>Water Efficiency</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Establish a Water Baseline</td>
<td>OM-35</td>
</tr>
<tr>
<td>2.2</td>
<td>Retroactive Water Efficiency</td>
<td>OM-37</td>
</tr>
<tr>
<td>2.3</td>
<td>Indoor Water Efficiency</td>
<td>OM-39</td>
</tr>
<tr>
<td>2.4</td>
<td>Water Efficient Landscaping</td>
<td>OM-42</td>
</tr>
<tr>
<td>2.5</td>
<td>Rain Harvesting for Non-Irrigation Usage</td>
<td>OM-45</td>
</tr>
<tr>
<td>2.6</td>
<td>Innovative Wastewater Management</td>
<td>OM-47</td>
</tr>
<tr>
<td>2.7</td>
<td>Water Efficient Vehicle Washing</td>
<td>OM-49</td>
</tr>
<tr>
<td>3.0</td>
<td>Energy &amp; Atmosphere</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Refrigerant Management</td>
<td>OM-51</td>
</tr>
<tr>
<td>3.2</td>
<td>Utility Meter Data</td>
<td>OM-53</td>
</tr>
<tr>
<td>3.3</td>
<td>Retroactive Energy Optimization</td>
<td>OM-55</td>
</tr>
<tr>
<td>3.4</td>
<td>Optimize Energy Performance</td>
<td>OM-57</td>
</tr>
<tr>
<td>3.5</td>
<td>Existing Building Commissioning</td>
<td>OM-65</td>
</tr>
<tr>
<td>3.6</td>
<td>Performance Measurement</td>
<td>OM-69</td>
</tr>
<tr>
<td>3.7</td>
<td>On-Site and Off-Site Renewable Energy</td>
<td>OM-73</td>
</tr>
<tr>
<td>3.8</td>
<td>Enhanced Refrigerant Management</td>
<td>OM-77</td>
</tr>
<tr>
<td>3.9</td>
<td>Emissions Reduction Reporting</td>
<td>OM-79</td>
</tr>
<tr>
<td>4.0</td>
<td>Materials &amp; Resources</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Solid Waste Management</td>
<td>OM-82</td>
</tr>
<tr>
<td>4.2</td>
<td>Local/Regional Materials</td>
<td>OM-88</td>
</tr>
<tr>
<td>5.0</td>
<td>Indoor Environment Quality</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Outdoor Air Introduction and Exhaust System</td>
<td>OM-90</td>
</tr>
<tr>
<td>5.2</td>
<td>Environmental Tobacco Smoke (ETS) Control</td>
<td>OM-92</td>
</tr>
<tr>
<td>5.3</td>
<td>High Performance Cleaning</td>
<td>OM-93</td>
</tr>
<tr>
<td>5.4</td>
<td>Indoor Air Quality (IAQ) Best Management Practices</td>
<td>OM-95</td>
</tr>
<tr>
<td>5.5</td>
<td>Occupant Comfort</td>
<td>OM-101</td>
</tr>
<tr>
<td>5.6</td>
<td>Green Cleaning</td>
<td>OM-105</td>
</tr>
<tr>
<td>6.0</td>
<td>Innovation for Operations &amp; Maintenance</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Innovation in Operations</td>
<td>OM-109</td>
</tr>
</tbody>
</table>
6.2 Innovation in Operations ................................................. OM-109
6.3 Innovation in Operations ................................................. OM-109
6.4 Innovation in Operations ................................................. OM-109

7.0 Education & Training

7.1 Community Education .................................................. OM-110
7.2 Implement Employee Sustainability Training Program ................ OM-112
7.3 Staff Training ............................................................... OM-114

8.0 Monitoring & Reporting

8.1 Documenting Sustainable Measures ................................. OM-115

Appendices

OM-B Operations & Maintenance Checklist ........................................ OM-B-1
INTRODUCTION

There are almost 20,000 airports in the United States today. The day-to-day operation and maintenance of an airport involves various tasks. Airport operators must handle both routine matters as well as unusual circumstances. Their responsibilities, among many, include:

- Keeping records
- Hiring and training personnel
- Maintaining pavement
- Maintaining markings, signs, and lighting
- Providing snow and ice control
- Overseeing procedures for operation of vehicles on the airfield
- Providing obstruction lighting
- Protecting navigational aids
- Managing emergency preparedness
- Overseeing handling of hazardous materials - including jet fuel
- Vehicle maintenance
- Facility maintenance, from terminals, to office building, to warehouses, trades buildings, etc.
- Conducting airport self-inspections
- Protecting public safety
- Ensuring wildlife control
- Overseeing construction projects

While conducting day-to-day operations and activities, airport operators must comply with regulations protecting the environment. All airport operations must be carried out with consideration for how the environment could be adversely affected. Airport environmental concerns may include many things: noise, land use; social impacts, air quality; endangered and threatened species and wildlife, energy supply and natural resources, light pollution, solid waste impacts, stormwater impacts, or construction impacts.

The Sustainable Airport Manual (SAM) Green Airplane Rating System for Operations & Maintenance (O&M) is designed to certify the sustainability of day-to-day building operations, maintenance procedures, system upgrades, minor space-use changes, and minor facility alterations or additions, and training and educational programs.

APPLICABILITY

SAM Operations & Maintenance (SAM O&M) certification encourages airport operators to implement sustainable practices to reduce the environmental impacts of the day-to-day activities and their buildings functional life cycles. Specifically, the rating system addresses exterior building site maintenance programs, water and energy usage, environmentally preferred products and practices for cleaning and alterations, sustainable purchasing policies, waste management, and ongoing indoor/outdoor environmental quality, as well as training and education of employees, tenants and the general public.
The Sustainable Airport Manual (SAM) Operations & Maintenance chapter is applicable to entities and activities that have no customer/passenger contact and do not require design services.

The three main entities are defined below:

1. **Chicago Department of Aviation Divisions**

   The activities of the following CDA divisions and their subgroups and contractors will be evaluated within this chapter:
   - Design/Construction (maintenance activities)
   - Environmental and Noise
   - Facilities
   - Safety and Security
   - Ground Transportation (Landside)
   - Operations (Landside/Airside)
   - Parking
   - Real Estate/Properties
   - Terminal Building/Landside
   - Vehicle Services

   Contractor activities will be included and evaluated under the CDA division or Tenant based on individual contract. Major renovations (defined as major HVAC renovation, envelope modifications and major interior rehabilitation) will be evaluated under the Design and Construction chapter.

2. **Tenants**

   The following are representative of tenants that can be evaluated within this chapter:
   - Airlines
     o Airline non-customer contact
     o Freight handlers non-customer contact
   - Flight Service Kitchens
   - Landscaping
   - Parking Services
   - Parking Lots
   - Hangars

   Tenant entities and activities that have direct customer/passenger contact and/or require design services will be evaluated under the Concessions & Tenants chapter.

3. **User-Defined**

   This category includes entities with operations that have clearly defined boundaries that may not exactly fit into the two categories above or that may be combinations of the above, or some derivation thereof. It is intended to encompass entities that may have multiple tenants or CDA divisions but operating under a single O&M regime, e.g. a building having
operations large enough to require its own administrative, custodial, and/or landscape operations.

OPERATIONS & MAINTENANCE SECTIONS

The achievement of credits is dependent on the sustainable elements included in the following categories:

Applies to OPERATIONS & MAINTENANCE activities:

<table>
<thead>
<tr>
<th>AP</th>
<th>Administrative Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Sustainable Site Management</td>
</tr>
<tr>
<td>2.0</td>
<td>Water Efficiency</td>
</tr>
<tr>
<td>3.0</td>
<td>Energy &amp; Atmosphere</td>
</tr>
<tr>
<td>4.0</td>
<td>Materials &amp; Resources</td>
</tr>
<tr>
<td>5.0</td>
<td>Indoor Environmental Quality</td>
</tr>
<tr>
<td>6.0</td>
<td>Innovation for Operations &amp; Maintenance</td>
</tr>
<tr>
<td>7.0</td>
<td>Education &amp; Training</td>
</tr>
<tr>
<td>8.0</td>
<td>Monitoring &amp; Reporting</td>
</tr>
</tbody>
</table>

Each category contains a specific number of credits, against which each project is evaluated in order to determine that project’s earned points. The number of points earned is then translated into a rating. There are specific weighted point thresholds (i.e. applicable credits), so as not to inadvertently penalize a project for not achieving points that would not be applicable. The list of credits and point thresholds applicable to each project type are summarized in Appendix OM-A – Green Airplane Rating System for Operations & Maintenance.

PROCESS

Within the Manual’s main body, each sustainable credit has five subsections: Intent, Requirements, Submittals, Technology/Strategy, and Case Studies, as described below:

- **Intent**: The primary motivations for any sustainable practice.
- **Requirements**: Specifies institutional, operational, and mechanical elements that satisfy the intent. The prerequisites must be achieved; the credits are optional, but contribute to the overall rating.
- **Submittals**: Required and supporting documentation and/or information required to achieve applicable prerequisites or credits. This documentation may include calculations, data, short narratives, policies, documents or references to specification sections or design drawings indicating how the requirements are being met.
- **Technology/Strategy**: Highlights specific ways of meeting the recommendations within the scope for each specific project. Case studies where available, are presented to help guide the application of sustainable credits to operations and maintenance activities. To aid with consideration of applicable strategies and technologies, they are organized into the following three categories; “Standard Practice,” “Recommended Practice,” and “Best Available Practice.”
o **Standard Practice**: These are requirements that may be due to standards, specifications, codes, general best management or construction practices. They are practices already in place, and in many cases SAM prerequisites, which also serve to meet sustainable goals.

o **Recommended Practice**: These include recommendations that are expected to have insignificant impacts to cost and are therefore, encouraged to be incorporated.

o **Best Available Practice**: These are strategies and practices that are expected to enhance the environmental efforts of the Chicago Department of Aviation (CDA), but are anticipated to potentially increase costs or effort.

- **Case Study**: Examples of credit intent “in action” at airports and/or other industry facilities.

While not all strategies will be applicable, operations and maintenance teams are highly encouraged to think creatively and to consider the intent of each issue throughout the decision process. In all cases, it is the responsibility of the design and construction teams to evaluate and review with the Chicago Department of Aviation any anticipated cost or schedule impact.

**SUBMITTALS**

**Sustainable Airport Manual (SAM) Checklists**

Incorporation of sustainable practices and technologies is tracked using a checklist in order to determine the number of applicable credits described in this Manual. The SAM O&M Checklist is completed by the applicant. The checklist is provided in Appendix OM-B – Operations & Maintenance Checklist.

In order to achieve points, certain requirements need to be met, as outlined in each credit. In some instances, studies and calculations would be appropriate. In other instances, this will be accomplished through product and material data or through referenced standards or specifications.

In addition to review of the checklist, the Sustainable Review Panel (SRP) will review any supporting documentation including calculations, specifications, and contractor’s submittals as needed to support the achievement of the credit(s). See Section titled *Implementation and Review Process* for detailed information about the SRP.
SAM GREEN AIRPLANE RATING SYSTEM

The SAM Green Airplane Rating System for OM uses a five tier approach to rating operations and maintenance activities. Due to the variety of departments, operations, and entities that can be evaluated in this chapter, the rating system is based on the number of Total Applicable Points for each evaluation. The Total Applicable Points are determined on a case by case basis. A credit is deemed applicable if it is obtainable by the entity being evaluated. “Green Airplane Certification” statuses are used to designate achievement levels. The levels are:

<table>
<thead>
<tr>
<th>No. of Green Airplanes</th>
<th>Points Required to Achieve Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Prerequisites</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>All Applicable Prerequisites + 6 Points</td>
</tr>
<tr>
<td></td>
<td>20% of Total Applicable Points</td>
</tr>
<tr>
<td></td>
<td>30% of Total Applicable Points</td>
</tr>
<tr>
<td></td>
<td>50% of Total Applicable Points</td>
</tr>
<tr>
<td></td>
<td>80% of Total Applicable Points</td>
</tr>
</tbody>
</table>

IMPLEMENTATION AND REVIEW PROCESS

The SAM and its supporting documentation are administered by the Sustainable Review Panel (SRP), which currently consists of representatives of the CDA Management Staff, CDA Design and Construction Staff and Representatives, OMP Project Management Office (PMO), Master Civil Engineer (MCE), and Airport Planners actively involved in CDA projects. The composition of the SRP is intended to be dynamic depending on needs.

The SRP is responsible for the review of project initiatives with respect to sustainability and provides technical support to the Project Manager (PM) of each project in relation to sustainable practices. The SRP is responsible for review of every operation and maintenance project and for the awarding of “Green Airplane Certification” ratings based on the extent of incorporation of sustainable practices as outlined in this Manual and as documented on the submitted SAM Checklist(s). Other responsibilities of the SRP include preparation and review of sustainable design related specifications, technical memoranda, and miscellaneous documents, as necessary. In addition, the SRP is responsible for presentations and training to project team members with respect to the application of this Manual. The primary task of the SRP is to oversee the application of the Manual.
For any and all sustainability-related questions and/or submittals, please use the following email address to submit forms electronically (preferred method): SAMdocs@cityofchicago.org

airportsgoinggreen.org

For comments, case studies, lessons-learned, new technologies or for any and all project submittal forms, please email:

SAMdocs@cityofchicago.org
1.0  SUSTAINABLE SITES

1.1  Prerequisite 1 – Equipment Maintenance

Required

INTENT

Minimize the environmental impact of construction and maintenance equipment and associated maintenance activities.

REQUIREMENTS

Follow the requirements of the City of Chicago Department of Aviation’s (CDA) Best Management Practices (BMP) Manual.

SUBMITTALS

Include a location in the contract documents where the BMP Manual is required.

TECHNOLOGY/STRATEGY

By requiring the City of Chicago divisions, tenants and their contractors to comply with the CDA BMP Manual, it is anticipated that the impacts due to equipment maintenance activities will be reduced. The BMPs include procedures for vehicle washing, maintenance, fueling, chemical storage, and spill control.

Standard Practice

Follow the preferred practices per the BMPs below:

- 001 – Equipment Vehicle Washing Restrictions
- 002 – Equipment Vehicle Fueling Controls
- 003 – Equipment Vehicle Maintenance Requirements
- 011 – Above Ground Storage Tank Equipment Requirements/Spills
- 012 – Mobile Tank Trucks (petroleum) Requirements
- 013 – Chemical Handling/Storage Requirements
- 014 – Drum Storage Procedures
- 015 – Battery Storage Procedures
- 017 – Truck Loading/Unloading Procedures/Spill Control
- 018 – Spill Control Kits and Spill Response
- 019 – Good Housekeeping Procedures/Waste Storage
- 020 – Storm Drain Protection/Identification

Recommended Practice

None
Best Available Practice
None

CASE STUDY

Motor Vehicle Maintenance
College of Tropical Agriculture and Human Resources – University of Hawaii at Manoa

Excerpt taken from the University of Hawaii at Manoa’s Motor Vehicle Maintenance Document:

Your motor vehicle can be a source of water pollution even if it is not near the water source. Oil spilled on a driveway or parking lot and outdoor spills of antifreeze, brake fluid, and other automotive fluids can be washed away by rain into streams and the ocean. There, they can harm aquatic life and make the water unpleasant and sometimes unsafe to swim or fish in. Washing your vehicle can also cause pollution if the dirty water flows into a storm drain and on to the ocean. However, there are several things that you can do to reduce the risks of water pollution from your vehicles. Proper vehicle maintenance and appropriate disposal of waste oil, antifreeze, and other fluids will greatly reduce water pollution risks. Washing your vehicle can cause water pollution. If you live in an urban area and wash your vehicle on the street, in a driveway, or in a paved parking lot, the dirty, soapy water drains off and flows directly into the storm drain, picking up oil and other pollutants as it goes. A better option is to wash your car in an approved car-washing area of your building where water goes into the sewer system, or to take it to a commercial car wash or spray booth that sends its dirty water into the sewer system.

1.0 SUSTAINABLE SITES

1.2 LEED Certified Project

1 point

INTENT

Recognize environmentally sensitive building design and construction by enabling high-performance building operations to be achieved in a more efficient and straightforward manner.

REQUIREMENTS

Show that the project has previously been certified under LEED. This includes all LEED rating systems (e.g., Core and Shell, Building Design and Construction, etc.).

SUBMITTALS

Include descriptive narrative and areas for which LEED certification was applicable (keep on file and understand what the LEED certification was based on/measures added; identify maintenance activities and schedule to adequately maintain the LEED measures; train personnel on proper maintenance/operating requirements (e.g., HVAC systems, etc.)).

TECHNOLOGY/STRATEGY

Pursue and earn LEED certification for new buildings, existing buildings, or major renovations.

Standard Practice

None

Recommended Practice

None

Best Available Practice

None

CASE STUDY

Delta Air Lines ‘Terminal A’
Boston Logan International Airport – Boston, Massachusetts

The new Delta Air Lines ‘Terminal A’ at Logan International Airport in Boston has achieved an environmental milestone as the world’s first air terminal to earn LEED certification from the U.S. Green Building Council (USGBC). The facility maximizes sustainable building methods and technologies, overcoming the significant obstacles inherent in bringing green design to airports. To combat the accelerated heat island effect and stormwater runoff issues typically caused by impervious surfaces on runways, parking lots and large roofs areas.

[Source: www.sustainablebusiness.com/index.cfm/go/news.feature/id/1358]
1.0 SUSTAINABLE SITES

1.3 Exterior Facilities Management

1 point

INTENT

Encourage environmentally sensitive building exterior practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations based on its original state.

REQUIREMENTS

If any of the following are met, 1 point may be awarded:

Utilize green cleaning and maintenance practices and materials (e.g., glass cleaner, blasting agents, corrosion preventers) that minimize environmental impacts to include, but are not limited to, biobased, low-emitting and recycled content materials.

Use adhesives and sealants on building exterior that meet the South Coast Air Quality Management District (SCAQMD) Rule 1168, where applicable.

AND

Use cleaning products that are noted in Appendix AP-A – Green Product Listing, where applicable. A partial list of products may include, but are not limited to:

- Glass cleaners – 49% minimum biobased content
- Grease remover – 34% minimum biobased content
- Industrial cleaner – 41% minimum biobased content

AND

Use paints and coatings that meet the limits in Appendix AP-A – Green Product Listing or Green Seal’s Standard GS-11, where applicable. A partial list of products may include, but are not limited to:

- Reprocessed latex paint – 20% minimum post-consumer content (light colors)/50 percent minimum post-consumer content (dark colors)
- Concrete sealers, liquid – 79% minimum biobased content

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Employ an environmentally sensitive, low-impact building/facility exterior plan that helps discourage surrounding wildlife habitat while sustaining ecological and environmental integrity. The plan must employ best management practices that significantly reduce harmful chemical
use, energy waste, water waste, air pollution, solid waste, and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The plan must address all of the following operational elements that occur on the building and grounds, as applicable:

- Cleaning of building exterior
- Paints and sealants used on building exterior

**Standard Practice**

None

**Recommended Practice**

- Clean only as often as needed to maintain building appearance and safety
- Use cleaning products efficiently to make sure cleaning products do not drain into a sewer
- Contractor must administer training on the proper use of green chemicals
- For additional credit opportunities, see SAM Credit AP.4 Green Procurement Policy

**Best Available Practice**

None
1.0 SUSTAINABLE SITES

1.4 Hardscape Grounds Management

1 point

INTENT

Employ an environmentally sensitive, low-impact hardscape management process for building exterior (e.g., sidewalks, paved surfaces and other hardscape) that sustains ecological and environmental integrity while deterring wildlife and maintaining site appearance and safety.

REQUIREMENTS

Within the performance period, have in place low-impact snow and ice removal methods utilizing chemicals that are innovative and ecologically friendly.

AND

Include green cleaning and maintenance practices and materials that minimize environmental impacts. An outline of acceptable materials is available in Appendix AP-A – Green Product Listing.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

Employ an environmentally sensitive, low-impact snow and ice removal method utilizing chemicals that are innovative and ecologically friendly. The process must employ best management practices that significantly reduce harmful chemical use, energy waste, water waste, air pollution, solid waste, and/or chemical runoff (e.g., gasoline, oil, antifreeze, salts) compared with standard practices. The process must address all of the following operational elements that occur on the building and grounds, as applicable:

- Snow and ice removal
- Cleaning of sidewalks, pavement and other hardscape methods

Standard Practice

- Application of road salt (landside)
- Airside ground anti-icing/deicing fluid that are environmentally friendly, such as but not limited to:
  - Solid: Sodium Formate and Sodium Acetate
  - Liquid: Potassium Acetate
  - Biochemical Oxygen Demand (BOD)
Recommended Practice

- Use anti-icing/deicing that are lower in BOD and toxicity
- Develop a [landside] policy for optimal road salt usage balancing environmental and safety concerns
- Investigate non-electrified snowmelt procedures, including Hydronic runway pavement for snowmelt and Epoxy overcoat with glycol for controlling snow on runways
- Use fossil fueled equipment only as frequently as needed to maintain site appearance and safety, or use low-impact alternatives such as, but not limited to:
  - Electric powered equipment
  - Low-noise equipment
  - Hand raking or sweeping
- Use more environmentally friendly deicing chemicals, such as but not limited to:
  - Magnesium Chloride
  - Potassium Chloride
  - Potassium Acetate
- Contractor must administer eco-training, such as chemical use and eco-driving to their personnel to ensure appropriate use/applications, and to reduce fuel consumption, greenhouse gas emissions, and accident rate

Best Available Practice

- Infrared Radiant Deicing Technology
- Forced air/hybrid deicing which adds deicing fluid to the airstream to aid in removing ice and snow
- Tempered steam technology

CASE STUDY

State-of-the-Art Deicing Facility
Philadelphia International Airport – Philadelphia, Pennsylvania

The deicing facility at Philadelphia International Airport captures and disposes deicing fluid runoff in order to protect nearby waterways and the groundwater system. A network of inlets and stormwater drains provide wastewater collection for both deicing aprons. This stormwater drainage system diverts deicing fluid runoff into the recovery collection system during deicing operations.

1.0 SUSTAINABLE SITES

1.5 Integrated Pest Management and Wildlife Deterrence

1 point

INTENT

Preserve environmental integrity while discouraging the presence of pests/wildlife, in an effort to include methods that maintain and encourage high-performance pest management control.

REQUIREMENTS

Use Integrated Pest Management (IPM) Techniques, such as:

- Control dirt, moisture, clutter, foodstuffs, harborage, and building penetrations
- Use baits and traps rather than pesticide sprays where possible
- Avoid pesticide applications for prevention of pests
- Use pesticides only where pests are located
- Use pesticide specifically formulated for targeted pest

AND

Use wildlife deterrent methods in accordance with United States Department of Agriculture - Wildlife Services.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Over the performance period, have in place a wildlife and pest management plan that addresses overall site management, chemicals, and waste. Include such green landscape management practices such as: applying integrated pest management and deterring wildlife habitat.

Integrated pest management (IPM), defined as managing pests (plants, fungi, insects, and/or animals) in a way that protects human health and the surrounding environment that improves economic returns through the most effective, least-risk option.

The IPM plan includes preferred use of nonchemical methods, definition of emergency conditions, and universal notification providing advance notice of not less than 72 hours under normal conditions, and, 24 hours in emergencies before a pesticide, (other than a least-toxic pesticide) is applied in a building or on surrounding grounds that the building management maintains.

Vegetated roofs must be designed and maintained to not attract wildlife or provide habitat.
Standard Practice

None

Recommended Practice

- Apply pesticides only during unoccupied hours
- Ventilate building with significant quantities of outside air during and after applications
- Completely flush building prior to occupancy
- Use more than normal outside air ventilation for some period after occupancy
- Notify occupants prior to occupation
- If applying outside keep away from air intake
- Contractor must administer eco-training, such as chemical use, eco-driving, to their personnel to ensure appropriate use/applications, and to reduce fuel consumption, greenhouse gas emissions, and accident rates

Best Available Practice

None

CASE STUDY

Wildlife Management Program
Southwest Florida International Airport – Fort Myers, Florida

The airport utilizes various projects that analyze problematic habitats and species to develop specialized methods of prevention. The formation of a Hazardous Wildlife Working Group in 2005 improved communications between Environmental Compliance, Airport Operations and Airport Maintenance to assist in the implementation of new and innovative deterrence methods. In March of 2008, the airport initiated a Wildlife Hazard Assessment that used a unique methodology that broke down species into hazard guilds, assigning relative risk values to more effectively focus on specific airfield areas that attract the highest risk species.

1.0 SUSTAINABLE SITES

1.6 Erosion Control

1 point

INTENT

Address landscape operations while preserving and maintaining ecological integrity and site preservation by minimizing soil loss and preventing water pollution.

REQUIREMENTS

Have in place an environmentally sensitive management plan for the site’s natural components pertaining to erosion and sedimentation control for ongoing landscape operations (where applicable). The plan must address both site soil and potential land disturbances. The plan must also include measures that prevent erosion and sedimentation, air and water pollution from dust or particulate matter and restore eroded areas.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Over the maintenance period of the site, have in place a maintenance and best practice plan that addresses overall site management and control. Examples of erosion control methods include, but are not limited to:

- Temporary and permanent seeding (in accordance with CDA/OMP Specification 02905 – Sustainable Airport Landscaping, see SAM appendix DC-C Referenced City of Chicago Specifications and Standards)
- Mulching
- Structural control methods (such as: earthen dike, silt fence, sediment traps and sediment basins)
- Use of perennial plants (in accordance with CDA/OMP Specification 02905 – Sustainable Airport Landscaping, see SAM appendix DC-C Referenced City of Chicago Specifications and Standards)
- Buffer strips
- Ditch liners
- The use of fertilizer as necessary
- Removing and/or not installing invasive plants

Standard Practice

- Follow the Best Management Practice (BMP) guidelines for erosion control
Recommended Practice

- Identify problems
- Perform periodic checks
- Dispose of loose debris
- Maintain ground cover
- Clean major sediment sources on paved surfaces
- Install rolled mats (organic, biodegradable mulch mats used to reduce erosion) and ensure that they conform to site contours
- Use natural fiber geotextiles (permeable fabrics) that are biodegradable
- Install permeable paving materials to reduce stormwater runoff and allow rain water to infiltrate into the ground and replenish groundwater

Best Available Practice

None

CASE STUDY

Erosion and Sediment Control on Atlanta Hartsfield International Airport Project
Hartsfield-Jackson Atlanta International Airport – Atlanta, Georgia

Excessive rain can create excessive soil erosion control problems. Due to the large quantities of soil being moved on the land, the potential for sediment contamination is great. Erosion control measures for this project consisted of the use of slope drains that feed into a detention basin. The basins then serve as collectors of heavy rainfall to prevent flooding.

Rock is often times used in conjunction with the erosion control systems. A more aesthetically pleasing method was a vegetative cover provided by 3.2 million square yards of temporary seeding and 2 million square yards of permanent seeding. Atlanta, in addition, installed a total of 300,000 square yards of turf reinforcement mat and 4,000 square yards of ditch liner will be installed to help anchor the grass within the problem areas.

www.landandwater.com/features/vol47no5/vol47no5_2.html
1.0 SUSTAINABLE SITES

1.7 Landscape Management

1 point

INTENT

Maintain the landscape that is aesthetically pleasing and at the same time, low maintenance, ecologically and financially sustainable yet does not compromise Airport security and aircraft safety.

REQUIREMENTS

Currently follow the requirements of the CDA 02905 “Sustainable Airport Landscaping” specifications

AND

Use non-gasoline powered landscape equipment

AND

Use fertilizer only as needed

AND

Prohibit burning and reuse or compost landscape waste on-site.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Over the performance period, have in place a low-impact plan that addresses overall site management, chemicals, fertilizers, and landscape waste. Include such green landscape management practices such as:

- Provide proper training methods to current employees
- Reduce the use of power equipment
- Discourage wildlife habitat
- Remove or don’t install invasive plants
- Use mulching mowers to significantly reduce landscape waste generation, fertilizer needs, and water consumption through retention of organic matter

Standard Practice

- Do not apply pesticides or fertilizers before an expected rainfall (unless specified within the manufactures recommendations)
- Conduct soil testing as necessary to determine the amount of nutrients needed for a healthy landscape
- Never wash spilled chemicals into streets or storm drains
- Do not store in a manner which allows exposure to storm water

**Recommended Practice**

- Do not apply chemicals within 25-feet (at a minimum) of a body of water
- Use organic and natural products
- Use non-potable hot water for weed control to eliminate vegetation in pavement cracks in place of herbicides
- Mulching and/or electric mowers
- Eliminate fertilizer and herbicide use altogether
- Install rolled mats (organic, biodegradable mulch mats used to reduce erosion) and ensure that they conform to site contours
- Use natural fiber geotextiles (permeable fabrics) that are biodegradable
- Specify non-toxic, non-chemical organic or bio-based materials for landscape planting and fertilization
- Top-dress soil with compost to decrease fertilizer and irrigation needs, to control erosion, and to retain moisture
- When application of landscape fertilizers, pesticides and other chemicals is necessary, specify organic or bio-based fertilizers and pesticides
- Spot treat landscape problem areas instead of chemically treating a larger area than necessary
- Use electric lawn mowers, such as the Neuton lawn mower, to reduce the level of noise and air pollution generated by traditional gasoline-powered mowers ([www.neutonpower.com](http://www.neutonpower.com)). Electric mowers need no extension cords and have replaceable, rechargeable batteries for extended range.
- Use propane- and/or natural gas-powered string trimmers, blowers, and push mowers
- All diesel-powered equipment to use biodiesel (minimum 20% blend). Since there’s little or no cold weather issue with lawn care, high blends (50%-100%) are possible.
- No mowing on Air Pollution Action days
- Install cisterns and other water recycling infrastructure to use stormwater and/or graywater for irrigation
- Install high-efficiency irrigation systems (if irrigation is a necessity) with a slow-drip, sub-soil irrigation and automated linkages to meteorological data
- Contractor must administer eco-training, such as chemical use, eco-driving, to their personnel to ensure appropriate use/applications, and to reduce fuel consumption, greenhouse gas emissions, and accident rates
Best Available Practice

- Establish a centralized landscaping composting facility
- Utilize a solar or propane mower

CASE STUDIES

Environmental Management
Santa Barbara Airport – Santa Barbara, California

Since 2000, the Santa Barbara Airport has been implementing one of the largest environmental restoration projects, as nearly half of the Airport property is comprised of the Goleta Slough State Marine Park. The Santa Barbara Airport is actively managing 55-acres of the Park that is currently undergoing planting, maintenance, and monitoring, as part of this restoration effort. This coastal wetland is recognized as one of the few remaining saltmarsh habitats in California. At Area I, a 25-acre site on the south side of the Goleta Slough, the Santa Barbara Airport has replaced invasive species with native plants. These plants were carefully grown at the Airport Nursery using seeds collected in the Slough.

www.flysba.com/news_facts/environmental_management

Storm Water Management Plan
San Diego International Airport – San Diego, California

San Diego International Airport is responsible for administering approximately 661 acres of public lands on the shore of San Diego Bay. The Storm Water Management Plan is a major element of the Airport’s commitment to preventing, eliminating, and reducing the discharge of polluted storm water into the surrounding environment and San Diego Bay. The Stormwater Management Plan is directed at those activities of the Airport Authority itself, as well as those of the airlines and other airport tenants that have the potential to cause stormwater pollution.

The Storm Water Management Plan is designed to control the pollutants generated by everyday operations of the airport, including: trash, litter and debris; petroleum products that might leak from aircraft and motor vehicles; heavy metals potentially contained in the dust from brake pads, rubber tires, engine exhaust, and the fertilizers and pesticides used to maintain the airport’s landscape and facilities.

www.san.org/sdcraa/airport_initiatives/environmental/protection/stormwater.aspx

Landscape Composting
Hartsfield-Jackson Atlanta International Airport – Atlanta, Georgia

Composting is performed at the landscape shop located at the former Northwest Airlines hangar. The process combines nitrogen from the green materials (flowers, grass clippings) and carbon from the brown materials (dried leaves and straw). These materials are turned regularly and eventually break down into decomposed organic matter known as compost. All of the materials are derived from routine work at the airport (e.g. grass cutting, raking leaves in the fall, recycled flowers). The materials are added to the compost pile throughout the year. The compost is used as a soil amendment in the various seasonal color beds and containers throughout the Airport property.

http://www.atlanta-airport.com/Airport/Environmental/Composting.aspx
1.0 SUSTAINABLE SITES

1.8 Alternative Commuting Transportation for Employees

1 to 4 points

INTENT

To reduce pollution and land development impacts from conventional automobile use for commuting trips.

REQUIREMENTS

Within the performance period, reduce the number of commuting round trips made by regular building occupants, or tenant or division employees, using single-occupant, conventionally powered, and conventionally fueled vehicles. For the purposes of this credit, alternative transportation includes, but is not limited to:

- Telecommuting
- Compressed work weeks
- Mass/public transit
- Walking
- Bicycles or other human-powered conveyances
- Carpools
- Vanpools
- Low-emitting, fuel-efficient or alternative-fuel vehicles

Performance calculations are made relative to a baseline case that assumes all regular occupants commute alone in conventional automobiles. The calculations must account for seasonal variations in the use of alternative commuting methods and, where possible, indicate the distribution of commuting trips using each type of alternative transportation.

Points are earned for percentage increase in employees who utilize the alternative commuting transportation methods within the performance period:

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>Percentage Increase in Alternative Methods</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8.1</td>
<td>5%</td>
<td>1</td>
</tr>
<tr>
<td>1.8.2</td>
<td>10%</td>
<td>2</td>
</tr>
<tr>
<td>1.8.3</td>
<td>20%</td>
<td>3</td>
</tr>
<tr>
<td>1.8.4</td>
<td>30%</td>
<td>4</td>
</tr>
</tbody>
</table>

Low-emitting vehicles and fuel-efficient vehicles are defined as vehicles that are classified as zero-emission vehicles (ZEVs) by the California Air Resources Board or that have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy annual vehicle-rating guide.
SUBMITTALS
Include descriptive narrative and calculations in SAM Checklist.

TECHNOLOGY/STRATEGY
When developing an alternative transportation program, consider the opportunities and limitations of different options, based on the building’s location and community’s transportation infrastructure/services.

Provide space and infrastructure features such as, but not limited to:

- Bicycle racks
- Changing facilities
- Preferred parking
- Access to mass transit
- Alternative-fuel refueling stations

Offer employees incentives for using alternative transportation such as, but not limited to:

- Additional vacation days
- Cash rewards or pretax options
- Free or discounted public transportation passes
- Bicycling equipment or telecommuting equipment to individuals committed to using them

Encourage the use of alternative commuting methods by guaranteeing free rides home for employees who must unexpectedly leave work early or late. Utilize organization resources to communicate with building occupants about alternative transportation options and benefits, and facilitating communication among building occupants for coordinating ride sharing.

Standard Practice
- Chicago Department of Aviation (CDA) already has programs in place for alternative fuel vehicles within the airport operations department that is designed so that these programs are enhanced and supported

Recommended Practice
- Develop and provide alternative facilities and areas to encourage alternative commuting

Best Available Practice
- Provide a centralized facility(s) for employees to store alternative commuting opportunities as well as include incentives to employees for applying alternative commuting means
- Increase the awareness of alternative fuel vehicles for airport operations – particularly the indoor cargo operations
- Provide preferred parking for staff and public alternative fuel vehicles
• Plan for a development of preferred parking and/or lot locations for rental fleets, which offer alternative fuel rental vehicles

CASE STUDIES

Bike to Work Plan
City of Chicago, Illinois

The Bike 2015 Plan is the City of Chicago’s vision to make bicycling an integral part of daily life. The plan recommends projects, programs and policies through 2015 to encourage use of bicycles as a practical, non-polluting, and affordable mode of transportation. The Bike 2015 Plan has two overall goals:

• To increase bicycle use, so that 5 percent of all trips less than five miles are by bicycle.
• To reduce the number of bicycle injuries by 50 percent from current levels.

The plan has eight chapters, each with a specific goal:

• Bikeway Network – Establish a bikeway network that serves all Chicago residents and neighborhoods.
• Bicycle-friendly Streets – Make all of Chicago’s streets safe and convenient for bicycling.
• Bike Parking – Provide convenient and secure short-term and long-term bike parking throughout Chicago.
• Transit – Provide convenient connections between bicycling and public transit.
• Education – Educate bicyclists, motorists, and the general public about bicycle safety and the benefits of bicycling.
• Marketing and Health Promotion – Increase bicycle use through targeted marketing and health promotion.
• Law Enforcement and Crash Analysis – Increase bicyclist safety through effective law enforcement and detailed crash analysis.
• Bicycle Messengers – Expand the use of bicycle messengers; improve their workplace safety and public image.

http://bike2015plan.org

Preferred Parking for Carpoolers
Denver International Airport – Denver, Colorado

Denver International Airport launched an aggressive program to encourage carpooling that offers reduced parking cost for carpoolers. Additionally, the airport offers designated locations which include unreserved spaces typically in close proximity to employee or passenger access points.

1.0 SUSTAINABLE SITES

1.9.1 Stormwater Management: Landside

1 point

INTENT

Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants by enhancing the current operating system.

REQUIREMENTS

Reduce impervious surfaces totaling at least 5% of your total site area with permeable surfaces. Those surfaces can include, but are not limited to:

- Permeable asphalt / concrete
- Open grid pavers
- Aggregate materials
- Turf or landscaped areas

OR

Harvest rainwater and develop a use for it;

OR

Nonstructural techniques such as, but not limited to:

- Rain gardens
- Vegetated swales
- Disconnection of imperviousness
- Rainwater recycling

SUBMITTALS

Include descriptive narrative and calculations in SAM Checklist.

TECHNOLOGY/STRATEGY

Because many airside pavements have the potential for deicing fluid and jet fuel contamination, technologies that increase infiltration to the subsurface are not used. On landside projects, or for areas not subject to aviation-related contaminants, these methods are encouraged; however, other contaminants may be present and need to be addressed.

Maintain natural stormwater flows by promoting infiltration. Maintain procedures that include ongoing monitoring of any installed features that assist in stormwater irrigation, pervious paving, and other measures to minimize impervious surfaces. Any strategies used should discourage
wildlife habitat. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.

**Standard Practice**

- Follow Chicago Department of Aviation’s Best Management Practices

**Recommended Practice**

- Install rain gardens, vegetated swales, disconnection of imperviousness, and rainwater recycling
- Installing cisterns or rain barrels
- Install landscape to reduce runoff. See SAM Credit 2.4 Water Efficient Landscaping
- Evaluate curb breaks and drainage ditches, and/or bioswales
- Install high-efficiency irrigation systems (if irrigation is a necessity) with a slow-drip, sub-soil irrigation
- Install permeable paving materials to reduce stormwater runoff and allow rain water to infiltrate into the ground and replenish groundwater

**Best Available Practice**

- Encourage use of permeable pavement, where applicable
- Where potential for contamination exists, the use of these technologies must be weighed carefully to prevent larger contaminant issues, such as infiltration of ground water

**CASE STUDY**

**Terminal Building Cooling System**

**New Chitose Airport – Hokkaido, Japan**

Since 2010, the New Chitose Airport terminal building in Hokkaido, Japan has used collected snow during the winter to provide 30% of the building’s cooling needs during the summer. Of the snow collected throughout the winter, approximately 45% is preserved for the summertime through the use of heat-insulating materials. This practice could reduce up to 2,100 tons of carbon dioxide emissions per year in comparison to the building’s existing cooling system.

1.0 SUSTAINABLE SITES

1.9.2 Stormwater Management: Airside

1 to 4 points

INTENT

Reduce airside stormwater pollutants by employing environmentally sensitive maintenance techniques within the current operating system.

REQUIREMENTS

Up to 4 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use sweeper vacuums, glycol recovery vehicles and/or mobile collection units to remove and reuse spent deicing fluid.</td>
<td>1</td>
</tr>
<tr>
<td>Develop collection systems for deicing runoff. The proposed runway and taxiway pavements would contain first flush systems along the edge of pavements and Central Deicing Facilities for aircraft. The first flush system could consist of slotted edge drains connected to underground holding tanks. Glycol contaminated snowmelt and minor storm water runoff would be captured in the tanks and removed for treatment, disposal or recycling.</td>
<td>2</td>
</tr>
<tr>
<td>Reduce or eliminate deicing chemical contamination by using low Biological Oxygen Demand (BOD), low toxicity, and low corrosivity material (e.g., acetate and urea).</td>
<td>1</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Because of the potential for deicing fluid contamination, the use of these technologies must be weighed carefully to prevent larger contaminant issues, such as infiltration of ground water.

Standard Practice

- Follow CDA BMP procedures

Recommended Practice

- Follow Best Management Practices outlined in Chapter 4, Part 2 (Urban Runoff), on the United States Environmental Protection Agency’s Guidance Specifying Management
Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (document No EPA-840-B-92-002)

- Recover and recycle deicing chemicals at application point (e.g., vacuum truck, or other capturing method)

**Best Available Practice**

- Incorporate technologies, application techniques and/or designs to minimize glycol residual after application of deicing agents
- Use glycol separation and/or concentration methods to recover spent glycol from storm water or snow melt
- Central Deicing Facilities could also be utilized to capture excess glycol from aircraft deicing operations in underground storage tanks

**CASE STUDIES**

**Airport Stormwater Program**
**Seattle-Tacoma Airport – Seattle, Washington**

Sea-Tac Airport protects area creeks from flooding, contamination and sediment through its stormwater management program. It manages runoff generated from more than 2,300 acres, including those associated with airfield operations and industrial construction activities. Central to this program is the industrial wastewater treatment system (IWTS). Continual improvements ensure stormwater potentially contaminated by aircraft fueling, de-icing, cleaning and maintenance does not enter nearby streams.

[https://www.portseattle.org/Environmental/Pages/default.aspx](https://www.portseattle.org/Environmental/Pages/default.aspx)

**Stormwater Quality Initiative**
**Denver International Airport – Denver, Colorado**

Denver International Airport was built with a dedicated system for the capture, conveyance, treatment, and discharge of stormwater contaminated with aircraft deicing fluids. The system includes seven dedicated deicing pads, five wastewater retention ponds, and an onsite deicing fluid recycling facility.

1.0 SUSTAINABLE SITES

1.10 Heat Island Reduction

1 to 2 points

INTENT

Minimize impacts of existing roofs and pavements that cause the heat island effect (thermal gradient differences between developed and undeveloped areas).

REQUIREMENTS

Use any combination of the following strategies when replacing/renovating or maintaining pavement:

- For 50% of the site's hardscape area (including roads, sidewalks, courtyards, and parking lots) complete the following (1 point):
  - Provide shade from an existing tree canopy or within five years of landscape installation - landscaping (trees) must be in place at the time of certification application
  - Have paving materials with a Solar Reflective Index (SRI) of at least 29 and implement a maintenance program that ensures these surfaces are cleaned at least every two years to maintain good reflectance and minimums
  - Have an open-grid pavement system (that consists of at least 50% open area)

AND/OR

- For 50% of the roof area use roofing materials having one of the following characteristics (1 point):
  - A Solar Reflectance Index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof area. Implement a maintenance program that ensures all SRI surfaces are cleaned at least every two years to maintain good reflectance

<table>
<thead>
<tr>
<th>Roof Type</th>
<th>SRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Sloped Roof</td>
<td>78</td>
</tr>
<tr>
<td>Steep-Sloped Roof</td>
<td>29</td>
</tr>
</tbody>
</table>
  - Vegetated green roof

SUBMITTALS

Include descriptive narrative and calculations in SAM Checklist
TECHNOLOGY/STRATEGY

Employ strategies, materials and landscaping techniques that reduce heat absorption of exterior materials. Use shade (calculated at 10 a.m., 12 noon, and 3 p.m. on the summer solstice [June 21] that will be used as the effective shaded area) from native or adapted trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. Consider the use of new coatings and integral colorants for asphalt to achieve light-colored surfaces instead of blacktop. Position photovoltaic cells to shade impervious surfaces.

Consider installing high-albedo roofs to reduce heat absorption. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Product information is available from the Cool Roof Rating Council website, at www.coolroofs.org. Also, visit the ENERGY STAR website, www.energystar.gov to research compliant products.

Unless the reflectance is determined directly through in-site testing, the following default SRI values are to be used:

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>SRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Conventional “gray” concrete</td>
<td>35</td>
</tr>
<tr>
<td>Old (weathered) “gray” concrete</td>
<td>19</td>
</tr>
<tr>
<td>New “white” concrete</td>
<td>86</td>
</tr>
<tr>
<td>Old (weathered) “white” concrete</td>
<td>45</td>
</tr>
<tr>
<td>New Asphalt</td>
<td>0</td>
</tr>
<tr>
<td>Old Asphalt</td>
<td>6</td>
</tr>
</tbody>
</table>

Standard Practice

- White roofs are currently the standard for new construction on airport property. These are acceptable; however, SRI decreases with the age of the roof. Unless a cleaning program is in place, the benefits of white roofs diminish over time. For this reason, along with the benefits of stormwater management, the construction of vegetated green roofs is encouraged.

Recommended Practice

- Maximize light colored/high albedo pavement, such as Portland Concrete Cement (PCC), for roadways, parking lots, sidewalks and plaza areas. Reflectance must be a minimum of 0.3 (‘White’ portland cement – 0.7 to 0.8, typical PCC – 0.35 to 0.5, typical asphalt pavement – 0.05 (new) to 0.15 (over 5 years)). On an annual basis, test the pervious areas to verify the SRI standard is met as well as to depict improvement.
- Install a vegetated green roof
• Evaluate and utilize an ENERGY STAR compliant roofing system, such as aluminum coating and light-colored coatings. Thermoplastic and white Poly(vinyl chloride) (PVC) roofing systems meet these standards.

Best Available Practice

• For Landside projects only, install trees consistent with CDA/OMP Specification 02905 – Sustainable Airport Landscaping, and for any proposed plant species not listed, consult an FAA certified airport biologist to ensure the plants will not attract wildlife
• A creative combination of the above strategies to reach this goal is encouraged. For example, a task/project can provide 5% shading of dark colored impervious surfaces and 25% light colored/high albedo pavement to achieve this goal
• Install open grid pavement for surface lots and site pavement
• Install light-colored permeable pavers and concrete
• Install “green walls” for building façade

CASE STUDIES

Line Station 4 Living Wall
Vancouver International Airport – Vancouver, Canada

Vancouver International Airport is the first Canadian airport to install a green wall on its SkyTrain Station. One of the largest living walls in North America (the largest at the time in 2009), it measures nearly 56 x 38 feet, and houses more than 27,000 individual plants. Landscape architect Randy Sharp used a modular system for this living wall that encompasses 2,107 stainless steel panels. His design concept stresses the connection of the vegetated wall to the rapid transit station to the ground.

www.greenroofs.com/blog/2010/03/26/gpw-yvr-canada-line-station-4-livi

FedEx Cargo Facility Green Roof
O’Hare International Airport – Chicago, Illinois

The FedEx Cargo Facility green roof at the O’Hare International Airport in Chicago is the largest free-standing building vegetated roof in the central United States at 170,000 square feet. This project required utilization and coordination of an uplift-resistant and rapidly executed green roof design due to the active runway status of the O’Hare facility.

1.0 SUSTAINABLE SITES

1.11 Light Pollution Reduction

1 point

INTENT

Eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environments and upgrade existing lighting specifications to meet new standards.

REQUIREMENTS

*Interior Lighting:* All non-emergency built-in existing interior/indoor lighting with a direct line of sight to any openings in the envelope (translucent or transparent, wall or ceiling) must be automatically controlled to turn off during all after-hours periods during the performance period. The total duration of all programmed after-hours periods annually must equal or exceed 2,190 hours per year (50% of annual nighttime hours). Manual override capability may be provided for occasional after-hours use.

Implement a program to ensure that the lighting control system is being properly used to adjust lighting levels during all after-hours periods.

*Exterior and Site Lighting:* Choose one of the following options:

**OPTION 1**

If the project achieved LEED – NC SS Credit 8 and/or SAM Design & Construction Credit 2.7 Light Pollution Reduction, the point is earned.

**OR**

**OPTION 2**

Partially or fully shield all fixtures so that they do not directly emit light to the night sky.

**Fully shielded:** Exterior light fixtures are shielded or constructed so that light rays emitted by the fixture are projected below the horizontal plane passing through the lowest point on the fixture from which light is emitted.

**Partially shielded:** Exterior light fixtures are shielded so that the lower edge of the shield is at or below the centerline of the light source or lamp such that light emission above the horizontal plane is minimized.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.
TECHNOLOGY/STRATEGY

Implement site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Technologies to reduce light pollution include full-cutoff luminaries and low-reflectance surfaces.

Standard Practice

- Minimize site lighting where possible and use standard cutoffs for interior and exterior lighting wherever possible and appropriate

Recommended Practice

- Automatic Lighting controls such as motion sensors or timers
- Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution
- Low-angle spotlights for roadway and building lighting
- The maximum candela value of all interior lighting shall fall within the building (not out through windows) and the maximum candela value of all exterior lighting shall fall within the property
- Consider a parking lot design which allows for a reduction of the available parking areas and the associated exterior lighting during non-use or low use hours

Best Available Practice

- Fine tune the lighting energy demand while evaluating potential smart-lighting control systems and LED light technologies

CASE STUDY

Total Lighting Control System
T.F. Green International Airport – Providence, Rhode Island

The newly renovated terminal at T.F. Green International Airport implemented an energy-efficient and automated Total Lighting Control (TLC) system by General Electric. The system features programmable networked technology, controlling the internal and external lighting at the facility, including lights in the concourse areas, departure areas, baggage claims and outdoor parking areas.

2.0 WATER EFFICIENCY

2.1 Prerequisite 1 – Establish a Water Use Baseline

Required

INTENT

Increase water efficiency within CDA Division and tenant spaces to reduce the burden on municipal water supply and wastewater systems.

REQUIREMENTS

Provide water meter data (if available);

OR

Calculate baseline water usage by taking an inventory of plumbing fixtures. Once the inventory has been completed use the table below to determine the aggregate baseline fixture flow rate by multiplying the number of fixtures by their respective baseline flow rates. The sum of all these flow rates will become the baseline for each subsequent review.

Exceptions from Calculations:

- Those appliances & equipment for which water is used toward human consumption may be excluded. For example, bread misters, soda machines, coffee making machines, misters for produce and fixtures used to fill sinks for washing produce.

- Equipment, appliances, fixtures and fittings not covered by the Energy Policy Act 1992 and that do not contribute toward the retail process and are not commercially rated may also be excluded. For example, a residential dishwasher in an employee break room.

- Fixtures whose flow rates are regulated by health codes may be excluded (e.g., fixtures used for filling sinks in which a certain temperature must be maintained for dishwashing)

<table>
<thead>
<tr>
<th>Commercial Fixtures, Fittings, and Appliances</th>
<th>Usage Rate</th>
<th>Fixture Flow Rate</th>
<th>Baseline Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Toilet</td>
<td>4 times per day</td>
<td>1.6 gallons/use</td>
<td>6.4 gallons/day</td>
</tr>
<tr>
<td>Commercial Urinal</td>
<td>2 times per day</td>
<td>1 gallons/use</td>
<td>2 gallons/day</td>
</tr>
<tr>
<td>Commercial Lavatory (restroom) Faucet</td>
<td>6 times per day</td>
<td>0.5 gallons/use</td>
<td>3 gallons/day</td>
</tr>
<tr>
<td>Kitchen Faucet</td>
<td>2 times per day</td>
<td>1 gallons/use</td>
<td>2 gallons/day</td>
</tr>
<tr>
<td>Shower</td>
<td>1 time per day</td>
<td>105 gallons/use</td>
<td>105 gallons/day</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves (for food service applications)</td>
<td>3 times per day</td>
<td>95 gallons/use</td>
<td>285 gallons/day</td>
</tr>
<tr>
<td>Washing Machine</td>
<td>1 time per day</td>
<td>35 gallons/use</td>
<td>35 gallons/day</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1 time per day</td>
<td>8.5 gallons/use</td>
<td>8.5 gallons/day</td>
</tr>
<tr>
<td>Dishwasher (for food service applications)</td>
<td>5 times per day</td>
<td>200 gallons/use</td>
<td>1,000 gallons/day</td>
</tr>
<tr>
<td>Water Fountain</td>
<td>5 times per day</td>
<td>0.01 gallons/use</td>
<td>0.05 gallons/day</td>
</tr>
<tr>
<td>Ice Machines</td>
<td>1 time per day</td>
<td>30 gallons/use</td>
<td>30 gallons/day</td>
</tr>
</tbody>
</table>

* Flow rates have been based on EPAct 1992 where available
SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Gather the meter data from one full year. When calculating the aggregate baseline amount only the following fixtures and fixture fittings (as applicable to the space) should be included: toilets, urinals, lavatory faucets, kitchen faucets, showers, and pre-rinse spray valves, washing machines, dishwashers, water fountains and ice machines.

Standard Practice

- Comply with CDA/OMP Specification 15410 – Plumbing Fixtures

Recommended Practice

- Track water consumption using whole building metering
- Identify meters and install a separate meter if one is not present

Best Available Practice

- Track water consumption using submetering for one or more of the following:
  - Irrigation
  - Indoor plumbing fixtures
  - Cooling towers
  - Domestic hot water
  - Process water
2.0 WATER EFFICIENCY

2.2 Retroactive Water Efficiency

1 to 5 points

INTENT

Recognize previous improvements and upgrades that had a positive impact on water efficiency.

REQUIREMENTS

- Create an inventory of all the water improvements and upgrades undertaken to improve their water efficiency prior to the initial performance review.

- This credit is only applicable on the first completed performance review. Subsequent reviews would refer to SAM Credits 2.1 Prerequisite 1 – Establish a Water Baseline and 2.3 Indoor Water Efficiency.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

A point will be awarded for each of the retroactive improvements. Up to 5 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switched to high efficiency toilets</td>
<td>1</td>
</tr>
<tr>
<td>Switched to high efficiency urinals</td>
<td>1</td>
</tr>
<tr>
<td>Switched to waterless toilets and urinals</td>
<td>1</td>
</tr>
<tr>
<td>Installed low flow kitchen faucets</td>
<td>1</td>
</tr>
<tr>
<td>Installed low flow lavatory faucets</td>
<td>1</td>
</tr>
<tr>
<td>Installed ENERGY STAR dishwasher</td>
<td>1</td>
</tr>
<tr>
<td>Installed ENERGY STAR washing machine</td>
<td>1</td>
</tr>
</tbody>
</table>
Standard Practice
None

Recommended Practice
None

Best Available Practice
None
2.0  WATER EFFICIENCY

2.3  Indoor Water Efficiency

1 to 5 points

INTENT

Maximize indoor plumbing fixture and fitting efficiency to reduce the use of potable water and the burden on municipal water supplies and wastewater systems.

REQUIREMENTS

During the performance period have in place strategies and systems that in aggregate produce a reduction in indoor plumbing fixture potable water use from the reported or calculated baseline established in SAM Credit 2.1 Prerequisite 1 – Establish a Water Baseline.

The minimum water savings percentages for each point threshold are as follows:

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>Water Reduction</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.1</td>
<td>10%</td>
<td>1</td>
</tr>
<tr>
<td>2.3.2</td>
<td>20%</td>
<td>2</td>
</tr>
<tr>
<td>2.3.3</td>
<td>30%</td>
<td>3</td>
</tr>
<tr>
<td>2.3.4</td>
<td>40%</td>
<td>4</td>
</tr>
<tr>
<td>2.3.5</td>
<td>50%</td>
<td>5</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Calculations are based on estimated occupant usage and shall include only the following fixtures and fixture fittings (as applicable to the space): water closets, urinals, lavatory faucets, showers, kitchen sink faucets and pre-rinse spray valves.

WaterSense™- certified fixtures and fixture fittings should be used where available. Use high-efficiency fixtures (water closets and urinals) and dry fixtures such as composting toilet systems to reduce the potable water demand. Consider the use of alternate on-site sources of water, such as rainwater, stormwater, or air conditioner condensate, and graywater for non-potable applications such as toilet and urinal flushing, as approved by the manufacturer, and for custodial uses.

Reduce indoor plumbing fixture and fitting potable water usage through automatic water control systems. Install, where possible, water-conserving indoor plumbing fixtures and fittings that meet or exceed the UPC 2006 or IPG 2006 fixture and fitting requirements in combination with high-efficiency or dry fixture and control technologies.
Special consideration should be used to distinguish applicability of these technologies in high-volume passenger terminal areas versus office facilities, especially with respect to maintenance.

**Standard Practice**
- Comply with CDA/OMP Specification 15410 – Plumbing Fixtures

**Recommended Practice**
- Exceed Chicago Building Code (CBC) (EPAct 1992) by 20%
- Use high-efficiency fixtures and valves
- Utilize fixtures such as dual flush toilets and waterless urinals to reduce wastewater volumes
- Evaluate reusing stormwater for non-potable uses
- Use local generation of domestic hot water, as much as possible, to eliminate long piping runs associated with recirculation piping. Unless connecting to an existing hot water recirculating system
- Domestic hot water for general plumbing fixtures should be designed for a temperature of 140°F maximum, but not less than 120°F
- Install water efficient dishwashers and washing machines
- Water efficient dishwashers and washing machines

**Best Available Practice**
- While regulatory requirements vary by jurisdiction and a permit and/or a variance may be necessary, graywater can be captured from lavatories, showers, and institutional dishwashing facilities and potentially used for irrigation needs, toilet flushing, sewage conveyance or on-site wastewater treatment systems

**CASE STUDIES**

**Water Use Reduction**
**Double Eagle II Airport – Albuquerque, New Mexico**

The Double Eagle II Airport uses dual-flush toilets, low flow urinals, and aerators on faucets to account for an overall water savings of 38% over the standard water fixtures used in a similar building per ASHRAE 90.1-2004.


**Water-Efficient Devices**
**Canberra International Airport - Canberra Australia**

Canberra Airport installed 5A reduced flow shower heads, mixer or infrared taps, 3/4.5 dual flush toilets and waterless urinals, which all use significantly less water than the fittings put into most domestic homes. Existing buildings at Canberra International Airport usan alternative
water saving devices such as the Desert Cube Waterless Urinal System that cuts water usage by about 84%.


AND

2.0 WATER EFFICIENCY

2.4 Water Efficient Landscaping

1 to 3 points

INTENT

Limit or eliminate the use of potable water or other natural surface or subsurface resources available on or near the project site for landscape irrigation.

REQUIREMENTS

Reduce potable water or other natural surface or subsurface resource consumption for irrigation compared with current conventional means. If the building does not have separate water metering for irrigation systems, the water-use reduction achievements can be demonstrated through calculations.

Points will be awarded by achieving the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation controls (e.g., soil moisture sensors, weather data-based controller)</td>
<td>1</td>
</tr>
<tr>
<td>Rain water harvesting and graywater (e.g., rain barrels and cisterns)</td>
<td>2</td>
</tr>
<tr>
<td>No irrigation (through plant selection/landscape xeriscaping)</td>
<td>3</td>
</tr>
</tbody>
</table>

*Potable water:* Water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

Specify water-efficient, climate-tolerant native or adapted plantings. Implement or maintain high-efficiency irrigation technologies, such as micro-irrigation, moisture sensors, or weather data-based controllers. Feed irrigation systems with captured rainwater, graywater (on-site or municipal), municipally reclaimed water, or on-site treated wastewater. Consider not operating an irrigation system. Consider use of xeriscaping principles in arid climates.
Standard Practice

- Irrigation systems are not typically installed airside and the lower maintenance tall fescue is used for all projects per the following CDA/OMP Master Specifications:
  - CDA/OMP Specification T-901 – Seeding
  - CDA/OMP Specification 02931 – Seeding Hydro-mulching
  - CDA/OMP Specification 02905 – Sustainable Airport Landscaping, is the airport landscaping specification that deals with other plants and landscaping requirements

Recommended Practice

- No irrigation system
- Drought tolerant plants
- Utilize vegetation which may be acceptable for site use (native and/or low-maintenance), with special consideration for vegetated green roofs. Utilize vegetation to reduce or eliminate irrigation requirements for airside/landside areas
- Minimized use of high maintenance grass areas, lawns and annual plants
- Established areas of high and low landscape maintenance areas. Group plants with similar water-use needs by determining which areas of the site should receive a higher level of care than others and, during drought periods, more irrigation. Coordinate these areas with the irrigation plan. Higher maintenance areas should be located around the major building entries and high traffic areas. Lower maintenance areas should be located on low traffic areas, buffer zones and service areas.

Best Available Practice

- Have a soil and climate analysis to determine the appropriate landscape strategy
- Evaluation of stormwater and/or graywater cisterns for capturing rainwater from all new roofs for irrigation
- If an irrigation system is installed, a soil moisture monitoring system is present to reduce reliance on manual control and timed devices, as well as for detecting leaks
- Have incorporated the use of recycled and treated wastewater for the use of irrigation

CASE STUDIES

Sustainability Plan
Santa Monica Airport – Santa Monica, California

The Santa Monica Airport Sustainability Plan outlines ways to reduce water use in all areas of operations through: installation of water efficient plumbing fixtures in all Airport buildings controlled by the City; installation of water efficient landscaping and irrigation systems in all landscaped areas of the Airport; and installation of graywater and stormwater capture systems to reduce the use of potable water resources.

http://www.smgov.net/uploadedFiles/Departments/Airport/Community/SMO_Sustainability_Plan.pdf
Green Building
Dane County Regional Airport – Madison, Wisconsin

The project incorporates 25 green building strategies including water efficient landscaping, recycled carpet, acoustic ceiling tiles manufactured from recycled soda bottles, non-toxic wood preservative treatment, chlorine free vinyl wall covering, and on-site construction waste recycling. Recycled materials were used throughout the building and construction debris was separated and sorted, with 98% collected for recycling – 40,000 tons. Even some of the aqua blue wall sconces are made from recycled soft drink bottles.

http://www.msnairport.com/about/facilities/tour.aspx
2.0 WATER EFFICIENCY

2.5 Rain Harvesting for Non-Irrigation Usage

3 Points

INTENT

Decrease the demand for potable water for non-irrigation use.

REQUIREMENTS

The CDA and/or the tenant should implement and maintain a rainwater harvesting system for the following processes to include, but is not limited to:

- Equipment/Vehicle Washing
- Aircraft Washing
- Cooling tower
- Other non-irrigation uses as approved by the SRP

SUBMITTALS

Include descriptive narrative on SAM Checklist detailing the system used.

TECHNOLOGY/STRATEGY

Rain harvesting systems can vary in complexity and sophistication, but in every system must utilize some basic common elements. A catchment area will intercept the rainfall and a cistern will store the collected rainwater. Rooftops provide an idea environment for the catchment and a rain barrel is a simplistic example of a cistern. A downspout running can be used for conveyance between the catchment area and the cistern.

Standard Practice

None

Recommended Practice

- The cleaning of building exteriors and hardscapes
- Install cisterns to collect and store rainwater to be used for landscaping and other purposes
- Install rain barrels at the end of downspouts
- Use swales to collect and guide stormwater to catchment areas

Best Available Practice

None
CASE STUDIES

Consolidated Rental Car Facility
Nashville International Airport – Nashville, Tennessee

The Consolidated Rental Car Facility at the Nashville International Airport features on-site refueling and car wash services. The facility incorporates sustainable practices including the use of recycled and captured rainwater for washing rental cars.

https://www.flynashville.com/ground-transportation/Pages/rental-car-facility.aspx

Rainwater Harvesting and Utilization System
Singapore Changi International Airport – Changi, Singapore

A rainwater harvesting and utilization system at the Changi Airport diverts rainfall from the runways and surrounding green areas to two impounding reservoirs. One of the reservoirs is designed to balance the flows during the coincident high runoffs and incoming tides, and the other reservoir is used to collect the runoff. The water is used primarily for non-potable functions such as fire-fighting drills and toilet flushing. Collected and treated water accounts for 28-33% of the total water used at the airport and has resulted in financial savings.


Rainwater Harvesting – Bovington
Regional Prime Contract South West (RPC SW), England – United Kingdom

Bovington Camp, located in Dorset, has been developed as a training facility for maintenance and operations of the Terrier track armored excavating vehicle. As part of the development, two new buildings were required – a junior ranks mess and communal facility serving several hundred people per day, and a building to house the Terrier simulators, and provide training and workshop space for 65 people. A rainwater harvesting system was installed on both buildings, each with a 5,000 L tank capacity. The system is designed to continuously meet the water demands for the toilets and urinals in both buildings, with each tank providing enough water for over 1,000 flushes when full.

2.0 WATER EFFICIENCY

2.6 Innovative Wastewater Management

2 points

INTENT

To reduce wastewater generation and potable water demand while increasing the local aquifer recharge.

REQUIREMENTS

Use a system or technology that uses one of the following:

OPTION 1

Reduce potable water use for building sewage conveyance by 50% through the use of water conserving fixtures (water closets, urinals) non-potable water (captured rainwater, recycled graywater, and on-site or municipally treated wastewater).

OR

OPTION 2

Currently treats 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.

SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Specify high-efficiency fixtures and fittings and dry fixtures such as composting toilet systems and non-water using urinals to reduce wastewater volumes. Consider reusing stormwater or graywater for sewage conveyance or on-site mechanical and/or natural wastewater treatment systems. Options for on-site wastewater treatment include packaged biological nutrient removal systems and high-efficiency filtration systems.

Standard Practice

None

Recommended Practice

- Uses high-efficiency fixtures and valves
- Utilizing fixtures such as dual flush toilets and waterless urinals to reduce wastewater volumes
- Evaluation or reusing stormwater for non-potable uses
Best Available Practice

- Capture graywater from lavatories, showers and institutional dishwashing facilities for sewage conveyance or on-site wastewater treatment systems

CASE STUDY

Blackwater Recycling Treatment Plant
Canberra Airport – Brindabella, Australia

The Blackwater Recycling Treatment Plant at Canberra Airport was launched in 2007 and is a system designed to take sewer (or “black”) water from buildings and treat it to a drinkable level using a self-cleaning membrane system and UV safety filters. After treatment, the water is used (along with rainwater harvested from roofs) in toilets and externally for irrigation (whilst the water is drinkable, it is not used for drinking or showering). This was the first commercial large scale water recycling system in the ACT, and the first at an Australian Airport.

2.0 WATER EFFICIENCY

2.7 Water Efficient Vehicle Washing

1 to 4 points

INTENT

To limit or eliminate the use of potable water or other natural surface or subsurface resources available on or near the project site for vehicle washing.

REQUIREMENTS

Up to 4 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install low volume, high pressure sprayer nozzles on water hoses</td>
<td>1</td>
</tr>
<tr>
<td>Log vehicle washing and meter vehicle wash systems separately to measure water</td>
<td>1</td>
</tr>
<tr>
<td>Recycle more than 20% of wash water during vehicle washing</td>
<td>1</td>
</tr>
<tr>
<td>Recycle more than 50% of wash water during vehicle washing</td>
<td>1</td>
</tr>
</tbody>
</table>

Potable water: Water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Reduce potable water or other natural surface or subsurface resource consumption for vehicle washing compared with current conventional means. If the building does not have separate water metering for vehicle washing systems, the water-use reduction achievements can be demonstrated through calculations.

Standard Practice

- Indoor vehicle washing

Recommended Practice

- Low volume, high pressure sprayer nozzles on water hoses
- Keep a log of vehicle washing water use
- Capture wash water for re-use (cistern)
Best Available Practice

- Treat wash water for re-use

CASE STUDIES

Terminal 5
London Heathrow International Airport – London, England

Groundwater boreholes and T5’s own rainwater harvesting scheme supply water for non-potable uses such as toilet flushing, irrigation, energy centre cooling and vehicle washing. The system is able to capture and reuse 85% of the rainfall that falls on the entire T5 catchment. Demand from the public water supply is expected to be reduced by 70%.


Water Conservation Ordinance #1580
City of Santa Monica, California

The City implemented the Water Conservation Ordinance to minimize the needless waste of water. Activities affected include: watering of landscaping, sidewalk washing, vehicle washing, and serving water in restaurants, among others.

http://www.werf.org/liveablecommunities/studies_santa_ca.htm
3.0 ENERGY & ATMOSPHERE

3.1 Prerequisite 1 – Refrigerant Management

Required

INTENT

Reduce stratospheric ozone depletion.

REQUIREMENTS

Do not use chlorofluorocarbon (CFC)-based refrigerants in HVAC&R base building systems unless system replacement or conversion is not economically feasible or it is demonstrated that a phase-out plan for CFC-based refrigerants is in place.

Small HVAC&R units (defined as containing less than 0.5 pounds of refrigerant), standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 pounds of refrigerant are not considered part of the base building system and are exempt.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

Specify only non-CFC-based refrigerants in all new building HVAC&R systems. Identify all existing CFC based refrigerant uses and upgrade the equipment if economically feasible and/or develop a phase-out plan that identifies a schedule for future replacement.

Standard Practice

- Only HCFC and HFC refrigerants have been used for CDA projects where refrigerants were required (typically R-410a, which is an HFC).

Recommended Practice

None

Best Available Practice

- Although Hydrochlorofluorocarbons (HCFCs) and Hafnium carbide (HfCs) have ozone depletion potentials (ODP) that are nearly zero, consideration should also be given to their global warming potentials (GWP) (see SAM Credit 3.8 – Enhanced Refrigerant Management). Alternative refrigerants that minimize ODP and GWP compared to HCFCs and HFCs include natural refrigerants such as carbon dioxide, ammonia, and propane. These compounds have an ODP of zero and GWPs which are three orders of magnitude less than most HCFCs and HFCs.
CASE STUDY

Central Utilities System
Toronto Pearson International Airport – Toronto, Ontario Canada

Sustainable principles were implemented in an effort to modernize Toronto Pearson International Airport and increase passenger capacity. A new central utilities plant replaced older equipment with a new HVAC system and a state-of-the-art deicing facility. The new system is supplied with chillers that use non-ozone depleting, chlorine free HFC-134a refrigerant. These chillers were customized to add extra temperature sensing capabilities to allow for closer monitoring of the chiller’s motor temperatures, while enhancing equipment safety though an effective preventative maintenance program.

3.0 ENERGY & ATMOSPHERE

3.2 Utility Meter Data

1 to 4 points

INTENT

Monitor, track and report utility data to reduce environmental and economic impacts associated with excessive energy use.

REQUIREMENTS

Provide utility meter data (if available). (1 point)

AND/OR

The data collected under the first performance review will become the baseline for each subsequent review.

During the performance period have in place strategies and systems that in aggregate produce less energy from the reported baseline established under the first performance review.

The minimum energy savings percentages for each point threshold are as follows:

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>Energy Reduction</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.1</td>
<td>10%</td>
<td>1</td>
</tr>
<tr>
<td>3.2.2</td>
<td>20%</td>
<td>2</td>
</tr>
<tr>
<td>3.2.3</td>
<td>30%</td>
<td>3</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

If a separate utility meter is not in place, it is recommended that one be installed. Meter data should be used to determine where energy consumption can be optimized and areas where submetering may be useful.

Standard Practice

None
Recommended Practice

- Install utility meters where applicable

Best Available Practice

- Install submeters wherever possible
3.0 ENERGY & ATMOSPHERE

3.3 Retroactive Energy Optimization

1 to 5 points

INTENT

Recognize previous improvements and upgrades that had a positive impact on energy efficiency.

REQUIREMENTS

- Create an inventory of all the energy improvements and upgrades undertaken to improve their energy efficiency prior to the initial performance review.

- This credit is only applicable to the first completed performance review. Subsequent reviews would refer to SAM Credits 3.2 Utility Meter Data and 3.4 Optimize Energy Performance.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

A point will be awarded for each of the retroactive improvements. Up to 5 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switched to LED lighting</td>
<td>1</td>
</tr>
<tr>
<td>Switched to CFL lighting</td>
<td>1</td>
</tr>
<tr>
<td>Utilized energy saving halogen lamps</td>
<td>1</td>
</tr>
<tr>
<td>Utilized high efficiency T8s and T5s</td>
<td>1</td>
</tr>
<tr>
<td>Provided the use of lighting sensors or timers</td>
<td>1</td>
</tr>
<tr>
<td>Organized circuiting of lighting and systems so that individual areas were separately controlled relative to daylight and heating/cooling zones</td>
<td>1</td>
</tr>
<tr>
<td>Technology/Strategy</td>
<td>Points</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Provided motion sensors/occupancy sensors in stairs, restrooms, storage rooms,</td>
<td>1</td>
</tr>
<tr>
<td>equipment rooms and office space</td>
<td></td>
</tr>
<tr>
<td>Optimized lighting controls for energy savings and function</td>
<td>1</td>
</tr>
<tr>
<td>Provided high-efficiency motors and variable-speed pumping systems</td>
<td>1</td>
</tr>
<tr>
<td>Utilized ENERGY STAR furnaces, exhaust fans, ceiling fans, and air conditioners</td>
<td>1</td>
</tr>
</tbody>
</table>

**Standard Practice**

None

**Recommended Practice**

None

**Best Available Practice**

None
3.0 ENERGY & ATMOSPHERE

3.4.1 Optimize Energy Performance: Lighting Power

1 to 5 Points

INTENT

Achieve increasing levels of energy conservation beyond the referenced standard to reduce environmental and economic impacts associated with excessive energy use.

REQUIREMENTS

For interior facility lighting, reduce connected lighting power density below that allowed by ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda) using either the space-by-space method or by applying the lighting power allowance to the project area.

OR

For non-facility/non-aviation exterior lighting applications, a baseline energy use shall be calculated assuming a conventional 400-watt lamp is used for each fixture, except for low-mast applications or covered areas where a 250-watt lamp is applicable. This benchmark standard shall assume that the lamps run without lighting controls such as timers and motion sensors. Light sensors, however, should be taken into account. To meet the requirements of this credit, reduce lighting power for these applications based on the benchmark standard. Non-facility/non-aviation exterior lighting applications may include the following:

- Roadways
- Surface Parking Lots
- Covered Parking Garages

OR

For aviation lighting, exceed the minimum FAA specifications. The benchmark calculations shall assume that conventional lighting is used throughout the project area and that the calculation must be based on annual energy consumption that takes into account seasonal climate data.

---

1 Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all SAM credits.
Any combination of points earned for reducing energy usage below the standards documented above are as follows (may not exceed 5 points in total).

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>Lighting Power Density Reduction Below the Standard</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4.1.1</td>
<td>15%</td>
<td>1</td>
</tr>
<tr>
<td>3.4.1.2</td>
<td>20%</td>
<td>2</td>
</tr>
<tr>
<td>3.4.1.3</td>
<td>25%</td>
<td>3</td>
</tr>
<tr>
<td>3.4.1.4</td>
<td>30%</td>
<td>4</td>
</tr>
<tr>
<td>3.4.1.5</td>
<td>35%</td>
<td>5</td>
</tr>
</tbody>
</table>

Examples: A 15% reduction in facilities lighting power (1 point) in addition to a 25% reduction in parking lot lighting power (3 points) would total four points earned for this credit. A 25% reduction in facilities lighting power (3 points) in addition to a 25% reduction in parking lot lighting power (3 points), totaling six points, would earn the maximum five points for this credit.

SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Ensure the connected lighting power maximizes energy performance. Consider a computer simulation model to assess the performance and identify the most cost-effective energy measures.

Standard Practice

None

Recommended Practice

Consider the following:

- Use a computer simulation model to assess energy performance and identify the most cost effective energy measures
- Provide energy efficient lighting systems including LED, fluorescent lighting, solar lighting and the use of lighting sensors or timers
- Use LED lighting, wherever applicable
- Use CFL lighting, wherever applicable
- Utilize energy saving halogen lamps
- Utilize high efficiency T8s and T5s

Best Available Practice

None
3.0 ENERGY & ATMOSPHERE

3.4.2 Optimize Energy Performance: Lighting Control

1 to 3 Points

INTENT

Achieve increasing levels of energy conservation beyond the referenced standard to reduce environmental and economic impacts associated with excessive energy use.

REQUIREMENTS

Up to 3 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Daylight controls for daylight areas:</strong> Install daylight responsive controls in all regularly occupied daylit spaces within 15 feet of windows and under skylights. Daylight controls must switch or dim electric lights in response to the presence or absence of daylight illumination in the space</td>
<td>1</td>
</tr>
<tr>
<td><strong>Daylight controls for 50% of the lighting load:</strong> Install daylight responsive controls for 50% or more of the connected lighting load and demonstrate that 50% of the connected lighting load is daylight responsive. Daylight controls must switch or dim electric lights in response to the presence or absence of daylight illumination in the space</td>
<td>1</td>
</tr>
<tr>
<td><strong>Occupancy Sensors:</strong> Install occupancy sensors for 75% of the connected lighting load.</td>
<td>1</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Ensure the connected lighting power maximizes energy performance.

Standard Practice

None

Recommended Practice

- Provide energy efficient lighting systems including LED, fluorescent lighting, solar lighting and the use of lighting sensors or timers
• Organize circuiting of lighting and systems so that individual areas may be separately controlled relative to daylight and heating/cooling zones
• Provide motion sensors/occupancy sensors in stairs, restrooms, storage rooms, equipment rooms and office space unless life safety is compromised
• Optimize lighting controls for energy savings and function

Best Available Practice

• Integrate lighting systems with Building Automation System
3.0 ENERGY & ATMOSPHERE

3.4.3 Optimize Energy Performance: HVAC

3 to 6 Points

INTENT

Achieve increasing levels of energy conservation beyond the referenced standard to reduce environmental and economic impacts associated with excessive energy use.

REQUIREMENTS

OPTION 1

Implement one or both of the following strategies:

- **Equipment Efficiency:** (3 pts)
  
  Install heating, ventilation and air conditioning (HVAC) systems that comply with the efficiency requirements outlined in the New Buildings Institute’s Advanced Buildings™ Core Performance™ Guide Sections 1.4: Mechanical System Design, 2.9: Mechanical Equipment Efficiency and 3.10: Variable Speed Control.

- **Appropriate Zoning and Controls:** (3 pts)
  
  Zone spaces to meet the following requirements:
  
  - Every solar exposure must have a separate control zone
  - Interior spaces must be separately zoned
  - Private offices and special occupancies (conference rooms, kitchens, etc.) must have active controls capable of sensing space use and modulating the HVAC system in response to demand

OR

OPTION 2

Reduce design energy cost compared with the energy cost budget for regulated energy components described in the requirements of ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda).

AND

PATH 1 (3 pts)

Demonstrate that HVAC system component performance criteria used for space are 15% better than a system in minimum compliance with ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda).

OR
PATH 2 (6 pts)
Demonstrate that HVAC system component performance criteria use for space is 30% better than a system that is in minimum compliance with ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda).

SUBMITTALS
Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY
Ensure the HVAC system components maximize energy performance. Review compliance options to determine the most appropriate approach. Option 1 provides a more prescriptive approach to recognizing energy-efficient HVAC design, while Option 2 is performance based.

Standard Practice
None

Recommended Practice
- Provide high-efficiency motors and variable-speed pumping systems.
- Utilize ENERGY STAR furnaces, exhaust fans, ceiling fans, and air conditioners

Best Available Practice
- Evaluate under floor air distribution systems in office-type spaces
- Evaluate the potential for “green walls"
- Utilize premium efficiency motors where applicable
3.0 ENERGY & ATMOSPHERE

3.4.4 Optimize Energy Performance: Equipment and Appliances

1 to 4 Points

INTENT

Achieve increasing levels of energy conservation beyond the referenced standard to reduce environmental and economic impacts associated with excessive energy use.

REQUIREMENTS

For all ENERGY STAR qualified equipment and appliances installed, achieve one of the following percentages by rated power:

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>ENERGY STAR Qualified Equipment*</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4.4.1</td>
<td>70%</td>
<td>1</td>
</tr>
<tr>
<td>3.4.4.2</td>
<td>77%</td>
<td>2</td>
</tr>
<tr>
<td>3.4.4.3</td>
<td>84%</td>
<td>3</td>
</tr>
<tr>
<td>3.4.4.4</td>
<td>90%</td>
<td>4</td>
</tr>
</tbody>
</table>

*As a percentage of ENERGY STAR eligible equipment
Excluded are HVAC, lighting and building envelope products.

This requirement applies to appliance, office equipment, electronics and commercial food service equipment. Excluded are HVAC, lighting and building envelope products.

SUBMITTALS

Include descriptive narrative and calculations in the SAM Checklist.

TECHNOLOGY/STRATEGY

Select energy-efficient equipment and appliances, as qualified by the EPA’s ENERGY STAR Program (https://www.energystar.gov).

Standard Practice

None

Recommended Practice

- Provide high-efficiency motors and variable-speed pumping systems.
- Provide ENERGY STAR compliant equipment such as:
  - Dishwashers
  - Refrigerators
  - Water Heater
- Computers
- Printers
- Copiers
- Phones
- Televisions
- Ice machines
- Convection ovens
- Combination ovens

Best Available Practice

None

CASE STUDIES

Moving Walkways
Boston Logan International Airport – Boston, Massachusetts

Boston Logan International Airport is undergoing tests on energy-efficient moving walkways. The walkways are equipped with EcoStart, which contains a motor efficiency controller that soft starts an electric motor, bringing it from rest to full speed. Once at full speed, the EcoStart monitors the motor and improves its efficiency when operating. Initial test efforts are estimated to conserve approximately 60,000 kilowatt-hours (kWh) per year.


Baggage Check-In Building
Reno-Tahoe International Airport – Reno, Nevada

The new airport baggage check-in building at Reno-Tahoe International Airport was designed with an efficient HVAC system, in addition to utilization of energy-efficient entryways to reduce heat/cooling loss. This helps the airport monitor and reduce overall energy use.

3.0 ENERGY & ATMOSPHERE

3.5 Existing Building Commissioning

1 to 6 points

INTENT

Develop and implement an operation of the building’s major energy-using systems and implement a no to low cost option(s) for optimizing energy performance and a plan to achieve energy savings.

REQUIREMENTS

Conduct one of the following options below – 1 to 2 points

OPTION 1

Commissioning Process (1 point)
- Develop a retrocommissioning or ongoing commissioning plan for the building’s major energy-using systems
- Conduct the investigation and analysis phase
- Document the breakdown of energy use in the building
- List the operating problems that affect occupants’ comfort and energy use, and develop potential operational changes that will solve them
- List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

OR

OPTION 2

ASHRAE Level II, Energy Audit (2 points)
- Conduct an energy audit that meets the requirements of ASHRAE Level II, energy survey and analysis
- Document the breakdown of energy use in the building
- Perform a savings and cost analysis of all practical measures that meet the owner’s constraints and economic criteria, along with a discussion of any effect on operations and maintenance procedures
- List the identified capital improvements that will provide cost-effective energy savings and document the cost-benefit analysis associated with each.

AND

Implementation (2 Points)
Implement one of the two no- or low-cost operational improvements aforementioned and create a capital plan for major retrofits or upgrades. Provide training for management staff that builds
awareness and skills in a broad range of sustainable building operations topics this could include energy efficiency and building, equipment and systems operations, and maintenance.

Demonstrate the observed and/or anticipated financial costs and benefits of measures that have been implemented.

Update the building operating plan as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design set-points, and lighting levels.

AND

Ongoing (2 points)
Implement an ongoing commissioning program that includes elements of planning, system testing, performance verification, corrective action response, ongoing measurement, and documentation to proactively address operating problems.

Create a written plan that summarizes the overall commissioning cycle for the building by equipment or building system group. The ongoing commissioning cycle must not exceed 24 months. This plan must include a building equipment list, performance measurement frequency for each equipment item, and steps to respond to deviation from expected performance parameters.

Update the building operating plan and/or systems narrative as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design setpoints, lighting levels, or system specifications.

SUBMITTALS

Include descriptive narrative and calculations in SAM Checklist.

TECHNOLOGY/STRATEGY

Based on the building operating plan and systems narrative:

- Confirm that all building systems and equipment are functioning as appropriate according to the equipment schedule
- Conduct testing and analysis to ensure that building systems and equipment are functioning correctly
- Identify opportunities to make no- or low-cost capital improvements to enhance building performance

Implement no- and low-cost operational improvements that will immediately enhance building performance. Develop a capital plan for the completion of any major retrofits identified through the investigation and analysis phase.

Develop an ongoing commissioning program that addresses the ongoing changes and maintenance needs in an existing building.
Standard Practice

- Commissioning Agents are typically engaged to conduct fundamental commissioning for buildings.

Recommended Practice

- Review the design intent and the basis of design documentation
- Incorporate commissioning requirements into the construction documents
- Develop and utilize a commissioning plan
- Verify installation, functional performance, training, operations and maintenance documentation
- Complete a commissioning report
- Provide the owner with a single manual that contains the information required for re-commissioning systems
- Engage a commissioning team that does not include individuals directly responsible for project design or construction management to evaluate both building and site systems as part of the commissioning plan
- Priority Systems - high energy consuming systems:
  - Central Building Automation system
  - All HVAC system equipment
  - Lighting controls and sensors
  - Site Lighting
  - Refrigeration systems
  - Vertical Transport
  - Building Envelope
  - Baggage handling systems (included in process loads: to promote energy savings, use the exceptional calculation method described in ANSI/ASHRAE/IESNA 90.1-2010 G2.5)
  - Information Technology Systems - IT (included in process loads: to promote energy savings, use the exceptional calculation method described in ANSI/ASHRAE/IESNA 90.1-2010 G2.5)
- Lower Priority Systems – low energy consuming system:
  - Emergency Power Generators and Automatic Transfer Switching
  - Uninterruptible Power Supply systems
  - Life Safety systems Fire protection Fire alarm, Egress pressurization
  - Lightning Protection
  - Domestic and Process water pumping and mixing systems
  - Equipment sound control systems
  - Data and Communication systems
  - Paging systems
  - Security systems
  - Irrigation systems
For Runways, Civil/Stormwater and Roadways/Rail projects this scope should include the following project components:
- For support and ancillary buildings include all of the applicable systems and assemblies noted above
- Runway lighting and illuminated signage
- Runway NAVAIDS
- Site lighting systems
- Traffic signals
- Stations (e.g., pump stations, lift stations, drainage pumps)
- Oil/water separators

Best Available Practice

None

CASE STUDIES

STAR Program
Metropolitan Airports Commission – Minneapolis, Minnesota

Minneapolis – St. Paul International Airport recently launched the Stewards of Tomorrow’s Airport Resources (STAR) initiative. Airport operators develop and implement sustainable solutions that address long-term environmental, operational, financial and social needs. Goals include minimizing impacts to air quality, reducing waste reduction and hazardous materials use, as well as developing alternative energy programs.

3.0 ENERGY & ATMOSPHERE

3.6.1 Performance Measurement: Building Automation System

1 point

INTENT

Provide information to support the ongoing accountability and optimization of building energy performance and identify opportunities for additional energy-saving investments.

REQUIREMENTS

Have in place a computer-based building automation system (BAS) that monitors and controls key building systems that include, but are not limited to:

- Heating
- Cooling
- Ventilation
- Lighting

Have a preventive maintenance program in place that ensures BAS components are tested and repaired or replaced according to the manufacturer’s recommended interval. Demonstrate that the BAS is being used to inform decisions regarding changes in building operations and energy-saving investments.

SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

Install and/or maintain a BAS to automatically control key building systems. Ensure that relevant staff is adequately trained to use the system, analyze output, make necessary adjustments, and identify investment opportunities to improve energy performance.

Standard Practice

None

Recommended Practice

- Install a Building Automation System

Best Available Practice

None
CASE STUDY

New Building Automation System
Kunming New International Airport – Kunming, Yunnan, China

As of December 2008, the Kunming New International Airport has planned to install Honeywell’s Trend Building Automation System to integrate its various control systems, including operation management system, terminal operation system, and parking management system. The adoption of the system enables effective data sharing among the airport’s management systems and increases the airport’s efficiency at a lower cost.

3.0 ENERGY & ATMOSPHERE

3.6.2 Performance Measurement: System Level Metering

1 to 2 points

INTENT

Provide accurate energy use information to support energy management and identify opportunities for additional energy-saving improvements.

REQUIREMENTS

Have a developed breakdown of energy use in the building, either through SAM Credits 3.4.1 Optimize Energy Efficiency: Lighting Power, 3.4.2 Optimize Energy Efficiency: Lighting Controls, 3.4.3 Optimize Energy Performance: HVAC or 3.4.4 Optimize Energy Performance: Equipment and Appliances, or by using energy bills, spot metering or other metering to determine the energy consumption of major mechanical systems and other end-use applications. This analysis of major energy use categories must have been conducted within two years prior to the date of application for SAM O&M certification.

Based on the energy use breakdown, employ system-level metering covering at least 40% or 80% of the total expected annual energy consumption of the building. Permanent metering and recording are required. All types of submetering are permitted.

Up to 2 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate that system-level metering is in place covering at least 40% of the total expected annual energy consumption of the building. Further, at least one of the two largest energy use categories from the breakdown report must be covered to the extent of 80% or more (i.e., if energy use in the two largest categories is each 100 BTUs/year, at least 80 BTUs/year in one of them must be metered).</td>
<td>1</td>
</tr>
<tr>
<td>Demonstrate that system-level metering is in place covering at least 80% of the total expected annual energy consumption of the building. Further, at least two of the three largest energy use categories from the breakdown report must be covered to the extent of 80% or more.</td>
<td>2</td>
</tr>
</tbody>
</table>

Meters must be calibrated within the manufacturer’s recommended interval if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.
SUBMITTALS

Include descriptive narrative in the SAM Checklist.

TECHNOLOGY/STRATEGY

Identify, through an energy audit, building commissioning or some other means, how the building systems are consuming energy. Based on the energy use profile, develop a metering plan to capture the most significant building loads. Use output from the meters to identify any changes in consumption and opportunities for energy-saving improvements. Have a plan for periodically inspecting the data.

Standard Practice

None

Recommended Practice

- Independently meter separate tenants and CDA facilities where applicable
- Sub-meter building systems by process, floor or location

Best Available Practice

None

CASE STUDY

Energy Efficiency Software
Mineta San Jose International Airport – San Jose, California

Deployment of high-performance energy efficiency software to manage the airport's HVAC system, coupled with an addition and an upgrade to the facility's array of chillers, have yielded more than $35,000 in savings from utility costs in the first five months of operation.

The measures have also saved 235,000 kilowatt hours (kWh) of electricity and reduced the carbon footprint for the facility by almost 300,000 pounds of CO2 during the same period, according to Optimum Energy, the provider of the software solution, and the airport.

www.greenbiz.com/blog/2009/04/10/green-flies-high-california-airport
3.0 ENERGY & ATMOSPHERE

3.7 On-Site and Off-Site Renewable Energy

1 to 6 points

INTENT

Encourage and recognize increasing levels of on-site and off-site renewable energy to reduce environmental impacts associated with fossil fuel energy use.

REQUIREMENTS

OPTION 1

Over the performance period, meet some or all of the building’s total energy use with on-site or off-site renewable energy systems. Points are earned according to the following table, which shows the percentages of building energy use met by renewable energy over the performance period.

Off-site renewable energy sources are defined by the Center for Resource Solutions (CRS) Green-e-products certification requirements, or the equivalent. Green power must be procured from a Green-e-certified power marketer or a Green-e-accredited utility program, or through Green-e-certified tradable renewable energy certificates (RECs), or the equivalent. For on-site renewable energy that is claimed for this credit, the associated environmental attributes must be retained or retired and cannot be sold.

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>On-Site Renewable Energy</th>
<th>Off-Site Renewable Energy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7.1</td>
<td>3% or 25%</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3.7.2</td>
<td>4.5% or 37.5%</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3.7.3</td>
<td>6% or 50%</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3.7.4</td>
<td>7.5% or 62.5%</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>3.7.5</td>
<td>9% or 75%</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>3.7.6</td>
<td>12% or 100%</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Up to the six-point limit, any combinations of individual actions are awarded the sum of the points allocated to those individual actions. For example, one point would be awarded for implementing three 3% of on-site renewable energy, and two additional points would be awarded for meeting 37.5% of the building’s energy load with renewable power or certificates over the performance period. Projects must submit proof of a contract to purchase RECs for a minimum of two years and must also make a commitment to purchase RECs on an ongoing basis beyond that.

OR
OPTION 2 – Prescriptive Method

Install alternative renewable energy technologies on-site by using any of the following technologies for one point each:

- Wind Power:
  - Generate on-site electricity using wind turbines, horizontal or vertical that generate 0.5 kW or greater
- Photovoltaics (solar electric)
  - Use the system to generate electricity that has a capacity of 0.5 kW or greater

SUBMITTALS

Include descriptive narrative and calculation in the SAM Checklist.

TECHNOLOGY/STRATEGY

Maintain the use of on-site nonpolluting renewable technologies to contribute to the total energy requirements of the building. Consider and employ solar, geothermal, wind, biomass (other than unsustainably harvested wood), and biogas technologies.

Purchase renewable energy or tradable renewable energy certificates to meet some or all of the building’s energy requirements. Review the building’s electrical consumption trend. Research power providers in the area and select a provider that guarantees that a portion of its delivered electric power is derived from net nonpolluting renewable technologies. If the project is in an open-market state, investigate green power and power marketers licensed to provide power in that state. Grid power that qualifies for this credit originates from solar, wind, geothermal, biomass, or low-impact hydro sources.

Standard Practice

- Solar powered signage
- Solar powered RPU for weather sensors
- Solar powered obstruction and barricade lighting
- Solar thermal water heating has been used at a number of locations, such as the ARFF Station #2, which has a system that provides hot water for up to 18 full-time occupants

Recommended Practice

- Purchase renewable energy or tradable renewable energy certificates to meet some or all of the building’s energy requirements

Best Available Practice

The following technologies should be considered for any applicable projects:

- Roof-mounted or building integrated photovoltaic panels
- Electricity generation using bio-fuels (untreated wood waste, agricultural crops or waste, landfill gas)
- Electricity generating wind turbines
- Solar-thermal water or air heating
- Geothermal heating systems
- Geothermal electrical systems

CASE STUDIES

Wind Turbines
Boston Logan International Airport – Boston, Massachusetts

A fleet of miniature wind turbines at Boston Logan International Airport, each 6-foot-tall, placed at the edge of the rooftop of the airport's headquarters, is affixed at a unique angle to capture the winds that gust through Boston Harbor and climb the building's walls. The 20 turbines, installed in July 2008, are expected to generate about 100,000 kilowatt-hours annually, equal to 3% of the building's energy needs.

[Link to case study]

Hangar 25
Bob Hope Airport – Burbank, California

Hangar 25 at Bob Hope Airport in Burbank, California, is a $17 million structure designed to be a model of green construction and was built for what a traditional aircraft hangar would cost, according to Andy Meyers, president of Shangri-La Construction. The hangar features solar panels, skylights, artificial grass, low-flush toilets, and massive aerating fans. Situated on a former industrial lot with a cement slab, the hangar property now houses a state-of-the-art green aviation hangar minimizing the 51,000-square-foot building's carbon footprint. Avjet Corp. is the building owner. The building received a Platinum LEED® certification. In addition to providing power to run the tools and machines to maintain the planes, the energy from the solar panels on the roof powers the building's offices, copiers, computers and coffee machines. The building generates 110% of the energy it needs and then gives the surplus energy back to the municipal grid. Grates at the building's entrance scrape off contaminants under shoes. No toxic chemicals fill the fire suppression system. The concrete floor has no chemical polymers. In the office area, all of the cabinets are made of Plyboo®, a type of bamboo with a water-based finish.

[Link to case study]

See Also:


AND

www.huffingtonpost.com/paige-donner/greening-hollywood-jet-ha_b_150102.html

Airfield Snow Removal Equipment Building
Dane County Regional Airport - Madison, Wisconsin

In March of 2013, the Dane County Regional Airport broke ground on the construction of a 58,800-square-foot building that will house equipment essential to its winter snow removal
operations. The building hosts an array of environmentally conscious design principles and uses on-site renewable energy sources, such as:

- Geothermal heating and cooling system.
- 100 kilowatt rooftop photovoltaic system which will generate up to 135,000 kilowatt-hours per year, the annual equivalent to the usage of 12 typical American homes – creating the largest solar energy system in the MG&E service area.

3.0 ENERGY & ATMOSPHERE

3.8 Enhanced Refrigerant Management

1 point

INTENT

Reduce ozone depletion and support early compliance with the Montreal Protocol (an international agreement designed to protect from ozone depletion) while minimizing direct contributions to global warming.

REQUIREMENTS

Choose one of the following options:

OPTION 1

Do not use conventional refrigerants in HVAC&R systems. Naturally ventilate and/or use natural refrigerants such as:
- Water
- Carbon dioxide
- Propane
- Ammonia

OR

OPTION 2

Use only Hydrofluorocarbons (HFC)
Small HVAC units (defined as containing less than 0.5 lbs of refrigerant), and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 lbs of refrigerant, are not subject to the requirements of this credit.

AND

Do not install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs or Halons).

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Operate the Facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is needed, use for the refrigeration cycle base building HVAC and refrigeration systems that minimize direct impact on ozone depletion and global warming. Select HVAC&R replacement equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Use fire-suppression systems that do not contain HCFCs or halons.
Standard Practice
None

Recommended Practice

- Use only Hydrofluorocarbons (HFC)

Best Available Practice

- Use natural refrigerants (water, carbon dioxide, ammonia, propane) where possible, in order to minimize ODPs and GWPs
3.0 ENERGY & ATMOSPHERE

3.9 Emissions Reduction Reporting

1 to 4 Points

INTENT

Document the emissions reduction benefits of building efficiency measures to better track CDA’s achievements in climate-altering fossil fuel consumption and resultant emissions.

REQUIREMENTS

Identify building performance parameters that reduce conventional energy use and emissions, quantify those reductions, and report them to a formal tracking program:

- Track and record emissions reductions delivered by energy efficiency measures, operational improvements, renewable energy and other building emissions reduction measures, including reductions from the purchase of renewable energy credits
- Report emissions reductions using a third-party voluntary reporting or certification program (e.g., EPA Climate Leaders, ENERGY STAR or World Resources Institute (WRI)/World Business Council Sustainable Development (WBCSD) protocols)
- Report emissions based on the international framework used to describe greenhouse gas emissions. The World Resources Institute’s Greenhouse Gas Reporting Protocol divides emissions into three categories:

  **SAM Credit 3.9.1:** Emissions are those Green House Gas’ (GHG) that are directly released on-site, such as combustion of fuels and the application of fertilizers on-airport. (1 point)

  **SAM Credit 3.9.2:** Emissions result from energy purchased from off-site sources where fuels are burned. (1 point)

  **SAM Credit 3.9.3:** Emissions include all other GHG-producing activities associated with the activities of an institution, including (2 points):

  - Commuting
  - Air travel for aviation management activities
  - Waste disposal
  - Embodied emissions from the extraction, production, and manufacturing of purchased goods

SUBMITTALS

Include descriptive narrative in SAM Checklist.
TECHNOLOGY/STRATEGY

CDA encourages tracking all project achievements to address all significant types of pollutants reduced by energy efficiency. Measure the following for:

SAM Credit 3.9.1

- Stationary fuel combustion (natural gas for heating)
- Mobile fuel consumption (vehicle fleet)
- Leakage (refrigeration, air conditioning, etc.)
- Fertilizers

SAM Credit 3.9.2

- Electricity generated off-site.

SAM Credit 3.9.3

- Commuting
- Travel
- Waste disposal
- Embodied emissions (extraction, production, & transportation of consumed goods)
- Food
- Office supplies
- Construction materials
- Miscellaneous (coffee mugs, t-shirts, etc.).

Standard Practice

None

Recommended Practice

- Install continuous metering equipment for the following end-uses:
  o Lighting systems and controls
  o Constant and variable motor loads
  o Variable frequency drive (VFD) operation
  o Chiller efficiency at variable loads (kW/ton)
  o Cooling load
  o Air and water economizer and heat recovery cycles
  o Air distribution static pressures and ventilation air volumes
  o Boiler efficiencies
  o Building-related process energy systems and equipment
  o Indoor water risers and outdoor irrigation

- Develop a Measurement and Verification plan that incorporates the monitoring information from the above end-uses and is consistent with Option B, C or D of the 2001

- Investigate whether these facilities will be included in the City of Chicago’s Global Building Monitoring System
- Consider the recommendations included in the Chicago Climate Action Plan

Best Available Practice

- Draft a Measurement & Verification Plan to apply during building operation that compares predicted savings to those achieved.

CASE STUDY

Emissions Reduction Strategy
Boston Logan International Airport – Boston, Massachusetts

Boston Logan initiated the voluntary Air Quality Initiative (AQI) implemented in 2001 with the goal of maintaining levels of nitrogen dioxide emissions associated with the airport at or below the levels from 1999. It is a 15-year program that has four primary commitments:

- Expand on existing initiatives at Logan. View the Air Quality Initiative Inventory Tracking of Nitrogen Dioxide Emissions for information on programs in place at place at Logan Airport when the Air Quality Initiative was developed
- Retire emissions credits giving priority to mobile sources in order to maintain nitrogen dioxide emissions at or below 1999 levels
- Report the status and progress in Massport's Environmental Data Report (EDR) and Environmental Status and Planning Report (ESPR)
- Continue working to decrease air emissions from aviation sources at both a national and international level.

www.massport.com/environment/environmental_reporting/Air%20Quality/EmissionsReductionStrategies.aspx
4.0 MATERIALS & RESOURCES

4.1.1 Waste Management: Waste Stream Audit

3 Points

INTENT

Facilitate the reduction of ongoing waste and toxins generated by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

REQUIREMENTS

Conduct a waste stream audit of the building’s, tenant’s and division’s entire ongoing consumables waste stream (not durable goods or construction waste for facilities alterations and additions). Use the audit’s results to establish a baseline that identifies the types of waste making up the waste stream and the amounts of each type by weight or volume. Identify opportunities for increased recycling and waste diversion. The audit must be conducted during the performance period.

SUBMITTALS

Include descriptive narrative and calculations in SAM Checklist.

TECHNOLOGY/STRATEGY

Understanding waste production patterns in a building is an important first step to waste reduction. Work with your waste hauler or service provider to collect and analyze information on the amounts and types of waste generated by the facility.

Standard Practice

None

Recommended Practice

- Use the results of the waste audit as a baseline for evaluating future recycling efforts. Analyze the results of the audit and identify targets for expanding the recycling program. Evaluate the capturing and recycling of specific wastes

Best Available Practice

- Create a Five Year Action Plan outlining waste reduction methods that will be undertaken in the coming years
CASE STUDIES

Airport Economizes on Food Residuals Collection Costs
Portland International Airport – Portland, Oregon

In January 2002, Portland International Airport conducted two waste characterization studies in order to gain a better understanding of its composition. The studies encompassed one hotel and two flight kitchens and revealed that 35 percent of their waste stream was made up of compostable materials. The waste audit concluded that the waste stream contained mostly coffee grounds, produce, baked goods, and prepared foods such as rice and noodles. From these waste studies, airport staff was able to determine equipment needs and food residuals diversion potential of the partner businesses.

As a result of these studies, the airport implemented a full-time composting program. PDX, along with its partners, divert approximately 7 tons of food waste every week. As of June 2011, the airport has 20 airport businesses, flight kitchens, and hotels participating in the program; in 2010, the program diverted an average of nearly 26 tons per month. Additionally, PDX developed, tested and implemented one of the first public food waste collection stations of any airport in the U.S. In Concourse D, PDX established a set of waste receptacles allowing its passengers to dispose of their leftover burgers, fries, cookies and salads to a composting facility. The station also features a drain for ice and liquids, trays, co-mingled recycling and trash.


Waste Audit and Composting Program
San Francisco International Airport – San Francisco, California

In 2009, SFO conducted a $15,000 waste audit to determine the percentages of recyclable and compostable materials in their waste stream. The study indicated that over 90% of the waste stream was comprised of compostable materials and recyclables. As a result, two pilot projects were conducted on source separation and food waste composting. The airport now maintains a full-time composting program.
4.0 MATERIALS & RESOURCES

4.1.2 Waste Management: Waste Reduction

2 to 6 Points

INTENT

Facilitate the reduction of waste and toxins generated from the use of products by building occupants and building operations that are hauled to and disposed of in landfills or incineration facilities.

REQUIREMENTS

Currently employed strategies that reduce the waste stream compared to baseline calculated in SAM Credit 4.1.1 Waste Management: Waste Stream Audit.

The waste reduction percentages for each point threshold are as follows:

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>Waste Reduction</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.2.1</td>
<td>10%</td>
<td>2</td>
</tr>
<tr>
<td>4.1.2.2</td>
<td>20%</td>
<td>3</td>
</tr>
<tr>
<td>4.1.2.3</td>
<td>30%</td>
<td>4</td>
</tr>
<tr>
<td>4.1.2.4</td>
<td>40%</td>
<td>5</td>
</tr>
<tr>
<td>4.1.2.5</td>
<td>50%</td>
<td>6</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative and calculations in SAM Checklist.

TECHNOLOGY/STRATEGY

Maintain a waste reduction and recycling program that addresses materials with a low cost per unit that are regularly used and replaced through the course of business, and maximize the diversion of materials that are also generated by facility alterations and improvements from disposal of landfills and incineration facilities. These materials include, but are not limited to:

- Paper
- Toner cartridges
- Glass
- Plastics
- Cardboard and old corrugated cardboard
- Food waste
- Metals
- Batteries
- Electronics
- Office equipment (computers, monitors, copiers, printers, scanners, and fax machines)
- Appliances (refrigerators, dishwashers, and water coolers)
- External power adapters
- Televisions
- Other audiovisual equipment

Actual diversion performance must be verified at least annually. Furniture, fixtures, and equipment (FF&E) are not considered base building elements and are excluded from this credit. Mechanical, electrical, and plumbing components and specialty items such as elevators are also excluded.

Maintain waste management policies applicable to any facility alterations and additions occurring on the site. Identify licensed haulers and processors of recyclable materials. Identify markets for salvaged materials. Employ deconstruction, salvage, and recycling strategies and processes. Document the cost for recycling, salvaging, and reusing materials. Make source reduction on the job site an integral part of the plan to reduce solid waste. Investigate salvaging or recycling lighting fixture pans when retrofitting.

**Standard Practice**

- Recycling of conventional products such as, but not limited to: paper, glass, etc.
- Battery and printer cartridge recycling programs are already in place in various locations.

**Recommended Practice**

- In addition to the standard practice include, but not limited to: light bulbs, batteries, electronics, landscape waste, automotive fluids, etc.
- Have a reuse or resale program for furniture and electronic goods
- Create a coordinated waste reduction program that makes used goods available to other entities
- Allow private salvage companies to access the site prior to demolition to avoid removal costs
- Establish waste reduction goals and specify construction and demolition waste management policies prior to demolition

**Best Available Practice**

- Establish a program that diverts waste streams to find an on-site use
- Develop a waste tracking system and have a designated sort area for all waste streams
CASE STUDIES

Sea-Tac Airport Recycling Program
Seattle-Tacoma Airport – Seattle, Washington

After expanding their bottle and can collection, the Sea-Tac added office paper collection. Based on the initial success, Sea-Tac has continued to grow their program, which now includes printer cartridges, batteries and coffee grounds.


Recycling Program
Denver International Airport – Denver, Colorado

In 2008, single-stream recycling was implemented and the airport placed 160 new containers placed through the common terminal areas. By 2010, the airport reduced the amount of waste per passenger sent to the landfill from 0.64 pounds per passenger to 0.41 pounds per passenger. The program includes participants from the Department of Aviation offices, tenants, food concessionaires, and the airlines. The airport has recycled the following items:

- 714 large batteries
- 2,030 pounds of other batteries
- 23,571 pounds of electronics
- 6,475 pounds of fluorescent bulbs
- 110,500 pounds of restaurant grease
- 1,375 gallons of antifreeze
- 819 tires
- 17,307 gallons of used oil


Call2Recycle
Chicago Department of Aviation – Chicago, Illinois

Call2Recycle is a free rechargeable battery and cellphone collection program that the Chicago Department of Aviation uses on a quarterly basis. Collection locations are available throughout the airport where employees deposit batteries and cellphones. This program diverts solid waste from the landfill and disposes of the items in a sustainable manner. Following CDA’s example, multiple tenants have expressed interest in joining the program.

http://www.call2recycle.org/
Semi-Annual Tenant Cleanup Events  
Portland International Airport – Portland, Oregon

Every six months, the PDX waste minimization team hosts tenant cleanup events where vendors and concessionaires gather material to either be broken down for recycling, salvaged or reused – a “swap meet for the airport tenant community.” In spring 2011, the team brought in an outside consultant to discuss waste minimization strategies and share reuse opportunities; through social networking and “speed-dating” activities, airport businesses are trading, selling or giving away items that might have once ended up in a landfill.


Waste Management  
Brussels International Airport – Brussels, Belgium

Brussels Airport has two waste collection centers for waste created in public areas, shops, restaurants and offices. They also maintain two collection centers for waste produced by technical facilities and cargo companies. At these collection points, trained staff records the flow of waste as well as supervise and assist with sorting.

4.0 MATERIALS & RESOURCES

4.2 Local/Regional Materials

1 to 3 Points

INTENT

Increase demand for materials and products that are extracted, harvested or recovered, as well as manufactured within the region, thereby supporting the local economy and the use of indigenous resources and reducing the environmental impacts resulting from transportation.

REQUIREMENTS

Demonstrate that materials and products purchased within the last year were obtained from local and regional sources.

Using materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% or 20% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. An additional point can be achieved if 50% of the materials are extracted, harvested, or recovered, as well as manufactured, within 250 miles of the project site.

The minimum percentages of local/regional materials for each point threshold are as follows:

<table>
<thead>
<tr>
<th>SAM Credit</th>
<th>Local/Regional Materials</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1</td>
<td>10%</td>
<td>1</td>
</tr>
<tr>
<td>4.2.2</td>
<td>20%</td>
<td>2</td>
</tr>
<tr>
<td>4.2.3</td>
<td>50% within 250 miles</td>
<td>3</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative and calculations in SAM Checklist.

TECHNOLOGY/STRATEGY

Establish an ongoing goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. Quantify the total percentage of local materials used by cost within the performance period. The product purchases shall follow Appendix AP-A – Green Product Listing.

Standard Practice

- The central location of Chicago makes many materials and products readily available
- Due to sole sourcing and limited availability, some specialty items may not meet the 500 mile criterion
Recommended Practice

- Identify all material and product purchases used on an annual basis for daily operations that are extracted, processed, or manufactured within 500 miles of Chicago. Materials that may contribute toward this goal include but are not limited to: plumbing and electrical supplies, landscaping materials, office supplies, automotive supplies, furniture, computers, appliances, cleaning products, etc.

Best Available Practice

None

CASE STUDY

Local and Regional Materials
Double Eagle II Airport – Albuquerque, New Mexico

Over 20% of building materials used on Double Eagle were extracted, processed, and manufactured regionally within 500 miles of the site. This supports local economies and encourages the use of indigenous resources reducing environmental impacts from transportation.

5.0 INDOOR ENVIRONMENTAL QUALITY

5.1 Prerequisite 1 – Outdoor Air Introduction and Exhaust Systems

Required

INTENT

Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in
buildings, thus contributing to the health and well-being of the occupants.

REQUIREMENTS

Choose one of the following options:

OPTION 1

Modify or maintain each outside air intake, supply air fan, and/or ventilation distribution system
to supply at least the outdoor air ventilation rate required by ASHRAE 62.1—2010 Ventilation
Rate Procedure under all normal operating conditions.

OR

OPTION 2

If meeting ASHRAE 62.1—2010 ventilation rates is infeasible because of the physical
constraints of the existing ventilation system, modify or maintain the system to supply at least
ten cubic feet per minute (cfm) of outdoor air per person under all normal operating conditions.

Demonstrate through design documentation, measurements, or other evidence that the current
system cannot provide the flow rates required by ASHRAE 62.1—2010 under any operating
condition even when functioning properly.

Each air-handling unit in the building must comply with either Option 1 or Option 2 above. If
some air-handling units can provide the outside airflow required by ASHRAE 62.1—2010 and
others cannot, those that can must do so. Buildings that cannot provide at least ten cfm per
person of outside air at each air-handling unit under all normal operating conditions cannot earn
this prerequisite.

Additionally, meet all the requirements below:

- Show compliance with the applicable requirement above (Option 1 or Option 2) through
  measurements taken at the system level (i.e., the air-handling unit). For variable air
  volume systems, the dampers, fan speeds, etc. must be set during the test to the worst-
  case system conditions (minimum outside airflow) expected during normal ventilation
  operations. Each air handler must be measured; sampling of air handlers is prohibited.
- Implement and maintain an HVAC system maintenance program to ensure the proper
  operations and maintenance of HVAC components as they relate to outdoor air
  introduction and exhaust.
- Test and maintain the operation of all building exhaust systems, including bathroom,
  shower, kitchen, and parking exhaust systems.
SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Conduct a visual inspection of outside air vents and dampers and remove any outside air vent or louver obstructions that restrict full outside air capacity from entering the distribution system. Conduct airflow monitoring to document outside air cubic feet per minute. Compare measured flow with designed flow for each unit.

Standard Practice

None

Recommended Practice

- Conduct airflow monitoring to document outside air cubic feet per minute. Compare measured flow with designed flow for each unit

Best Available Practice

- Monitor and adjust outside air flow using a Building Automation System (BAS)

CASE STUDY

Metasys System
Toronto Pearson International Airport – Toronto, Ontario

Maintaining comfort is challenging in a facility with large open spaces, glass exteriors and virtually constant in-and out traffic. The HVAC system throughout the terminals and ancillary facilities, including the parking structures, is controlled by the Metasys system, which provides a single-seat interface for monitoring and regulating multiple functions. This system operates on a campus wide-area network (WAN) configured as a dual-redundant fiber optic ring. Management and other authorized personnel can access the system from a central workstation or from their offices and from off-site, by way of the airport intranet.

http://www.johnsoncontrols.com/content/dam/WWW/jci/be/case_studies/Toronto_Airport__08.pdf
5.0 INDOOR ENVIRONMENTAL QUALITY

5.2 Prerequisite 2 – Environmental Tobacco Smoke (ETS) Control

Required

INTENT

Prevent or minimize exposure of occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

REQUIREMENTS

Prohibit smoking in the building and designate exterior smoking areas at least 25 feet from building entries, outdoor air intakes and operable windows.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Prohibit smoking in the building or provide negative-pressure smoking rooms

Standard Practice

- The State of Illinois prohibits smoking in almost all public spaces and workspaces
- The Chicago City Code Section 7-32-010 prohibits smoking within 15-feet of entry ways

Recommended Practice

None

Best Available Practice

None
5.0 INDOOR ENVIRONMENTAL QUALITY

5.3 High Performance Cleaning

2 Points

INTENT

Reduce the exposure of occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, and the environment.

REQUIREMENTS

Points are achieved for doing all of the following, as applicable:

Have in place during the performance period a high performance cleaning program that addresses the following:

- Purchase of sustainable cleaning and hard floor and carpet care products and equipment meeting the sustainability criteria outlined in SAM Credit 5.6 Green Cleaning. At a minimum, the program must cover the green cleaning materials that are within the CDA Division and tenant’s control.
- Establishment of standard operating procedures (SOPs) addressing how an effective cleaning and hard floor and carpet maintenance system will be consistently utilized, managed, and audited.
- Development of strategies for promoting and improving hand hygiene, including both hand washing and the use of hand sanitizers.
- Development of guidelines addressing the safe handling and storage of cleaning chemicals used within the space, including a plan for managing hazardous spills or mishandling incidents.
- Development of requirements for staffing and training of maintenance personnel appropriate to the need of the division or tenant. Specifically address the training of maintenance personnel in the hazards of use, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
- Provision for collecting occupant feedback and continuous improvement to evaluate new technologies, procedures, and processes.

SUBMITTALS

Include descriptive narrative in the SAM Checklist outlining details of a written high performance cleaning program.
TECHNOLOGY/STRATEGY

Over the performance period, have in place a high performance cleaning program addressing SOPs, sustainable products and equipment, chemical handling and storage, and staff training. Some additional items to consider include:

- Employ cleaning techniques that promote the most efficient use of products such as training on the proper amount of product to use and proper wiping motion for certain tasks
- Utilize cleaning techniques that promote the most efficient use of electricity such as working through areas and then turning off the lights in those areas and moving to another section instead of having all the lights on throughout the space for the entire shift
- Provide proper training on supply usage such as when to replace paper products and liners as not to throw away usable product. For example, office trash liners that may need emptying but not replacing when possible

**Standard Practice**

None

**Recommended Practice**

- See Appendix AP-A – Green Product Listing for a listing of products
- Utilize a High Performance Green Cleaning Program

**Best Available Practice**

None

**CASE STUDY**

**Green Seal Cleaning Products**
**Chicago Department of Aviation - Chicago, Illinois**

Both Chicago airports have implemented the sustainable initiative of using Green Seal certified cleaning products and eliminating the use of aerosol sprays to clean and disinfect airport facilities.

5.0 INDOOR ENVIRONMENTAL QUALITY

5.4.1 Indoor Air Quality (IAQ) Best Management Practices: IAQ Management Program

1 to 4 points

INTENT

Enhance indoor air quality by optimizing practices to prevent the development of IAQ problems in indoor spaces, correcting indoor air quality problems when they occur, and maintaining the well-being of the occupants.

REQUIREMENTS

Develop a plan that addresses the following items, where applicable.

Up to 4 points may be awarded by achieving any of the following measures:

<table>
<thead>
<tr>
<th>Technology/Strategy</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Remodeling and Renovation:</strong> Use effective strategies for materials selection and installation such as selection of low emitting and microbial resistant materials and isolate construction activity from occupants</td>
<td>1</td>
</tr>
<tr>
<td><strong>Painting:</strong> Establish a protocol for painting and ensure that protocol is followed by both in-house personnel and contractors that include the use of low VOC, fast drying paints where feasible, painting during unoccupied hours, and keep lids on paint containers when not in use</td>
<td>1</td>
</tr>
<tr>
<td><strong>Integrated Pest Management:</strong> See SAM Credit 1.5 Integrated Pest Management and Wildlife Deterrence</td>
<td>1</td>
</tr>
<tr>
<td><strong>Shipping and Receiving:</strong> Establish and enforce a program to prevent vehicle contaminants from entering the building by preventing idling of vehicles at the loading dock (post signs and enforce the ban), pressurizing the receiving area relative to the outside to ensure that contaminants from the loading area do no enter the building while making company supervisors aware of policy</td>
<td>1</td>
</tr>
</tbody>
</table>

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

The above requirements are based on the EPA Indoor Air Quality Building Education and Assessment Model (I-BEAM), EPA Reference Number 402-C-01-001, December 2002, available at [www.epa.gov/iaq/largebldgsl-beam/index.html](http://www.epa.gov/iaq/largebldgsl-beam/index.html).
During the performance period conduct an IAQ audit of the above requirements, where applicable to determine the IAQ status of a given indoor space. Identify and fix problems associated with poor IAQ. Immediately correct problems that can be addressed at no cost. For the remaining problems establish a plan that diagnoses and corrects the issues.

**Standard Practice**

None

**Recommended Practice**

- Control building’s relative humidity (below 50%) to limit mold and dust mites
- Exhaust areas of major indoor moisture sources instead of recirculating or dehumidifying the area
- Clean wet areas such as showers
- Remove and dispose of all carpeting, ceiling tiles, and other materials with signs of mold growth
- Provide entryways walk off mats, grates and grilles

**Best Available Practice**

None

**CASE STUDIES**

**Air Quality**

**Hong Kong International Airport – Hong Kong, China**

Hong Kong International Airport (HKIA) is committed to complying with statutory air quality criteria. HKIA provides the cleanest diesel and gasoline in the airfield area possible, replacing their entire vehicle fleet with electric or fuel efficient/ hybrid vehicles and have enforced a vehicle idling engine shutdown mandate since June 2008. HKIA has also strived to maintain a healthy environment for their passengers and staff by monitoring indoor air quality. The air inside Terminal 1 (T1) and Terminal 2 (T2) has received a Good Class certificate from the Environmental Protection Department.


**Passenger Health and Comfort**

**Indianapolis International Airport – Indianapolis, Indiana**

Radiant heating and cooling built into the flooring, along with other ventilation and temperature control features, continuously monitor indoor humidity and air quality. Use of volatile organic compounds (VOCs) and building materials using urea and formaldehyde was limited to reduce fumes and respiratory irritants for those with asthma and other respiratory conditions. Dust control at entryways and isolated use of cleaning products and chemicals to specially ventilated areas help maintain good indoor air quality. Smoking is not allowed inside or outside the airport’s terminal and other facilities.

5.0 INDOOR ENVIRONMENTAL QUALITY

5.4.2 Indoor Air Quality Best Management Practices: Outdoor Air Delivery Monitoring

1 point

INTENT

Provide capacity for ventilation system monitoring to help sustain occupants’ comfort and well-being.

REQUIREMENTS

Install permanent, continuous monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain minimum outdoor rates under all operating conditions.

Sensors must be tested and calibrated at least once every five years or per the manufacturer’s recommendation, whichever is shorter.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Install and maintain permanent ventilation monitoring systems that provide feedback on system performance to ensure minimum ventilation rates.

Standard Practice

None

Recommended Practice

- At least 80% of the building’s total outdoor air intake flow serving occupied spaces is monitored
- Monitoring system provides feedback to adjust outdoor air flow as needed

Best Available Practice

- Outdoor air delivery monitoring is tied to Building Automation System (BAS).
5.0 INDOOR ENVIRONMENTAL QUALITY

5.4.3 Indoor Air Quality (IAQ) Best Management Practices: Increased Ventilation

1 point

INTENT

Provide additional outdoor air ventilation to improve indoor air quality (IAQ) for improved occupant comfort, well-being and productivity.

REQUIREMENTS

Increase outdoor air ventilation rates for all air-handling units serving occupied spaces by at least 30% above the minimum required by ASHRAE Standard 62.1-2010 (with errata but without addenda).

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Use heat recovery, where appropriate, to minimize the additional energy consumption associated with higher ventilation rates.

Standard Practice

None

Recommended Practice

- Select and place air diffusers for all mechanically ventilated spaces, particularly office and passenger terminal spaces, following the recommended design approaches in the ASHRAE 2001 Fundamentals, Chapter 32, Space Air Diffusion
- Section 6 of ASHRAE 62.1-2010 outlines guidelines for determining ventilation rates for various applications of mechanical ventilation systems

Best Available Practice

- Increase air change effectiveness using the following strategies:
  - Displacement ventilation in passenger terminal areas.
  - Under floor air distribution in office areas.
- Operable windows and skylights in cargo buildings
- Increase air movement in cargo facilities with ceiling fans
- Install trickle ventilators in cargo facilities to provide natural winter ventilation
- Install relief vents or operable skylights in cargo facilities to provide stack effect natural ventilation
CASE STUDY

Displacement Ventilation System
San Francisco International Airport – San Francisco, California

Terminal 2 at San Francisco International Airport features an innovative “displacement ventilation” system that introduces fresh, filtered, cool air into the rooms near waist-level, pushing the older, warmer air to rise to the exhaust points. This system provides fresher air and uses over 25% less fan power than most ventilation systems.

www.greenbiz.com/blog/2010/05/06/green-design-takes-flight-san-francisco-international-airport
5.0 INDOOR ENVIRONMENTAL QUALITY

5.4.4 Indoor Air Quality (IAQ) Best Management Practices: Reduce Particulates in Air Distribution

1 point

INTENT

Reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants, which adversely affect air quality, human health, building systems and the environment.

REQUIREMENTS

Have in place filtration media with a minimum efficiency reporting value (MERV) of 13 or greater for all outside air intakes and inside air recirculation returns during the performance period. Establish and follow a regular schedule for maintenance and replacement of these filtration media according to the manufacturer's recommended interval.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Install and maintain filtration media with a particle removal effectiveness of MERV 13 or greater for all outside air intakes and returns for the recirculation of inside air. Establish and follow a regular schedule for maintenance and replacement of these filters.

Standard Practice

None

Recommended Practice

- Provide MERV 13 filters on all outdoor air intakes
- Create a maintenance schedule and log for filter replacement

Best Available Practice

None

CASE STUDY

Energy Recovery and Air Purification System
Reno Tahoe Airport – Reno, Nevada

High-efficiency particulate filters rated at 90% efficiency were installed to remove airborne particles. The system is periodically tested for effectiveness and replaced when fully saturated.

http://www.dectron.com/pdf/Case_Study_Reno_Tahoe_Airport.pdf
5.0 INDOOR ENVIRONMENTAL QUALITY

5.5.1 Occupant Comfort: Occupant Controlled Lighting

1 point

INTENT

Provide a high level of lighting control by individual occupants or specific groups in multi-occupant spaces (e.g., classrooms or conference areas) to promote the productivity, comfort, and well-being of building occupants.

REQUIREMENTS

Use lighting controls that enable adjustments to suit the task needs and preferences of individuals for at least 50% of individual workstations.

AND

Use lighting controls that enable adjustments for groups sharing a multi-occupant space or working area for at least 50% of multi-occupant space in the building.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Implement system and occupant control of ambient and task lighting to suit individual preferences and the needs of specific tasks.

Standard Practice

None

Recommended Practice

- Tie lighting in public areas of passenger terminals to flight schedules or use motion-activated lighting
- Design lighting control systems to take advantage of daylight harvesting to reduce artificial lighting when adequate daylight is available
- Design terminal areas to provide a variety of levels of light and sound in different areas simultaneously
- Provide operable windows in areas that are not noise-sensitive, such as cargo buildings
- Provide task lighting or more light switching zones in office areas

Best Available Practice

None
CASE STUDY

Lighting Management System
Toronto Pearson International Airport – Toronto, Ontario

The lighting management system at Toronto Pearson Airport integrates lighting management, an important function on a campus with annual electric bills totaling $18 million. Lighting management allows the airport to use natural light to the fullest extent possible without creating an inconvenience for staff. Lighting can be adjusted or switched off automatically based on natural lighting levels, building schedules, ATIMS information and other factors.

5.0 INDOOR ENVIRONMENTAL QUALITY

5.5.2 Occupant Comfort: Thermal Comfort Monitoring

1 point

INTENT

Support the appropriate operations and maintenance of buildings and building systems so that they continue to meet target building performance goals over the long term and provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

REQUIREMENTS

Have in place a system for continuous tracking and optimization of systems that regulate indoor comfort and conditions (air temperature, humidity, air speed and radiant temperature) in occupied spaces. Have a permanent monitoring system to ensure ongoing building performance to the desired comfort criteria as determined by ASHRAE SS—2004, Thermal Comfort Conditions for Human Occupancy.

The building must establish continuous monitoring of, at a minimum, air temperature and humidity in occupied spaces. The sampling interval cannot exceed 15 minutes.

- Require periodic testing of air speed and radiant temperature in occupied spaces. The use of handheld meters is permitted.
- Install alarms for conditions that require system adjustment or repair. Submit a list of the sensors, zone setpoints, and limit values that would trigger an alarm.
- Create procedures that deliver prompt adjustments or repairs in response to problems identified. All monitoring devices must be calibrated within the manufacturer’s recommended interval

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Implement systematic monitoring of the actual performance of the building to the comfort criteria defined by ASHRAE SS—2004.

As appropriate, monitoring may include measurement and trending of temperatures, relative humidity, air speed, and radiant temperatures at locations selected according to their variability and effect on occupants’ comfort.

Standard Practice

None
Recommended Practice

- Locate at least one temperature sensor in each HVAC zone
- Locate at least one humidity sensor in each humidity zone

Best Available Practice

- Tie thermal comfort monitoring systems into a Building Automation System (BAS)

CASE STUDY

Novar Controls System
101 North Tower – Phoenix, Arizona

By installing a building automation system (BAS) to replace older pneumatic controls, the tower enjoys central management, simpler operation, faster responses to any thermal comfort issues that occur, and significant energy savings. The 101 North Tower project includes cooling tower fans, chillers, air handling units, system pumps, and hundreds of dual duct VAV boxes. Novar Controls’ IQ controllers—running on a dedicated high-speed Ethernet network—manage all the building’s functions through Novar Controls’ 963 supervisor operator software.

5.0 INDOOR ENVIRONMENTAL QUALITY

5.6.1 Green Cleaning: Sustainable Cleaning Equipment

1 point

INTENT

Reduce the exposure of occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, and the environment.

REQUIREMENTS

Implement a program for the use of janitorial equipment that reduces building contaminants and minimizes environmental impact. The cleaning equipment program must require the following:

- Vacuum cleaners are certified by the Carpet and Rug Institute “Green Label” Testing Program for vacuum cleaners and operate with a sound level of less than 70dBA
- Carpet extraction equipment used for restorative deep cleaning is certified by the Carpet and Rug Institute’s “Seal of Approval” Testing Program for deep-cleaning extractors
- Powered floor maintenance equipment, including electric and battery-powered floor buffers and burnishers, is equipped with vacuums, guards and/or other devices for capturing fine particulates and operates with a sound level of less than 70dBA
- Propane-powered floor equipment has high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board (CARB) or Environmental Protection Agency (EPA) standards for the specific engine size and operate with a sound level of less than 90dBA
- Automated scrubbing machines are equipped with variable-speed feed pumps and on-board chemical metering to optimize the use of cleaning fluids; alternatively, the scrubbing machines use only tap water with no added cleaning products
- Powered equipment is ergonomically designed to minimize vibration, noise, and user fatigue
- Equipment is designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces
- Keep a log for all powered cleaning equipment to document the date of equipment purchase and all repair and maintenance activities and include vendor specification sheets for each type of equipment in use

SUBMITTALS

Include descriptive narrative in SAM Checklist.
TECHNOLOGY/STRATEGY

Develop, implement, and maintain a policy for the use of low-impact powered cleaning equipment. Evaluate the powered cleaning equipment currently being used and make a plan for upgrading to powered cleaning equipment that reduces building contaminants and minimizes environmental impact.

Standard Practice

None

Recommended Practice

- Utilize cleaning equipment that are designed to have a reduced environmental impact while maintaining performance of cleaning

Best Available Practice

- Carpet and Rug Institute approved vacuum and carpet cleaning equipment
- Electric and battery-powered floor buffers and burnishers that operate at less than 70dBA
- Low-emissions fossil fuel powered floor cleaning equipment that meets the California Air Resources Board (CARB) or Environmental Protection Agency (EPA) standards for the specific engine size and operate with a sound level of less than 90dBA
- Automated scrubbing machines are equipped with variable-speed feed pumps and on-board chemical metering to optimize the use of cleaning fluids
- Battery-powered equipment is equipped with environmentally preferable gel batteries
- Ergonomically designed equipment
- Equipment is designed with safeguards
- Keep a log for all powered cleaning equipment to document the date of equipment purchase and all repair and maintenance activities and include vendor specification sheets for each type of equipment in use
5.0 INDOOR ENVIRONMENTAL QUALITY

5.6.2 Green Cleaning: Entryway Systems

1 point

INTENT

Reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

REQUIREMENTS

Utilize entryway systems (grilles, grates, mats) immediately inside all public entryways within at least ten feet, the mats must be in place immediately inside all public entryways; exclude emergency exits from this requirement.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Use grills, grates or mats to catch and hold dirt particles and prevent contamination of the interior space. Design exterior stone, brick or concrete surfaces to drain away from regularly used entrances.

At entrances, install low-maintenance vegetation consistent with the requirements of SAM Credit 1.7 Landscape Management and avoid plants, including trees and shrubs that produce fruit, flowers or leaves that are likely to be tracked into the building. Select plants based on an integrated pest management (IPM) approach to eliminate pesticide applications that could be tracked into the building.

Provide a water spigot and electrical outlet at each public building entrance for maintenance and cleaning.

Standard Practice

None

Recommended Practice

- Utilize entryway systems (grilles, grates, mats) to reduce the amount of dirt, dust, pollen and other particles entering the building at all public entryways, and develop the associated cleaning strategies to maintain those entryway systems as well as exterior walkways. At least 10 feet of mats must be in place immediately inside all public entryways. Public entryways that are not in use or serve only as emergency exits are excluded from the requirements, as are private offices.
Best Available Practice

- Use grilles, grates, or mats to catch and hold dirt particles and prevent contamination of interior space.
- At public entrances, install low-maintenance vegetation within the landscape design and avoid plants, including trees and shrubs that produce fruit, flowers, or leaves that are likely to be tracked into the space. Base plant selection on an integrated pest management approach to eliminate pesticide applications that could be tracked into the space.
- Provide a water spigot and electrical outlet at each entrance for maintenance and cleaning.

CASE STUDY

Passenger Health and Comfort
Indianapolis International Airport – Indianapolis, Indiana

Dust control at entryways and isolated use of cleaning products and chemicals to specially ventilated areas help maintain good indoor air quality. Smoking is also not allowed inside or outside the airport’s terminal and other facilities.

6.0 INNOVATION IN OPERATIONS & MAINTENANCE

6.1 – 6.4 Innovation in Operations & Maintenance

1 to 4 points

INTENT

Provide building operations, maintenance, and upgrade teams with the opportunity to earn points for environmental benefits achieved beyond those already addressed by the SAM Operations & Maintenance Rating System.

REQUIREMENTS

Achieve significant, measurable environmental performance using an operations, maintenance, or system upgrade strategy not addressed in the SAM Operations & Maintenance Rating System.

SAM Credit 6.1. (1 point) Identify the intent of the proposed innovation credit, the additional environmental benefits delivered, the proposed requirements for compliance, and the proposed performance metrics to demonstrate compliance, and the approaches (strategies) that might be used to meet the requirements; meet the proposed requirements during the performance period.

SAM Credit 6.2 (1 point) same as Credit 6.1.

SAM Credit 6.3 (1 point) same as Credit 6.1.

SAM Credit 6.4 (1 point) same as Credit 6.1.

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

Implement and maintain over performance period actions that provide added environmental benefits. These can be actions that substantially exceed a current SAM O&M credit requirement or actions not addressed in SAM O&M that provide substantial added environmental benefits.

CASE STUDY

Active Water Leak Detection
Canberra Airport – Canberra, Australia

Water leakages typically account for 25% of water consumption in non-monitored buildings. Canberra Airport actively manages and monitors its water use, continuously searching for leakages or potential for leakages in its buildings. Water sub meters have been connected to all major uses, and newer buildings are electronically connected to a Building Management System, which provides alarms when leaks are detected. The Airport employs a licensed plumber and three full time irrigation experts to repair leaks and monitor water usage.

7.0 EDUCATION & TRAINING

7.1 Community Education

1 point

INTENT

Promote awareness of CDA Divisions and tenant environmental and sustainability initiatives.

REQUIREMENTS

Educate consumers/clients/public about the environmental stewardship committed to and results of the efforts.

SUBMITTALS

Include descriptive narrative in SAM Checklist of methods of community education.

TECHNOLOGY/STRATEGY

Provide and promote education through the following means that include, but are not limited to:

- Flyers
- Pamphlets
- Press Releases
- Signage
- Kiosks
- Workshops
- Conferences
- Websites
- CDA alerts (e-mail blasts)
- Public exhibits

Standard Practice

Many of these educational outreach programs are already implemented by the CDA and tenants. The internet is the primary outlet for promoting current programs in place by the tenants and CDA.

Recommended Practice

- Post environmental education information detailing the efforts of the CDA or tenant
- Promote customer participation in identifying initiatives that contribute to the CDA and tenant’s environmental goals
- Solicit suggestions from customers on how to improve CDA’s environmental and social programs
Best Available Practice

- Recognize and offer incentives to consumers/clients/public if they contribute to the CDA and tenant’s environmental goals
7.0 EDUCATION & TRAINING

7.2 Implement Employee Sustainability Training Program

1 Point

INTENT

In keeping with the spirit and intent of this Manual, it is strongly encouraged that companies working in support of CDA on any project establish and adopt their own employee training program.

REQUIREMENTS

Establish and implement an Employee Sustainability Training Program.

SUBMITTALS

Provide an electronic copy of the company’s Employee Sustainability Training Program and provide descriptive narrative on SAM Checklist documenting training sessions and their respective attendance numbers.

TECHNOLOGY/STRATEGY

As part of the Employee Sustainability Training Program a variety of topics should be covered to provide the employees with an overall understanding of the environmental responsibility that the CDA has committed to and how they can contribute to the organization meeting their sustainability goals. Through the development of a training program it will allow the CDA to provide consistent training to all employees and address facility specific issues.

Training is critical to the following, but not limited to:

- Missions and policies
- Opportunity to constantly be re-evaluated and improved
- Eco- more complex/more sophisticated systems and software
- Not yet a SOP, often requires a learning curve
- Addresses employee changeover
- Facilitates monitoring, tracking and reporting

Standard Practice

None

Recommended Practice

- Individual programs can be tailored to meet each company’s specific environmental goals and can include topics such as:
  - Corporate Sustainability Policy
  - Water Management Plan
- Waste Reduction
- Storage and Collection of Recyclables
- Composting or Re-use Options
- Managing and Disposing of Waste
- Systems management, including HVAC and other complex components

Best Available Practice
None

CASE STUDIES

Stationary Engineers of Local 399
Chicago Airport System – Chicago, Illinois

Recognizing the needs of Stationary Engineers to be responsive to the ever changing requirements of the industry, the Local 399 has instituted many training programs to educate their members in the latest technologies available. These training programs also include a focus on green initiatives and sustainability, indoor air quality, energy conservation, LEED (EB) and data center environments of critical systems to name a few.

Such training is meant to maximize operational efficiency while minimizing environmental impacts and provide measurable results that reflect operational cost savings to the owner.

www.iuoe399.org/

Environmental Stewardship Training Program
Dallas – Ft. Worth International Airport – Dallas, Texas

The training program solicits the participation of Dallas – Ft, Worth’s (DFW) 1,650 employees in an airport-wide commitment to environmental stewardship.

7.0 EDUCATION & TRAINING

7.3 Staff Training

1 point

INTENT

Support and encourage the operations, maintenance, upgrade, and project team integration required for SAM O&M implementation and to streamline the application and certification process.

REQUIREMENTS

At least one principal participant of the project team shall be LEED accredited (i.e., LEED Green Associate; LEED Accredited Professional).

SUBMITTALS

Include descriptive narrative in SAM Checklist.

TECHNOLOGY/STRATEGY

- Have someone in your organization study for and successfully complete the LEED accreditation exam or related program approved by the SRP
- Provide training for staff to handle day-to-day operations and maintenance involving sustainability, as related to this chapter

Standard Practice

None

Recommended Practice

- The Chicago Department of Aviation recommends that any operations and management team include a LEED AP on its staff to assist and oversee the administration of sustainable operations

Best Available Practice

None
8.0 MONITORING & REPORTING

8.1 Documenting Sustainable Measures

5 Points

INTENT

Track, document, report and promote the CDA’s Green Commitment and encourage divisions and tenants airport-wide to join the movement.

REQUIREMENTS

Identify a primary contact person for all sustainability-related tracking and communications.

AND

Complete the SAM Checklist in accordance with chapter guidelines.

SUBMITTALS

Complete the SAM Checklist. Include and submit the completed checklist, and submit any progress reports/annual reports that support this credit.

TECHNOLOGY/STRATEGY

Track operating costs to identify any positive impacts related to the sustainable performance improvements to the building and its operations. At a minimum include water, electricity and waste management data to document operating costs on an ongoing basis. Use this data to optimize consumption and waste from operations and identify potential areas of improvement in future checklist and performance periods.

Standard Practice

None

Recommended Practice

None

Best Available Practice

- Document overall operating costs (i.e., water/electricity/recycle) for the previous five years (or length of building occupancy, whichever is shorter) and track changes in overall building operating costs over the performance period. Document operating costs and financial impacts of all aspects of SAM O&M implementation on an ongoing basis.
CASE STUDY

Green Airport Initiative (GAI)
Fort Lauderdale-Hollywood International Airport – Fort Lauderdale, Florida

The Fort Lauderdale-Hollywood Green Airport Initiative is designed to help airports achieve quick and measurable benefits in environmental quality and energy savings. Broken down into two sections, the second section focuses on documenting cost impacts and identifies the many opportunities the airport will have in the future to reduce its environmental impact and operating costs.