



design and construction
GREEN GUIDE

**City of Phoenix
Aviation Department**

**Sustainable Horizontal
Design and Construction
Green Guide**



City of Phoenix

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Version 1 December 2010

Sustainable Horizontal Design and Construction Green Guide

Prepared for:

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Table of Contents

Section 1 – Overview	1-1
1.1 Intent	1-1
1.2 Sustainability Vision	1-1
1.3 Outline of the Green Guide	1-2
1.4 Structure of Sections 2, 3, 4 and 5	1-2
1.5 Structure of the Individual Performance Standards	1-3
1.6 Regulatory Requirements	1-3
1.7 Sustainable Rating System	1-3
Section 2 – Implementation	2-1
2.1 Applicability	2-1
2.2 Implementation Process	2-1
2.2.1 <i>Horizontal Design Phase</i>	2-2
2.2.2 <i>Horizontal Construction Phase</i>	2-3
Section 3 – Sustainable Horizontal Design (HD)	3-1
3.1 List of Horizontal Design Performance Standards	3-1
3.2 Horizontal Design (HD) Checklist	3-2
3.3 Certification Statement	3-3
3.4 Horizontal Design Performance Standards	3-4
Section 4 – Sustainable Horizontal Construction (HC)	4-1
4.1 List of Horizontal Construction Performance Standards	4-1
4.2 Horizontal Construction (HC) Checklist	4-2
4.3 Certification Statement	4-3
4.4 Horizontal Construction Performance Standards	4-4
Section 5 – Acronyms, Glossary and References	5-1
5.1 Acronyms	5-1
5.2 Glossary	5-2
5.3 References	5-5

List of Appendices

- A Sustainable Rating System
- B Internal Project Management Implementation Process
- C Acknowledgements

List of Figures

- 1 Implementation Process for Sustainable Horizontal Design
- 2 Implementation Process for Sustainable Horizontal Construction

Section 1 Overview

1.1 Intent

The City of Phoenix Aviation Department, Design and Construction Services Division (DCS) intends to reduce or avoid impacts from its construction process and to foster the development of sustainable projects at the three Phoenix airports.

By incorporating sustainable technology reviews into the project design process and low impact practices during construction, DCS will strive to reduce or avoid impacts to natural resources and neighboring communities. Additional benefits of this initiative are through the long-term reduction of resource use and operating costs.

1.2 Sustainability Vision

The DCS vision statement for this initiative is:

“DCS will perform design and construction activities in harmony with the community and the environment we live and work in, balanced by scope, schedule and budget.”

The Aviation Department will be consistent with the sustainability initiatives developed by the City of Phoenix for “vertical” or building construction through the implementation of Leadership in Energy and Environmental Design (LEED®) standards. The Green Guide has been developed for “horizontal” construction projects, i.e. non-building design and construction, where LEED does not apply.

Section 2 of this document (Implementation) will assist the Project Delivery Team by guiding in the selection of appropriate Performance Standards for each project to achieve the highest sustainability level possible. The full text Performance Standards located in Sections 3 and 4 present appropriate measures for the design and the subsequent construction of facilities and infrastructure at the City of Phoenix airports.

Section 5 is a glossary of terms used and a list of references.

Like LEED, this is a performance-based system where credits are earned for satisfying criteria designed to address specific environmental impacts inherent to the project design and construction. Moreover, the Performance Standards encourage the review of new technologies and initiatives for consideration into the project.

Green Guide Objectives:

- Foster the development of a more sustainable project
- Identify additional recycling, reuse and waste minimization opportunities
- Increase energy conservation
- Reduce construction noise to adjacent communities
- Utilize locally available resources
- Develop Life Cycle Cost analysis when choosing materials and systems
- Review opportunities for increased public transportation options during projects
- Develop designs that promote water conservation
- Maximize flexibility in the developed infrastructure toward future needs
- Promote sustainability awareness and education to all stakeholders

1.3 Outline of the Green Guide

The following Sections and Appendices are intended to guide Project Delivery Teams in the successful implementation of the DCS Green Guide for non-LEED projects:

- Section 2 - Implementation
- Section 3 - Sustainable Horizontal **Design** Checklist and Performance Standards
- Section 4 - Sustainable Horizontal **Construction** Checklist and Performance Standards
- Section 5 - Acronyms, Glossary and References
- Appendix “A” outlines the Sustainability Rating System.
- Appendix “B” is developed as a Guide for City of Phoenix Project Managers.
- Appendix “C” includes Acknowledgements.

1.4 Structure of Sections 2, 3, 4 and 5

Following Section 2 on Implementation, the Green Guide is organized by the natural progression of a project. The Sustainable Horizontal Design (HD) Performance Standards are in Section 3, and are intended to be used by the engineer during the design phase. The Sustainable Horizontal Construction (HC) Performance Standards are located in Section 4, for the project contractor.

Section 3 contains the following information:

Sustainable Horizontal Design (HD)

- List of HD Performance Standards – To assist in finding the desired Performance Standard.
- Checklist – To chart progress while striving to meet the desired sustainability level, as well as to be used at the end of each phase of the project to tally the points achieved and certify the information submitted to DCS.
- Certification Statement – To be submitted when a Performance Standard is met and complete documentation has been submitted to DCS.
- Performance Standards – Full text of the HD Performance Standards, providing information to meet the required actions and points.

Section 4 contains the following information:

Sustainable Horizontal Construction (HC)

- List of HC Performance Standards – To assist in finding the desired Performance Standard.
- Checklist – To chart progress while striving to meet the desired sustainability level, as well as to be used at the end of each phase of the project to tally the points achieved and certify the information submitted to DCS.
- Certification Statement – To be submitted when a Performance Standard is met and complete documentation has been submitted to DCS.
- Performance Standards – Full text of the HC Performance Standards, providing information to meet the required actions and points.

Section 5 is a list of acronyms, a glossary and references used in the Green Guide.

1.5 Structure of the Individual Performance Standards

Each Performance Standard, whether for HD or HC, is divided into the following sections:

- *Intent* - This is the primary motivation for implementing the sustainability Performance Standard. The most sustainable projects will be planned, designed and built around the intent of the Performance Standard rather than focusing on the number of points that can be achieved. While not all Performance Standards will be applicable to every project, Project Delivery Teams are encouraged to think creatively and to consider the intent of each Performance Standard and whether that intent can be achieved.
- *Required Actions for Credit* - This section outlines the activities, metrics and targets that are required by the Performance Standard to achieve the points associated with the Performance Standard. Targets may dictate the incremental performance improvement over a baseline, or a quantifiable percentage that must be achieved. In other cases, achievement of the Performance Standard will be measured on a scale by the accomplishment of a specific milestone or task.
- *Strategies* - This section includes suggestions on techniques and practices to achieve the requirements of the Performance Standard. Users may choose additional strategies that are not listed, but they must meet or exceed the intent of the Required Action and Documentation sections outlined in the Performance Standard.
- *Required Documentation* - This section outlines the documentation that is required to be submitted to achieve the Performance Standard.
- *Credits* - This section identifies the total number of points available from the implementation of the Performance Standard. In some instances, points are allocated according to a schedule of achievement.
- *Benefits* - The potential environmental, economic and social benefits resulting from the implementation of each Performance Standard also serves as motivation for incorporating sustainable design and construction practices into projects.
- *References* - This section includes references to helpful documents or websites that may be used to achieve the Performance Standard.

1.6 Regulatory Requirements

The design and construction of buildings and infrastructure at airports are subject to local, state and federal regulations. The Green Guide is meant to supplement the existing regulatory and code requirements of federal, state or local regulatory agencies. The Green Guide does not negate existing standards, regulations or codes currently in place or adopted by the State of Arizona or the City of Phoenix.

1.7 Sustainable Rating System

The Green Guide includes a Rating System to measure the level of achievement of the sustainable design and construction activity Performance Standards. For the design phase, Design Points (DPs) are awarded. Similarly, for construction, Construction Points (CPs) are awarded. For each Performance Standard that is achieved, an allocation of points will be awarded. Separate sustainability levels for the Horizontal Design and the Horizontal Construction phases will be awarded at completion of the project.

Sustainable levels for achieving certification for both HD and HC phases are described in Appendix A.

Section 2

Implementation

2.1 Applicability

This section provides information to assist the Project Delivery Team in navigating the Green Guide. It will provide direction in selecting the appropriate Performance Standards for the project to achieve the highest sustainability level attainable for each project. The Green Guide was developed to follow the outline of the LEED® standards, and in limited instances, reference LEED guidance. Therefore, it is expected that the project team will be familiar with LEED® standards and that a member of the team will be a LEED® Accredited Professional (LEED-AP) to assist in the project.

2.2 Implementation Process

For the successful implementation of the Green Guide, a review of the process outlined in Section 2.2.1 is advised for projects in the design phase. For projects in the construction phase, Section 2.2.2 outlines the process for using the Green Guide for construction projects.

2.2.1 Horizontal Design Phase

The following steps should be followed for Design Projects:

1. Identify the City's desired initiatives and goals for the project or any specific Performance Standards that should be examined. In the earliest stage of the project, specifically during the development of project definition and scope, the Project Delivery Team and other interested stakeholders should have ready a selection of Performance Standards the designer deems appropriate to the project. In addition, at the first opportunity, the project LEED-AP should be identified.
2. Note that many of the Design Performance Standards require that an analysis be completed by the designer for an initiative, often with a cost/benefit summary for review and project consideration by the City project manager. Those chosen will be used as a basis of design. It is important that those chosen Performance Standards be fully researched early in the design process for incorporation into the design.

An integrated design process will enable the Project Delivery Team to achieve thoughtful, sustainable design with limited or no impact to the budget and schedule. The objective is to balance the sustainability goals and strategies with design and construction requirements to find integrated solutions (not tradeoffs or compromises) to conflicts that may arise.

3. Other initiatives will call for development by the designer of construction specifications for later action or product purchases. The developed contractor specifications should clearly describe the intended action or materials to be purchased.

4. The Project Delivery Team needs to document their evaluation and selection of appropriate project Performance Standards by using the Horizontal Design Sustainability Checklist. The Checklist will be used as a guide in determining the level of sustainability possible for the project (see Appendix A for a description of the sustainable certification levels). The Checklist summarizes the Performance Standards, which have corresponding point allocations regarding achievement.
5. Consult with the DCS project manager to gain concurrence on the required sustainability level. To assist in setting and measuring progress toward the project, the checklists should be used during discussions with the City's project manager and at project kick-off. The Checklists will help to identify and record the sustainability goals and selected technical strategies for the project.
6. During the discussion with DCS, the appropriate interval for submittal of progress information will be determined. The Project Delivery Team may deem that quarterly submittals are appropriate for those initiatives without specifically listed submittal frequencies; however, if the project is fast-paced, a submittal schedule based on milestones may be preferred. At a minimum, a status of the Performance Standards under review or being incorporated will be given at 30/60/90% design completion.
7. Following the initial project scoping, continued review of the Performance Standards and Checklist throughout the design phase will help to ensure that the sustainability goals are met as the project progresses. This step will be followed until the completion of the design phase of the project.
8. Submit progress checklists with appropriate documentation at the predetermined interval. Each submittal should include the following information:
 - a. Sustainable Horizontal Design (HD) Checklist. The Checklist should be used to track progress in achieving the sustainability goals. Note the columns to track status where "analysis (is) under development by consultant" and "waiting on City approval of analysis or plan". Certification Statements of completed Performance Standards, if applicable.
 - b. Memo with the following information:
 - i. Update on project status – what has changed, deadlines, etc.
 - ii. Intended sustainability level
 - iii. Track progress – What Performance Standards have been met, can be met, cannot be met
 - iv. Number of points achieved and pending
 - v. Performance Standard submittals reviewed and approved by DCS
9. Please highlight those Performance Standard actions that will be done in parallel with the construction contractor, such as going to pre-bid meetings, review of contractor materials purchased, etc.
10. It is the responsibility of the Project Delivery Team to update this information and provide it to DCS. DCS will then review any developed studies or analysis as required by the selected Design Performance Standards and approve the incorporation of an initiative into the design. Alternatively, the City project manager may provide concurrence that a certain Performance Standard has been completed, or advise on what else may be provided as documentation and request additional information.
11. Upon completion of the design phase of the project, the final Checklist must be signed and submitted. Any additional documentation, such as follow-up requirements and signed certification statements, must be submitted. DCS will complete its final evaluation of the project design phase and determine or confirm the project's sustainability level.

2.2.2 Horizontal Construction Phase

The following steps should be followed for Construction Projects:

1. In the earliest stage of the project, specifically during pre-project planning, the contractor's Project Delivery Team should review the Construction Performance Standards and their required actions. The contractor must then select the Performance Standards which they deem most appropriate for implementation on the project. Also, at the first opportunity, identify the construction team's LEED-AP.
2. Discuss with the DCS project manager the sustainable certification level goal and any Performance Standards specifically required by DCS, or those specified in the design documents for the construction phase of the project. Determine project sustainability goals responsibilities and actions by engaging members of the Project Delivery Team, including subcontractors and DCS.
3. The Project Delivery Team will summarize their selected Performance Standards and use the Horizontal Construction Checklist to develop the level of sustainability possible for the project (see Appendix A for a description of the sustainable certification levels). The Checklist summarizes the Performance Standards, which have corresponding point allocations regarding achievement. Consult with the DCS project manager to gain concurrence on the proposed sustainability level.
4. Note that many of the Construction Performance Standards require the development and submittal of plans before the project is given a NTP. It is important that those initiatives be fully developed early in the project so that all appropriate resources are set in place. Likewise, some requirements (such as construction debris recycling) may best be specified as a condition in subcontractor documents. Integrate the required actions into the construction process to enable the project team to achieve thoughtful, sustainable construction efforts with no, or limited, impact to the budget and schedule.
5. To assist in measuring progress toward the project, the Checklist should be used at project kick-off and in all discussions with the City project manager to track the sustainability goals.
6. During the discussion with DCS, determine the appropriate interval for submittal of progress information. The Project Delivery Team may deem that monthly submittals are appropriate for those initiatives without specific submittal dates; however, if the project is fast-paced, a submittal schedule based on milestones may be a better fit. At a minimum, a status of the Performance Standards actions will be given at 30/60/90% completion.
7. Following the initial project evaluation, continued review of the Performance Standards and Checklist throughout the construction phase will help to ensure that the sustainability goals are met as the project progresses. This step will be followed until the completion of the construction phase of the project.
8. Submit progress reports and appropriate documentation on the predetermined interval. Each submittal should include the following information:
 - a. Sustainable Horizontal Construction (HC) Checklist. The Checklist will be used to track progress in achieving the sustainability goals. Note the Checklist includes columns to track submittals, including (submitted and) "waiting on City approval of analysis or plan".
 - b. Certification Statements of completed Performance Standards, if applicable.
 - c. Memo with the following information:
 - i. Update on project status – what has changed, deadlines, etc.
 - ii. Intended sustainability level
 - iii. Track progress – what Performance Standards have been met, can be met, cannot be met
 - iv. Number of points achieved and pending
 - v. Performance Standard submittals reviewed and approved by DCS

9. It is the responsibility of the Project Delivery Team to update this information and provide it to DCS. DCS will then review the information as required by the Performance Standards. DCS will provide concurrence that a certain Performance Standard action has been completed, or advise on what else may be provided as documentation and request additional information.
10. Upon completion of the construction phase of the project, the final Checklist must be signed and submitted. Any additional documentation, such as follow-up requirements and signed certification statements, must be submitted. DCS will complete its final evaluation of the project construction phase and determine or confirm the project's sustainability level.
11. Certification level is awarded upon completion of the construction phase or any required follow-up – whichever is later.

Section 3

Sustainable Horizontal Design (HD)

3.1 List of Horizontal Design Performance Standards

Administrative

- HD-AD-1 LEED® Accredited Professional with Pavement Design Experience - Roles and Responsibilities
- HD-AD-2 Environmentally Preferred Purchasing
- HD-AD-3 Low Impact Development

Pavements

- HD-PV-1 Subgrade Materials Enhancement, Supplements, Review, Engineering and Testing
- HD-PV-2 Long Life Pavement
- HD-PV-3 Alternative and Innovative Pavements
- HD-PV-4 Maximize Recycling and Reuse of Existing Pavements and Materials

Lighting, Mechanical and Utility Systems Design

- HD-LM-1 Lighting Technologies Review and Energy Conservation Return on Investment
- HD-LM-2 Mechanical Technologies Review and Energy Conservation Return of Investments
- HD-LM-3 Flexibility and Reusability Reviews

Landside Site Design

- HD-LD-1 Urban Design Principals: Pedestrian Comfort, Urban Heat Island and Increased Connectivity
- HD-LD-2 Landscape to Reduce Irrigation Needs and Urban Heat Island Effect (non-roof)

Parking Lots and Structures

- HD-PS-1 Surface Parking Lots
- HD-PS-2 Parking Structures

Innovation

- HD-ID-1 Innovation in Design

3.2 Horizontal Design (HD) Checklist

Yes	Maybe		No	Possible Points	Performance Standard	Performance Standard Title	Notes
	SM	DM					
Administrative							
				Required	HD-AD-1	LEED® Accredited Professional with Pavement Design Experience - Roles and Responsibilities	
				1	HD-AD-2	Environmentally Preferred Purchasing	
				1	HD-AD-3	Low Impact Development	
0	0	0	0	2			
Pavements							
				2	HD-PV-1	Subgrade Materials Enhancement, Supplements, Review, Engineering and Testing	
				2	HD-PV-2	Long Life Pavement	
				2	HD-PV-3	Alternative and Innovative Pavements	
				Multiple	HD-PV-4	Maximize Recycling and Reuse of Existing Pavements and Materials	
				1		Recycle 25% to 50% of materials	
				1		Recycle 51% to 75% of materials	
0	0	0	0	8			
Lighting, Mechanical and Utility Systems Design							
				2	HD-LM-1	Lighting Technologies Review and Energy Conservation Return on Investment	
				2	HD-LM-2	Mechanical Technologies Review and Energy Conservation Return on Investments	
				2	HD-LM-3	Flexibility and Reusability Reviews	
0	0	0	0	6		TOTAL	
Landside Site Design							
				Multiple	HD-LD-1	Urban Design Principals: Pedestrian Comfort, Urban Heat Island and Increased Connectivity	
				1		Develop report and review two urban design principles for project	
				1		Develop report and review four urban design principles for project	
				2		Successful implementation of at least two approved pedestrian comfort designs	
				Multiple	HD-LD-2	Landscape to Reduce Irrigation Needs and Urban Heat Island Effect (non-roof)	
				2		Reduce potable water use for landscaping irrigation	
				1		Eliminate potable water use for landscaping irrigation	
0	0	0	0	7		TOTAL	
Parking Lots and Structures							
				Multiple	HD-PS-1	Surface Parking Lots	
				1		Analyze listed Required Actions	
				2		Design all City project manager approved initiatives	
				Multiple	HD-PS-2	Parking Structures	
				1		Analyze listed Required Actions	
				2		Design all City project manager approved initiatives	
0	0	0	0	6		TOTAL	
Innovation							
				Variable	HD-ID-1	Innovation in Design	
0	0	0	0				
0	0	0	0			GRAND TOTAL (Selected Performance Standard points plus Innovation points)	
SM - Submittal Maybe - Analysis under development by contractor; attempting as a Yes for approval from City.							
DM - Decision Maybe - Waiting on City approval of analysis or plan.							

3.3 Certification Statement

CERTIFICATION STATEMENT

FOR THE SUBMISSION OF DOCUMENTATION TO RECEIVE CREDIT FOR ACHIEVEMENT OF THE PERFORMANCE STANDARDS INCLUDED IN THE SUSTAINABLE DESIGN AND CONSTRUCTION GREEN GUIDE

For airport projects, the Sustainable Design and Construction Green Guide (Green Guide) is required to be implemented throughout the project life cycle. As part of the Green Guide implementation process, Project Delivery Teams are obligated to submit documentation as verifiable evidence that the requirements of the performance standards included in the Green Guide were met for the project. This Certification Statement must be submitted in conjunction with all relevant and required documentation in order to receive credit for the actions taken to accomplish each performance standard for the project.

"I certify, based upon my knowledge, information and belief obtained from my personal observation and observation of the staff under my direct supervision, that the requirements for the performance standard listed below were met for the indicated project below and that all relevant and required documentation is contained herein.

Project Name

Project Location

Contractor or Entity Responsible for Project

Performance Standard Name and Number

PREPARED BY:

Printed Name

Title

Signature

Date

APPROVED BY:

Printed Name

Title

Signature

Date

3.4 Horizontal Design Performance Standards

<p>Administrative Performance Standard 1 – LEED® Accredited Professional with Pavement Design Experience – Roles and Responsibilities</p>	<p>AD-1 (0 points) Required</p>
<p>Intent Support and encourage the integration of sustainable concepts and practices into the design process with the inclusion of LEED® Accredited Professionals (AP) on the Design Team. The LEED-AP will assist the team in researching, developing and integrating sustainable innovations into the project design.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ At least one (1) principal participant of the project team shall be a LEED-AP and shall be designated as a sustainability coordinator for the design project. They will be responsible for the following: <ul style="list-style-type: none"> – Conducting an Initial Sustainability Project Planning Meeting to facilitate discussion of the project sustainability goals, the identification of Guideline points and ideas for research; AND – Provide any sustainability training needed and facilitate the setting of expectations for the level of sustainability performance for the design project; AND – Integrate chosen Performance Standards progress into project schedules, including at 30%, 60% and 90% design completion; AND – Prepare regular Progress Reports on sustainability initiatives research, including all life-cycle and cost analyses, for submittal to the City for review; AND – Help resolve potential time-sensitive review conflicts; AND – Provide management and tracking methods for the sustainability goals, document sustainability improvements to the design and coordinate communication with the City project manager on sustainable initiatives. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Assign one or more project team members to take the LEED® Professional Accreditation Exam, if not certified already, or hire a LEED-AP to be an integral part of the project team. ■ Assign the LEED-AP to facilitate the review of sustainable concepts and practices that are appropriate for the design and the application of the Guidelines early in the project life cycle with team members. ■ Assign the LEED-AP to lead an integrated design team approach to ensure the dynamic monitoring of sustainability goals and assignments. ■ Include training on sustainability during the Initial Sustainability Project Planning Meeting including their basis, the parties responsible for using the Guidelines and the rating system. ■ Complete the Sustainability Checklists as part of the initial meeting for planned points. ■ Form a “Sustainability Team” that will be responsible for managing the integration of selected sustainability performance standards into the design deliverables. ■ Establish a regular meeting schedule. ■ Submit life-cycle cost analyses for consideration to the City project manager prior to selection of any design. ■ Establish a project tracking system to document milestones and points achieved. ■ Consider early involvement of the construction contractor to assist in the review of design evaluations and selections.

Administrative Performance Standard 1 – LEED® Accredited Professional with Pavement Design Experience – Roles and Responsibilities	AD-1 (0 points) Required
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide the following documentation at the start of the project: <ul style="list-style-type: none"> – Name of the LEED-AP and their company – Brief description of the LEED-AP’s project role(s) and prior experience – Copy of the LEED-AP certificate ■ For the Initial Sustainability Project Planning Meeting and each Project Sustainability Progress Meeting, provide: <ul style="list-style-type: none"> – Agenda – Meeting materials (e.g., handouts, presentation slides, etc.) – Meeting minutes – Attendance lists including name, company, department, role on the project and contact information – Draft Guidelines checklist ■ Regular Progress Reports ■ Documentation that the goals of the identified sustainability projects were met, including completed checklist and all analysis developed for sustainable measures. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Prerequisite to have at least one (1) LEED-AP with appropriate design experience on the Design Team to support the Project Sustainability requirements.
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. The LEED-AP for the project will assist in achieving the successful implementation of the chosen performance standards. ■ Economic Considerations <ol style="list-style-type: none"> 1. Monitors progress through the design phase and identifies conflicts early to reconcile overall project and sustainability objectives. 2. Shares “lessons learned” to benefit the project and aid in the avoidance of Stop Work incidents, Change Orders and other potential obstacles and setback that could increase project costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Provides in-house expertise and experiences in coordinating the documentation process similar to that required for Aviation Department sustainable certification. 2. Provides incentives to track and focus on achieving sustainability goals. 	
<p>Resources</p> <p>Information on how to receive LEED® Professional Accreditation: www.usgbc.org/DisplayPage.aspx?CMSPageID=1815</p>	

<p>Administrative Performance Standard 2– Environmentally Preferred Purchasing</p>		<p>AD-2 (1 point)</p>
<p>Intent Encourage the use of products that reduce, minimize or eliminate environmental and health impacts associated with the manufacture, use and/or disposal of such products. Review and specify environmentally preferable products (EPP) in design specifications where appropriate.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Suggest and gain City project manager approvals for EPPs when their cost and performance are acceptable substitutes; AND ■ Include green procurement language in contractor and subcontractor contracts where acceptable products are approved; AND ■ Substitute EPPs in the design specification whenever they are reasonably equal in performance and cost-effectiveness based on the product’s life-cycle cost, which includes the purchase, operating and disposal costs associated with purchases. EPPs include, but are not limited to: <ul style="list-style-type: none"> – Energy efficient lighting fixtures (e.g., LED exit signs) – Products with a high recycled content or are highly recyclable after use (e.g., recycled plastic outdoor products) – Less or non-toxic products (e.g., bio-based lubricants) – Low-petroleum products 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Eliminate non-EPP alternatives wherever feasible and cost-effective. ■ Identify environmental and cost saving opportunities through product life-cycle cost assessments. ■ Track and record EPP substitution reviews for the project. ■ Designate a member of the Project Team to stay informed on EPP issues, receive ongoing information and disseminate such information to the rest of the Project Team. ■ Research EPPs as alternatives for typical products and when appropriate, specify these products in the specifications for the design. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ A narrative discussing all EPPs reviewed for the project and copies of all life-cycle cost analyses of those EPPs, including Material Safety Data Sheets (MSDS), cut sheets and other product specification showing effectiveness and environmental characteristics of the EPPs. ■ Documentation of the selected EPPs called-out in the construction specifications and the percentage of EPPs selected for use in the design. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for selecting and documenting selection of EPPs as effective substitutes for the design. 	

Administrative Performance Standard 2– Environmentally Preferred Purchasing	AD-2 (1 point)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduce environmental and health impacts associated with products, including conservation of natural resources, reductions in energy consumption and elimination of toxic materials from the waste stream. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduce construction costs with the purchase of less expensive environmentally preferable products. 2. Reduce long-term maintenance and operational costs for the project. ■ Social Considerations <ol style="list-style-type: none"> 1. Promote the increased production of environmentally preferable products, expand their availability, improve their performance and reduce their cost. 	
<p>Resources</p> <p>USEPA, Environmentally Preferable Purchasing (EPP) includes information on federal guidelines regarding EPP and has good information on how to find EPP products: www.epa.gov/epp/</p> <p>State of California Best Practices Manual for Environmentally Preferable Purchasing: www.green.ca.gov/EPP/Introduction/default.htm</p> <p>See Program Area #6: Environmentally Preferable Purchasing in the Agency Sustainability Planning and Implementation Guide, Commonwealth of Massachusetts State Sustainability Program: www.mass.gov/Eoaf/docs/dcam/mafma/manuals/sustainability_planning_and_implementation_guide.pdf</p>	

Administrative Performance Standard 3– Low Impact Development		AD-3 (1 point)
<p>Intent Minimize the impact of development on the project site and avoid development of areas that contain rare or valuable attributes that would be irretrievably lost in the development process. Protect the existing infrastructure, including utilities and groundwater monitoring wells.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> – Check to ensure that a historic and archeological review of the project site has been completed by the City project manager, and if areas to be left undisturbed are indicated; AND – Develop a project site map for the design and for use by the construction contractor. The site map will outline topographic and landscape features to be preserved, existing utilities and monitoring wells to be avoided and any areas off-limits to the construction contractor; AND – On new development sites, restrict site disturbance to the extent practical by limiting the project area. Outline acceptable staging areas and access roads for the construction project; AND ■ Review the site and the drainage capacity of the storm sewers. Determine if on-site percolation for some or all of the site run-off is feasible. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Perform a topographical analysis of the site. Strive to maintain natural topographic configuration and identify landscape features for preservation during site design for landside design projects. Design your project around these features, as approved by the City project manager. ■ Introduce drainage features as part of development if indicated at the site. ■ Create detailed site work plan showing areas to be preserved by the construction contractor. Attend pre-bid contractor meetings to discuss the features to be preserved. ■ Call out clean-cut or trenchless technology when installing utility conduits. ■ Use the Aviation Department’s Wildlife Management Plan approved vegetation for any landscaped areas. ■ Donate removed plants and trees, if allowed by the contract. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ A copy of the archeological and historic review letter from the City Archeologist. ■ Documentation that only the approved vegetation pallet in the Aviation Department’s Wildlife Management Plan has been used. ■ Narrative documentation along with pertinent maps and site plan clearly showing limits of disturbance and development, features and existing utilities including monitoring wells and methods to ensure their continued integrity. ■ Analysis used to determine if stormwater run-off could, and should, be retained on-site. ■ The narrative should also include an explanation of the approach used to achieve this performance standard, including special site attributes or challenges. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for restricting site disturbance to the extent practicable, successful implementation of the required actions and submittal of required documentation. 	

Administrative Performance Standard 3– Low Impact Development	AD-3 (1 point)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Limits environmental impact from development. 2. Encourages infill development. 3. Green roof options can improve stormwater management, habitat quality and energy performance in urban areas. ■ Economic Considerations <ol style="list-style-type: none"> 1. Minimizes time and budget allotted to permitting. 2. Avoids or minimizes the costs of mitigation measures. 3. Limits Change Orders and Stop Work incidences associated with permit conditions that could potentially increase project costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Provides a higher likelihood of public support and expedited public review process. 2. Onsite natural areas improve site aesthetics 	
<p>Resources</p> <p>The Low Impact Development Center, Inc. website includes information on “low impact development” as a new, comprehensive land planning and engineering design approach. www.lowimpactdevelopment.org/</p> <p>The Environmental Protection Agency (USEPA) provides information on low impact development approaches to manage stormwater as close to its source as possible. www.epa.gov/owow/NPS/lid/</p> <p>The U.S. Department of Housing and Urban Development (HUD) Office of Policy Development and Research provides a publication entitled “The Practice of Low Impact Development”. While the document is intended to assist the housing industry during the land development process, it provides useful information on technologies that affect both the cost impacts and environmental issues associated with land development. www.huduser.org/publications/pdf/practlowimpctdevel.pdf</p>	

Pavements Performance Standard 1 – Sub-Grade Materials Enhancement, Supplements, Review, Engineering and Testing		PV-1 (2 points)
Intent Improve the condition of native or existing sub-grade materials to reduce the use of imported materials.		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Evaluate the suitability of using sub-grade material alternatives. Improve sub-grade by typical or innovative improvement techniques. Submit an evaluation for approval by the City project manager prior to finalizing the project design features; AND ■ Conduct an environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed sub-base design. An environmental life cycle analysis calculates the resources, energy and emissions benefits of a proposed sustainable methodology. A pavement engineering life cycle cost analysis compares all the costs and durability associated with a proposed technology. Submit for City project manager consideration; AND ■ Evaluate implementing the sustainable option when choosing sub-base design. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Test pit or bore existing or native sub-grade materials and perform appropriate field classification and laboratory analysis of the materials. Review any extenuating circumstances in considering augmentation methods. ■ Reuse onsite materials (e.g., gravel sub-base) or in a reprocessed form (e.g., reclaimed asphalt) when possible. Look at soil cement or chemical additives as sub-base improvements. ■ Add imported materials only as needed to enhance material durability. ■ Conduct a comparative analysis of alternative sub-grade technologies to traditional construction methods. Look at PaLATE, manual calculation or other models for these calculations. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Prior to the selection of sub-grade materials, provide an evaluation that, with enhancements, the existing sub-grade material could be used for the project. ■ An environmental life cycle analysis and pavement engineering life cycle cost analysis of the proposed design. ■ Engineering design calculations signed and sealed by a Professional Engineer 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for: <ul style="list-style-type: none"> • Evaluating improved sub-grade materials for a project; AND • Conducting an environmental life cycle analysis and a pavement engineering life cycle cost analysis for options to the proposed design. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Encourages reuse of existing resources. 2. Reduces high energy processing to produce sub-base. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces project costs by reusing readily available existing materials rather than imported engineered materials. ■ Social Considerations <ol style="list-style-type: none"> 1. Creates work environments where team members can proactively support sustainability. 		

Pavements Performance Standard 1 – Sub-Grade Materials Enhancement, Supplements, Review, Engineering and Testing	PV-1 (2 points)
<p>Resources</p> <p>Greenroads™ sustainability rating system (performance metric): www.greenroads.us/1/home.html</p> <p>Life Cycle Cost Analysis tools:</p> <ul style="list-style-type: none"> ■ RealCost – FHWA’s pavement design life cycle cost analysis software: www.fhwa.dot.gov/infrastructure/asstmgmt/rc2102.cfm ■ Life Cycle Cost Analysis Technical Bulletin (FHWA-SA-98-079): http://isddc.dot.gov/OLPFiles/FHWA/013017.pdf ■ Life Cycle Cost Analysis of Rigid Pavements: www.utexas.edu/research/ctr/pdf_reports/1739_S.pdf ■ The University of California, Berkeley’s PaLATE model is an Excel-based tool for life-cycle assessment (LCA) of environmental and economic effects of pavements and roads. The PaLATE model can be found at www.ce.berkeley.edu/~horvath/palate.html 	

Pavements Performance Standard 2 – Long Life Pavement		PV-2 (2 points)
<p>Intent Look at engineering technologies and design to extend the life of pavements. “Long Life Pavement” design reduces airport traffic disruption, monetary costs and environmental costs associated with reconstruction.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Evaluate the suitability of integrating Long Life Pavements for the project. Submit the evaluation for approval by the City project manager prior to finalizing the project design features. Long Life Pavement should only be considered in circumstances where a change in horizontal or vertical alignment is unlikely to be necessary over the extended life of the pavement; AND ■ Design pavements for uses that meet this criteria for a service life greater than the typically recommended design life of 20 to 30 years; AND ■ Conduct an environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed Long Life Pavement design and submit for City project manager consideration. An environmental life cycle analysis calculates the resources, energy and emissions reduction benefits of a proposed sustainable pavement method. A pavement engineering life cycle cost analysis compares all the costs and the durability associated with a proposed technology; AND ■ Consider implementing the sustainable option when choosing the pavement design. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Design sub-grade improvements, utilities, sub-base, base and intermediate and surface pavements for a design life in excess of the typically recommended design life of 20 to 30 years. ■ Consider using geotextiles and other engineering technologies that can extend the life of a pavement. ■ Conduct a comparative analysis of alternative technologies to traditional construction methods via the PaLATE model. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide an evaluation of the appropriateness of Long Life Pavement design for areas of the project. Submit for City project manager consideration prior to the selection of a pavement. ■ Provide documentation showing that the new or reconstructed pavement for the project will exceed the typical standards for a design life of 20 to 30 years. ■ Create a drawing or project map showing the locations considered for Long Life Pavement. ■ An environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed design. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for: <ul style="list-style-type: none"> • Evaluating Long Life Pavement for new or reconstructed pavement areas for the project; AND • Conducting an environmental life cycle analysis and a pavement engineering life cycle cost analysis for options to typical pavement design. 	

Pavements Performance Standard 2 – Long Life Pavement	PV-2 (2 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1.Reduces the use of raw materials. ■ Economic Considerations <ol style="list-style-type: none"> 1.Reduces long-term operational and maintenance costs for replacement of pavement. 2.Reduces operational costs from disruption of operations. ■ Social Considerations <ol style="list-style-type: none"> 1.Encourages the use of long lasting pavement structures. 	
<p>Resources</p> <p>Greenroads™ sustainability rating system (performance metric): www.greenroads.us/1/home.html</p> <p>Sustainable Aviation Guidance Alliance (SAGA): www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf</p> <p>Life Cycle Cost Analysis tools:</p> <ul style="list-style-type: none"> ■ RealCost – FHWA’s pavement design life cycle cost analysis software: www.fhwa.dot.gov/infrastructure/asstmgmt/rc2102.cfm ■ Life Cycle Cost Analysis Technical Bulletin (FHWA-SA-98-079): http://isddc.dot.gov/OLPFiles/FHWA/013017.pdf ■ Life Cycle Cost Analysis of Rigid Pavements: www.utexas.edu/research/ctr/pdf_reports/1739_S.pdf ■ The University of California, Berkeley’s PaLATE model is an Excel-based tool for life-cycle assessment (LCA) of environmental and economic effects of pavements and roads. The PaLATE model can be found at www.ce.berkeley.edu/~horvath/palate.html 	

<p>Pavements Performance Standard 3 – Alternative and Innovative Pavements</p>		<p>PV-3 (2 points)</p>
<p>Intent Leverage historic and emerging technologies to provide designs suitable for the intended application, while balancing environmental and financial costs.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Evaluate the suitability of implementing alternative and innovative pavements for the project and submit for approval by the City project manager prior to finalizing the project design features; AND ■ Evaluate at least one alternative or innovative pavement technology or approach for a portion of the new or reconstructed pavements in a project; AND ■ Conduct an environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed alternative design. An environmental life cycle analysis calculates the resources, energy and emissions reduction benefits of a proposed sustainable methodology. A pavement engineering life cycle cost analysis compares all the costs and durability associated with a proposed technology. Submit for City project manager consideration; AND ■ Consider implementing the sustainable option when choosing a design. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Research alternative pavement designs that may be appropriate for the project. ■ Consider that alternative and innovative pavements have use limitations and are more suitable to some environments than others (i.e., permeable pavements are not beneficial on steep slopes). ■ Consider implementing the following alternative and innovative pavement: <ul style="list-style-type: none"> – Permeable pavements (e.g., pervious concrete, permeable pavers) – Low energy asphalts (e.g., warm mix asphalt, cold mix asphalt) – Quiet pavements – Low emission materials production (generally batch plant specific) – Cool pavement with elevated albedo, such as ultra thin white surface topping, white concrete, etc. Increased reflectivity must not create a glare problem for aircraft or other vehicles. – Pre-wet aggregate mix – High use of industrial by-products in the mix – Soil cement mixes – Rubberized asphalt 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Prior to the selection of pavement materials, provide the City project manager the evaluation conducted for alternative and innovative pavements based on the pavement use. ■ The documentation must show at least one alternative or innovative pavement technology was reviewed for the project. Include a calculation to indicate the total percentage of pavement surface areas that was reviewed for alternative or innovative pavement technology, the rationale for selecting the area and a drawing or project map showing the location(s). 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for evaluating alternative and innovative pavements for the new or reconstructed pavement for the project and conducting an environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed design. 	

Pavements Performance Standard 3 – Alternative and Innovative Pavements	PV-3 (2 points)
<ul style="list-style-type: none"> ■ An environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed design. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces contribution to localized increased air temperatures due to pavement reflectance and minimizes stormwater runoff temperatures. 2. Permeable pavement can reduce the rate and volume of runoff as well as lower the total suspended solids in the runoff. 3. Reduces the environmental impacts associated with typical pavement designs. ■ Economic Considerations <ol style="list-style-type: none"> 1. Allows consideration and use of new pavement technologies more matched to use. 2. Reduces long-term operational and maintenance costs for replacement of pavement. 3. Increases use of industrial by-products, thus reducing waste. ■ Social Considerations <ol style="list-style-type: none"> 1. Encourages the use of newly developed and more sustainable products and designs. 2. Use of alternative or innovative technologies will provide sustainable methods for pavement management and construction. 	
<p>Resources</p> <p>Greenroads™ sustainability rating system (performance metric): www.greenroads.us/1/home.html</p> <p>Sustainable Aviation Guidance Alliance (SAGA): www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf</p> <p>Life Cycle Cost Analysis tools:</p> <ul style="list-style-type: none"> ■ RealCost – FHWA’s pavement design life cycle cost analysis software: www.fhwa.dot.gov/infrastructure/asstmgmt/rc2102.cfm ■ Life Cycle Cost Analysis Technical Bulletin (FHWA-SA-98-079): http://isddc.dot.gov/OLPFiles/FHWA/013017.pdf ■ Life Cycle Cost Analysis of Rigid Pavements: www.utexas.edu/research/ctr/pdf_reports/1739_S.pdf ■ The University of California, Berkeley’s PaLATE model is an Excel-based tool for life-cycle assessment (LCA) of environmental and economic effects of pavements and roads. The PaLATE model can be found at www.ce.berkeley.edu/~horvath/palate.html 	

<p>Pavement Performance Standard 4 – Maximize Recycling and Reuse of Existing Pavement and Materials</p>		<p>PV-4 (1-2 points)</p>
<p>Intent Reuse or recycle existing resources to minimize the amount of material imported to the site, while achieving the same pavement quality. Use less energy-intensive methods for comparable results. Reused or recycled materials may result in a cost effective and environmentally sustainable project.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Evaluate the suitability of recycling existing materials for the project through field analysis (i.e., test pits, borings, non-destructive testing methods); AND ■ Maximize the use of available on-site materials. If unavailable, use recycled pavement materials from other projects. <p>OR</p> <ul style="list-style-type: none"> ■ Evaluate the use of partial depth reclamation of the existing pavement, using the equity left in the existing pavement and modifying only the surface characteristics. <p>For both Action options:</p> <ul style="list-style-type: none"> ■ Conduct an environmental life cycle analysis and a pavement engineering life cycle cost analysis of a design with new materials versus a design with available recycled materials. An environmental life cycle analysis calculates the resources, energy and emissions reduction benefits of a proposed sustainable methodology. A pavement engineering life cycle cost analysis compares all the costs and durability associated with a proposed technology. Submit to the City project manager for consideration; AND ■ Consider implementing the sustainable option when choosing a design. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Test materials and/or pavement for project suitability. ■ Consider the use, reuse or recycling of asphalt binder, aggregate, full asphalt sections, concrete aggregate and rebar, granular base, etc. ■ If materials are not available on-site, check other sources for recycled materials and determine their suitability. ■ Review partial depth reclamation when only the surface course needs rework. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Test results of the suitability of the recycled materials and of non-destructive testing for the partial depth reclamation section to be retained. ■ Provide documentation showing the percentage of recycled materials (by weight or cost) used for the project and a drawing or project map showing their origin. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for recycling 25% to 50% of reused or recycled materials (by weight or cost) for a project. Also conducting an environmental life cycle analysis and a pavement engineering life cycle cost analysis of the proposed design. ■ 1 additional point for recycling 51% to 75% of reused or recycled materials (by weight or cost) for a project. Also conducting an environmental life cycle analysis and a 	

Pavement Performance Standard 4 – Maximize Recycling and Reuse of Existing Pavement and Materials		PV-4 (1-2 points)
<ul style="list-style-type: none"> ■ An environmental life cycle analysis and pavement engineering life cycle cost analysis of the proposed design. 	<p>pavement engineering life cycle cost analysis of the proposed design.</p>	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Minimizes use of fossil and other non-renewable energy sources in the harvesting of raw materials and the manufacture of components. 2. Reduced overland hauling of materials. ■ Economic Considerations <ol style="list-style-type: none"> 1. Decreases project cost by making use of onsite materials. ■ Social Considerations <ol style="list-style-type: none"> 1. Creates work environments where team members can proactively support sustainability. 		
<p>Resources</p> <p>Greenroads™ sustainability rating system (performance metric): www.greenroads.us/1/home.html</p> <p>Life Cycle Cost Analysis tools:</p> <ul style="list-style-type: none"> ■ RealCost – FHWA’s pavement design life cycle cost analysis software: www.fhwa.dot.gov/infrastructure/asstmgmt/rc2102.cfm ■ Life Cycle Cost Analysis Technical Bulletin (FHWA-SA-98-079): http://isddc.dot.gov/OLPFiles/FHWA/013017.pdf ■ Life Cycle Cost Analysis of Rigid Pavements: www.utexas.edu/research/ctr/pdf_reports/1739_S.pdf ■ The University of California, Berkeley’s PaLATE model is an Excel-based tool for life-cycle assessment (LCA) of environmental and economic effects of pavements and roads. The PaLATE model can be found at www.ce.berkeley.edu/~horvath/palate.html 		

<p>Lighting, Mechanical and Utility Systems Design Performance Standard 1 – Lighting Technologies Review and Energy Conservation Return on Investment</p>		<p>LM-1 (2 points)</p>
<p>Intent Review opportunities to achieve increased lighting quality and increased energy efficiency, thereby reducing environmental impacts associated with lighting products. In reviewing newer lighting technologies, energy cost savings will be calculated to determine the return on investment for lighting upgrades.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Review new lighting technologies for light fixtures, diffusers or airfield lighting for the project; AND ■ Conduct a model for lighting needs to review performance of lighting products for the application; AND ■ Design with increased energy performance and/or lighting quality products in accordance with ASHRAE/IESNA Standard 90.1-2010 AND ■ Develop energy savings calculations showing reduced maintenance costs with a return on investment evaluation and submit this evaluation of suggested upgraded products for review by the City project manager. <p>For retrofit lighting projects:</p> <ul style="list-style-type: none"> ■ Eliminate the use of incandescent lamps; AND ■ Recycle existing luminaries; AND ■ Reduce exterior light pollution. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Carefully review lighting needs for the project by conducting a light modeling study. ■ Review new products and the new requirements of ASHRAE/IESNA Standard 90.1-2010. ■ Increase controllability of project lighting with patterned wiring and light-sensing photocells. ■ Coordinate electrical lighting scenarios with day-lighting strategies. ■ Specify recyclable lamps. ■ Minimize site lighting where possible by increasing light quality and uniformity of lighting. ■ Design for appropriate candela value. ■ Consider using the following technologies for the project: <ul style="list-style-type: none"> • High Pressure Sodium (HPS) lamps or LEDs instead of Metal Halide (MH) lamps • LED lighting for signs and signals • Low mercury/low lead lamps • Compact fluorescent light (CFL) bulbs in lieu of incandescent lamps for areas with low ceiling heights and minimal light requirements (i.e., covered bus stops) • Full cutoff luminaries, low-reflectance and low angle spotlights for roadway and parking lot lighting. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Prior to selection of light products, provide a narrative detailing lighting technologies reviewed for the project and calculate the energy return on investment and improvement in lighting quality through the use of these lighting products for City project manager consideration. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for reviewing lighting technologies and calculating the return on investment and/or improvement in light quality for lighting products used. 	

Lighting, Mechanical and Utility Systems Design Performance Standard 1 – Lighting Technologies Review and Energy Conservation Return on Investment	LM-1 (2 points)
<ul style="list-style-type: none"> ■ For retrofit lighting projects, provide a work plan that outlines steps that will be taken to recycle existing luminaries and provide documentation that no incandescent lamps were used for the project. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces pollution and environmental impacts. 2. Reduces mercury and lead in landfills by recycling luminaries. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces costs associated with energy use. ■ Social Considerations <ol style="list-style-type: none"> 1. Buffers against volatile energy markets. 	
<p>Resources</p> <p>Illuminating Engineering Society website at: www.iesna.org/</p> <p>ASHRAE/IESNA Standard 90.1-2010 at: www.ashrae.org/</p> <p>Information on the safe disposal and use of CFL bulbs: www.epa.gov/cfl/</p> <p>Energy Star information on CFLs: www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=LB</p> <p>Information on High-Pressure Sodium Lamps from the U.S. Department of Energy: www.energysavers.gov/your_home/lighting_daylighting/index.cfm/mytopic=12110</p>	

<p>Lighting, Mechanical and Utility Systems Design Performance Standard 2 – Mechanical Technologies Review and Energy Conservation Return on Investment</p>		<p>LM-2 (2 points)</p>
<p>Intent Review opportunities to achieve increased energy efficiency and reduce environmental impacts associated with mechanical equipment. In reviewing mechanical technologies, energy and maintenance cost savings will be calculated to determine the return on investment for mechanical technologies upgrades.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Review new mechanical technologies that can be used in the project. Mechanical technologies include non-building electrical and mechanical equipment, transformer boxes, conveyors, and retrofit projects; AND ■ Increase the energy performance of mechanical equipment; AND ■ Utilize Energy Star compliant equipment whenever available. A complete listing of Energy Star categories can be found at the USEPA website (see Resources section); AND ■ Develop energy savings calculations and mechanical maintenance return on investment for review by the City project manager of suggested upgraded products; AND ■ Design with increased energy performance products in accordance with ASHRAE/IESNA Standard 90.1-2010. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Develop energy use calculations to assess energy performance and identify the most cost effective energy measures to reduce long-term operating and maintenance costs. ■ Provide high-efficiency motors and systems. ■ Specify a strict quality control program for system component storage and installation. ■ Use variable air-volume systems for cooling to reduce energy use during part-load conditions. ■ Specify Variable Frequency Drive (VFD) motors. ■ Utilize National Electrical Manufacturers Association (NEMA) premium efficiency motors. ■ Review the use of Teflon and other low-drag belts for conveyors. ■ Improve controllability with stop-eyes and EcoStart technologies. ■ Apply for Energy Star Rating. ■ Ensure that energy systems are appropriately sized. ■ Design to the 2010 ASHRAE/IESNA Standard 90.1-2010 for energy efficient systems. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Prior to selection of mechanical products, provide a narrative detailing mechanical technologies reviewed for the project. Calculate the energy return on investment through the use of the upgraded mechanical equipment and maintenance savings for City project manager consideration. ■ Table of Energy Star eligible devices denoting which devices were included in the design. Include a detailed explanation if an available 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for reviewing new, energy efficient mechanical technologies and calculating the return on investment for these mechanical equipment technologies. 	

Lighting, Mechanical and Utility Systems Design Performance Standard 2 – Mechanical Technologies Review and Energy Conservation Return on Investment	LM-2 (2 points)
Energy Star device is not selected for the design.	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Decreases carbon footprint of project. 2. Reduces consumption of excess natural and non-renewable resources. 3. Reduces environmental impact related to energy production. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces costs associated with energy use. ■ Social Considerations <ol style="list-style-type: none"> 1. Buffers against volatile energy markets. 	
<p>Resources</p> <p>ASHRAE/IESNA Standard 90.1-2010 at: www.ashrae.org/</p> <p>The following website includes links to all Energy Star compliant equipment categories: www.energystar.gov/index.cfm?c=products.pr_find_es_products</p>	

<p>Lighting, Mechanical and Utility Systems Design Performance Standard 3 – Flexibility and Reusability Reviews</p>		<p>LM-3 (2 points)</p>
<p>Intent Review opportunities to design projects with reusable, replaceable, recyclable and de-constructible components. Create adaptable systems and infrastructure that will enhance future uses, upgrades and expansions.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Evaluate potential future uses for the project components, including mechanical, electrical and plumbing systems; AND ■ Discuss with the City project manager if additional utilities, extensions or “stub ups” installed during the project could assist in future upgrades or expansions (minimal cost); AND ■ Specify materials and systems with high future value during material selection; AND ■ Specify flexible components of electrical and fiber optics and other wiring; AND ■ Select materials with recycle value and that are easy to deconstruct or replace; AND ■ Detail connections and system connectors for simple disassembly and future changes, ensuring that connections are accessible. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Discuss with the City project manager any future upgrades or expansions in the design area for project components. ■ Design for current needs with the ability to expand into the future, where noted. ■ Consider the future value of materials and systems during selection. ■ Use homogenous material whenever possible. ■ Label components clearly and permanently that are meant for reuse where possible; include instructions if necessary. ■ Detail connections for disassembly. ■ Design projects with components that are flexible, could be reused in the future, modular and made of parts designed to be easily removed and reused. ■ Consider structure and component lifecycle. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide a narrative detailing the flexibility and reusability of components in the project OR ■ Identify adaptable components for future needs (minimal cost). ■ Provide a narrative describing the review of future uses in the project area and if installing additional utilities during the project construction is cost economical. ■ Provide a narrative guide to future project uses; include instructions and plans for reconfigurations to meet projected needs, instructions for additions and subtractions of components to the project and instructions for disassembly, reuse and recycling of project components. ■ Provide to the City project manager a separate submittal of the utility drawings specifically calling out the location of the enhanced utility or stub up. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for reviewing opportunities to provide adaptable, flexible and reusable components in the project and providing a narrative guide for future uses. 	

Lighting, Mechanical and Utility Systems Design Performance Standard 3 – Flexibility and Reusability Reviews	LM-3 (2 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1.Reduces environmental impacts of producing new construction products and materials. 2.Diverts construction waste from landfills and incinerators. ■ Economic Considerations <ol style="list-style-type: none"> 1.Reduces future liability for waste. 2.Decreases future building costs. ■ Social Considerations <ol style="list-style-type: none"> 1.Encourages repair, replacement or reuse of project components. 2.Facilitates ease of adaptation to changing technologies and infrastructure requirements. 	
<p>Resources</p> <p>King County Guide to Design for Disassembly document: http://your.kingcounty.gov/solidwaste/greenbuilding/documents/Design_for_Disassembly-guide.pdf and website: http://your.kingcounty.gov/solidwaste/greenbuilding/disassembly.asp</p>	

<p>Landside Site Design Performance Standard 1 – Urban Design Principals: Pedestrian Comfort, Urban Heat Island and Increased Connectivity</p>		<p>LD-1 (1-4 points)</p>
<p>Intent Review and implement urban design principals to increase pedestrian comfort, reduce the urban heat island effect, increase connectivity and safety for pedestrians and encourage the use of public transportation.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop a Shade Plan for the project area to assess if pedestrian routes and activity areas are sufficiently shaded. Calculate for shade using June 21, noon solar time to cover pedestrian waiting and walking areas. Evaluate natural or man-made shade devices to create “pedestrian oases” in well-used pedestrian areas. ■ Urban Heat Island: <ul style="list-style-type: none"> – Evaluate methods to minimize dark impervious surfaces in pedestrian areas. For required pavement, maximize light-colored and/or permeable pavements to increase pedestrian comfort. – Explore creative cooling techniques, such as heat-resistant materials. ■ Pedestrian Access and Safety Plan: <ul style="list-style-type: none"> – Provide or enhance operations or technologies for pedestrian facilities, including added signage, traffic calming measures or pedestrian access improvements. – Develop strong pedestrian connectivity to/from bus stops, between terminals and to the light rail. – Improve pedestrian access to activity areas. Improve pedestrian visibility and line-of-sight to drivers. ■ Amenities: <ul style="list-style-type: none"> – Review opportunities to install pedestrian amenities, such as drinking water fountains, seating, waste receptacles, or additional way-finding signage at well-used pedestrian areas. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Look at the use of man-made shading devices, such as awnings, arcades, passageways or solid overhangs. Where possible, move pedestrian crosswalks and waiting areas under existing overhangs and bridges. Orient pedestrian areas to the north to get maximum shade. ■ Look at creative vegetation solutions. Use only native or climate-tolerant trees or vegetated trellises that will not attract wildlife. Landscape site to reduce heat through plant transpiration. ■ Consider shading with solar panels to produce energy that can be used to enhance pedestrian lighting or signage. ■ To reduce urban heat island effect and increase pedestrian comfort, review the use of pavers, other open-grid pavement systems or the City-approved pervious concrete specification, where acceptable. ■ Traffic improvements may include signalized intersections or crosswalks, shelters and wheelchair ramps. ■ Review current and future plans for airport passenger movement areas and mass transit stops. ■ Review distances from existing amenities to ascertain the need for new installations. ■ Review current signage to determine if changes or additions are indicated in the project area. ■ Provide safe bicycle and pedestrian lanes/paths, and provide secure bicycle storage areas. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Submit a Shade Plan with narrative and drawings showing location of shading and landscaping design elements. Provide calculations for maximizing pedestrian shade in the project area. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Points for this performance standard will be awarded according to the following schedule: <ul style="list-style-type: none"> • 1 point for developing an acceptable report with a review and recommendation section for two urban design principals in the project area. 	

Landside Site Design Performance Standard 1 – Urban Design Principals: Pedestrian Comfort, Urban Heat Island and Increased Connectivity	LD-1 (1-4 points)
<ul style="list-style-type: none"> ■ Submit a review of pavement and surfaces that can be used to reduce Urban Heat Island effect and increase passenger comfort in the project area. Provide narrative and map. ■ Submit a review of current and planned public transportation access, stops, pedestrian routes and improvements that can be made. Provide narrative and map. ■ Submit a pedestrian access and safety analysis, with recommendations for improvements, to the City project manager. Provide narrative and map. ■ Submit a review with costs, for amenities that can be installed, a narrative explaining the rationale and a map of the proposed location and capacity. 	<ul style="list-style-type: none"> • 1 additional point for developing an acceptable report with a review and recommendation section for four urban design principals in the project area. • 2 additional points for the successful implementation of at least two approved pedestrian comfort design recommendations from the report(s).
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1.Reduces urban heat island effect. ■ Economic Considerations <ol style="list-style-type: none"> 1.Reduces energy use and cooling costs associated with temperature gradients. ■ Social Considerations <ol style="list-style-type: none"> 1.Improves the “user experience” at the airport. 2.Encourages the use of mass transit. 	
<p>Resources</p> <p>Refer to the following LEED® Version 3 urban design performance standards (www.usgbc.org/ShowFile.aspx?DocumentID=7244):</p> <ul style="list-style-type: none"> – Sustainable Sites (SS) Credit 4.1, Alternative Transportation – Public Transportation Access – SS Credit 4.2, Alternative Transportation – Bicycle Storage and Changing Rooms – SS Credit 7.1, Heat Island Effect – Non-roof <p>Information on Urban Heat Island Effect: www.epa.gov/heatisld/</p> <p>USEPA Reducing Heat Islands: Compendium of Strategies – Describes mitigation measures that communities can take to address the negative impact of urban heat islands. Includes information on heat island basics, trees and vegetation, green roofs, cool roofs, cool pavements and heat island reduction activities: www.epa.gov/heatisland/resources/compendium.htm</p>	

<p>Landside Site Design Performance Standard 2 – Landscape to Reduce Irrigation Needs and Urban Heat Island Effect (non-roof)</p>		<p>LD-2 (2-3 points)</p>
<p>Intent Minimize the use of potable water for landscape irrigation on the project site. Coordinate landscaping design with City of Phoenix standards.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Follow the City of Phoenix ordinance regarding installation of low water needs plants for public areas; AND ■ Coordinate with the Aviation Department Parks Section on any landscape design; AND ■ Use only approved plants from the Aviation Department Wildlife Hazard Management Plan - Appendix J (June 2009) to reduce wildlife attractions; AND ■ Perform a soil and climate analysis at the beginning of the landscape design process and use xeriscaping design principals; AND ■ Develop a map showing topography, wind and sun exposure, shade profiles per season based on middle of the day conditions and any microclimate or extenuating circumstances of the landscape design area; AND ■ Contour the landscape design area to direct rainwater runoff, including from roof drains, through the site as an additional water supply; AND ■ Install a sub-meter for water in the landscape area, if suggested by the Aviation Department Parks Section; AND ■ Substitute vegetated surfaces for impervious surfaces and landscape site to reduce heat through plant transpiration. <p>For an additional point, eliminate the use of potable water by:</p> <ul style="list-style-type: none"> ■ Design landscaping that does not require permanent irrigation. Temporary irrigation would be allowed for one year to establish new plantings. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Plant only native or adapted drought resistant vegetation that require little or no water. ■ Review the Aviation Department’s Wildlife Management Plan Appendix J for approved airport vegetation. ■ Discuss the landscape project with the Aviation Department Parks Section at 602-273-2195. Discuss low water, low maintenance vegetation, and if sub-metering of the landscape area(s) should be installed. Involve the Aviation Department Parks staff in design and equipment specification selection. ■ Use a professional landscape designer for the project to develop the soil and climate analysis and to identify water needs for the selected plant species. ■ Design landscaping and irrigation control to reduce water use once plants are established. A temporary increase in irrigation is allowed for one year maximum to establish new plantings, calculated from a mid-summer baseline. ■ Employ high-efficiency irrigation systems with a slow-drip, sub-soil irrigation. ■ Segregate drought-resistant vegetation from ornamental vegetation that requires irrigation and design for bifurcated irrigation system control. ■ Employ high-efficiency irrigation systems with a slow-drip, sub-soil irrigation. ■ Provide watering schedule based on computer control system and moisture sensors. ■ Consider the role of plant selection in planning integrated pest management. ■ Use mulching or composting to increase water retention, especially around plant root zones. ■ Increase plant shade to retain water. 	

<p>Landside Site Design Performance Standard 2 – Landscape to Reduce Irrigation Needs and Urban Heat Island Effect (non-roof)</p>	<p>LD-2 (2-3 points)</p>
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Calculations showing needed water usage for the landscaped site based on site mapping factors (i.e., topography, shade, rainfall, etc.) and species selected. Show compliance with the City landscaping ordinance. ■ Drawings showing details of the irrigation systems, metering, controls and irrigation flows needed per species area planted. ■ “Sign-off” of the design, irrigation system and controls by the Aviation Department Parks Section supervisor. ■ Certification that the selected plant species meet the requirements of the Aviation Department Wildlife Hazard Management Plan. <p>For additional point, provide:</p> <ul style="list-style-type: none"> ■ Calculations and drawings showing that the selected species and design allows for no, or reduced, irrigation water, beyond what is required by City ordinance. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for reducing potable water use for landscaping irrigation. ■ 1 additional point for eliminating potable water use for landscaping irrigation.
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Conserves limited water resources. 2. Reduces use of non-native plants. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces need and the cost to extract water. ■ Social Considerations <ol style="list-style-type: none"> 1. Minimizes impact on local water processing systems. 	
<p>Resources</p> <p>The City of Phoenix ordinance for water efficient landscaping is summarized in the publication: www.westernresourceadvocates.org/azmeter/phoenixsumm.pdf</p> <p>The City of Phoenix website containing desert landscaping design guides: www.phoenix.gov/waterservices/wrc/media/index.html</p> <p>The City of Phoenix website page on water efficient landscaping is at www.phoenix.gov/DEVPRO/lnscape.html</p> <p>Refer to the LEED® Version 3 Water Efficient Landscaping (WE) Credit 1 performance standard at: www.usgbc.org/ShowFile.aspx?DocumentID=7244</p> <p>The Arizona Municipal Water Users Association (AMWUA) provides a booklet detailing plants that are drought hardy, tolerant of heat and cold and those adapted to Arizona’s soil conditions. The following website provides a search function to easily navigate through the booklet:</p>	

<p>Landside Site Design Performance Standard 2 – Landscape to Reduce Irrigation Needs and Urban Heat Island Effect (non-roof)</p>	<p>LD-2 (2-3 points)</p>
<p>www.amwua.org/plants_index.html</p> <p>The Arizona Landscape Irrigation Guidelines Committee for AMWUA developed “Guidelines for Landscape Drip Irrigation Systems”: www.amwua.org/pdfs/drip_irrigation_guide.pdf</p> <p>USEPA WaterSense information on landscape irrigation: www.epa.gov/watersense/services/landscape_irrigation.html</p> <p>Information on Urban Heat Island Effect: www.epa.gov/heatisd/</p> <p>Tucson, AZ, Commercial Rainwater Harvesting Ordinance – First city in the U.S. to require rainwater harvesting for 50% of landscape water demand: www.tucsonaz.gov/ocsd/sustainability/water/rainwaterharvesting.php</p>	

Parking Lots and Structures Performance Standard 1 – Surface Parking Lots	PS-1 (1-3 points)
<p>Intent Implement design features in surface parking lot projects that reduce both energy use and Urban Heat Island effect. These design features will enhance site lighting and increase customer safety and comfort. In addition, define sustainable parking initiatives to encourage high occupancy vehicle usage. Multiple points may be possible from other applicable Performance Standards.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Research the viability of utilizing the City’s pervious concrete specification for the parking lot stalls. Develop an analysis for the City project manager’s review of the following elements: <ul style="list-style-type: none"> – Underlying soil permeability – Quantification of the potential reduction in site drainage needs with use of pervious concrete – Whether sloping and rainwater runoff can reduce irrigation requirements and extend the life of landscaping. – Include a cost benefit analysis of these items. (Also see Design Performance Standards HD-PV-3, Alternative and Innovative Pavements and HD-LD-2, Landscape to Reduce Irrigation Needs and Urban Heat Island Effect); AND ■ Conduct an analysis (for City project manager’s review) of other pavement innovations and pavement recycling methods as outlined by the Pavement Design Performance Standards HD-PV-1 through 4; AND ■ Conduct an analysis of pedestrian safety and comfort features using the Design Performance Standard HD-LD-1, Urban Design Principles; AND ■ Use IESNA 90.1- 2010 standard for the design of site and toll booth lighting. Improve lighting uniformity and review appropriate energy efficient lighting technologies, such as LEDs and/or the viability of using solar powered lighting. Perform a return on investment (ROI) analysis on all energy efficiencies and possible reduced infrastructure; AND ■ Use ASHRAE/IESNA 90.1-2010 energy efficiency standards for other project 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Review other Design Performance Standards and their utility on this project (for additional achievable points). ■ Design shade features (calculated on June 21, noon solar time) to cover pedestrian waiting areas. Evaluate natural or man-made shading and reduce dark colored impervious pavements and surfaces in these pedestrian areas to improve safety, comfort and visibility. Create “comfort zones” for waiting pedestrians. ■ Design shade features and review vehicle covered parking with solar technologies that will supplement the lighting demands and enhance pedestrian comfort. ■ Plan and design walking paths to and from the public transit stops. <ul style="list-style-type: none"> – Provide or improve technologies for pedestrian facilities, including added signage, traffic calming measures or minor access improvements. Improvements include signalized intersections or crosswalks, shelters and wheelchair ramps. – Provide or enhance access to public transportation infrastructure. Increase pedestrian safety. ■ Design sub-grade, base and surface pavements by reviewing Pavement Design Performance Standards HD-PV-1 through 4. Conduct a comparative analysis of alternative technologies to traditional construction methods (i.e., PaLATE, manual calculation). ■ Maximize recycling of existing pavement materials (see Design Performance Standard HD-PV-4, Maximize Recycling and Reuse of Existing Pavements and Materials). ■ Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting. Minimize night-sky pollution by considering

Parking Lots and Structures Performance Standard 1 – Surface Parking Lots		PS-1 (1-3 points)
<p>equipment specifications. Review Design Performance Standard HD-LM-3, Flexibility and Reusability Reviews for flexibility of project utilities; AND</p> <ul style="list-style-type: none"> ■ Review with the City project manager any policies for preferred parking for carpools, vanpools or alternative fuel or low-emission vehicles. 	<p>full cutoff luminaries and low angle spotlights for surface parking lot lighting.</p> <ul style="list-style-type: none"> ■ Analyze and discuss with the City project manager plans for the development of preferred parking for alternative fuel vehicles, carpools and vanpools. Review opportunities to install electric vehicle charge stations. ■ Evaluate the development of a centralized facility(s) for secure bicycle storage. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Analyses as described above in Required Actions for review and project consideration by the City project manager. ■ Provide drawings and specifications showing the locations of sustainable design features approved for use in the project. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Points, as outlined, for implementation of appropriate measures from other Performance Standards. ■ Points for this performance standard will be awarded according to the following schedule: <ul style="list-style-type: none"> • 1 point for analyzing the listed Required Actions of this Performance Standard. • 2 points for designing all City project manager approved initiatives from the listed Required Actions. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Pervious and light-colored parking lot materials decrease the Urban Heat Island effect and increase landscaping life. 2. Energy efficient lighting and equipment reduces GHGs from electrical production. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces energy consumption and long-term operating costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Increases local public transportation opportunities and pedestrian comfort and safety. 		
<p>Resources</p> <p>Please also see Design Performance Standards for sustainable pavements, HD-PV-1 through HD-PV-4.</p> <p>Also, see Performance Standards HD-LD-1, Urban Design Principles and PD-HD-2, Landscape to Reduce Irrigation Needs and Urban Heat Island Effect.</p> <p>Greenroads™ sustainability rating system (performance metric): www.greenroads.us/1/home.html</p> <p>Sustainable Aviation Guidance Alliance (SAGA): www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf</p>		

Parking Lots and Structures Performance Standard 2 – Parking Structures		PS-2 (1-2 points)
<p>Intent Implement design features for parking structure projects to reduce energy use. Sustainable parking facilities might improve customer safety, reduce single-occupancy vehicle usage and reduce the Urban Heat Island effect.</p>		
<p>Required Actions for Credit In addition to the applicable Required Actions of Performance Standard HD-PS-1, Surface Parking Lots for the pavements that surround the parking structure, develop an analysis for the following items:</p> <ul style="list-style-type: none"> ■ Follow the ASHRAE/IESNA 90.1-2010 standard for energy efficient parking structure lighting. Review appropriate lighting technologies, maximizing the use of day lighting by schedule controls and photo sensors; AND ■ Design lighting for greatest light uniformity and with criteria to maintain safe light levels while avoiding off-site light pollution; AND ■ Use the ASHRAE/IESNA 90.1-2010 standard for energy efficient elevators, conveyors, controls, motors and other equipment; AND ■ Maximize the controllability of the lighting and energy systems; AND ■ Perform a return on investment (ROI) analysis on the use of rooftop solar panels to produce energy that may offset energy use in the structure; AND ■ Provide or enhance access to public transportation infrastructure; AND ■ Design high-albedo structural roofing to reduce heat gain; AND ■ Review with the City project manager the policies for preferred parking for carpools and vanpools, and policies for metered quick charge stations for electric vehicles. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Review other Design Performance Standards and their utility on this project (for additional achievable points). ■ Review initiatives from other Design Performance Standards and their utility on this project. Look at Performance Standard HD-PS-1, Surface Parking Lots for adjacent paved surfaces. ■ Review use of pervious concrete and native vegetation adjacent to the parking structure to increase pedestrian comfort. ■ Plan and design walking paths to and from public transit stops. ■ Look at improving the circulation patterns in the structure. ■ Consider cut-off luminaries or low-angle spotlights to reduce light pollution outside the building. ■ Review the use of reflective and zero or low energy use signs. ■ Review the use of stop-eyes and variable speed/load drives to lower energy use in equipment not in constant use. Use premium quality motors for the design to reduce maintenance, replacement and energy used. ■ Plan for the development of preferred parking for alternative fuel vehicles, carpools and vanpools. If not approved for the current project, design with future needs in mind. Review Design Performance Standard HD-LM-3, Flexibility and Reusability Reviews for utility flexibility points. ■ Provide a centralized facility(s) for secure bicycle storage. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Analysis as described above in Required Actions for review and project consideration by the City project manager. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Points, as outlined, for implementation of appropriate measures from other Performance Standards. 	

Parking Lots and Structures Performance Standard 2 – Parking Structures		PS-2 (1-2 points)
<ul style="list-style-type: none"> ■ Provide drawings showing the locations of sustainable design features approved for use in the project. 	<ul style="list-style-type: none"> ■ Points for this performance standard will be awarded according to the following schedule: <ul style="list-style-type: none"> • 1 point for analyzing the listed Required Actions of this Performance Standard. • 2 points for designing all City project manager approved initiatives from the listed Required Actions. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces land development impacts from the automobile. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces energy consumption and long-term operating costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Increases local public transportation opportunities. 		
<p>Resources</p> <p>Greenroads™ sustainability rating system (performance metric): www.greenroads.us/1/home.html</p> <p>Sustainable Aviation Guidance Alliance (SAGA): www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf</p>		

Innovation Performance Standard 1 – Innovation in Design	ID-1 (variable points)
<p>Intent Provide innovative design ideas, with the opportunity to be awarded additional design points for exceptional performance in a particular Sustainable Design Performance Standard. Alternatively, additional design points may be awarded for use of innovative materials, technologies or practices not specifically addressed by this rating system.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance and the proposed submittals to demonstrate compliance and the strategies that might be used to meet the requirements. ■ Provide a draft of this information to the City project manager as soon as is reasonable for concurrence with the proposed action or innovation. Submit the final documentation for approved innovation credit. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Substantially exceed a Sustainable Performance Standard. For example, increase the percentage of recycled materials used in pavement design by 10%. ■ Create an interactive multimedia display (e.g., video, website, etc.) that would engage and educate visitors about the green aspects of the completed project. Include project results and in-situ performance criteria compared to standard performance results. ■ Other examples of innovative design credits include: <ol style="list-style-type: none"> 1. Substantially improve energy conservation measure for lighting or mechanical systems. 2. Suggest product substitutions for low-VOC projects, beyond what is already required by Maricopa County. 3. Use recycled paper for all correspondence.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide the following information, as soon as possible in draft for City project manager approval, then in final format at the end of the project in a format similar to these Sustainable Performance Standards: <ul style="list-style-type: none"> – A title for the credit being pursued. – Narrative statement of the credit intent. – Narrative statement describing the credit’s required actions. – Detailed narrative describing the approach to achieving the credit. This narrative should include a description of the quantifiable environmental benefits of the credit proposal, to the extent possible. – Copies of specific construction drawings or exhibits, as applicable, that will serve to illustrate the project’s approach to the 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for each innovative design performance standard submitted.

<p>Innovation Performance Standard 1 – Innovation in Design</p>	<p>ID-1 (variable points)</p>
<p>credit. A separate submittal is required for each innovation pursued.</p>	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Encourages the use of evolving sustainability initiatives and technologies that may provide additional environmental, social and economic benefits toward achieving the sustainable goals of the project. ■ Environmental Considerations <ol style="list-style-type: none"> 1. Evaluates a benchmark for sustainable design practices by surpassing prescribed Sustainable Performance Standards. ■ Social Considerations <ol style="list-style-type: none"> 1. Increases the likelihood of achieving and upgrading the project sustainability level. 	
<p>Resources</p> <p>See the CC-1, Custom Credit of the Greenroads Rating System for an example of how to create an innovative performance standard. Download the “CC-X Custom Credit” documentation at the bottom of the page. www.greenroads.us/18/1/custom-credit.html</p>	

Section 4

Sustainable Horizontal Construction (HC)

4.1 List of Horizontal Construction Performance Standards

Implementation

HC-IM-1	Construction Health and Safety Planning
HC-IM-2	LEED® Accredited Professional/Construction Sustainability Liaison
HC-IM-3	Contractor and Subcontractor Sustainability Training
HC-IM-4	Sustainability Inspection Program and Reporting
HC-IM-5	Construction Scheduling and Sequencing
HC-IM-6	Promote Use of Regional Materials and Local Suppliers

Construction Air Quality

HC-AQ-1	Low-Emission Diesel Construction Vehicles, Equipment and Generators
HC-AQ-2	Construction Vehicles, Equipment and Material Delivery - Idling Restrictions
HC-AQ-3	Alternative Transportation Plan During Construction
HC-AQ-4	Track Project Criteria Air Pollutant Emissions
HC-AQ-5	Construction Materials Conveying Plan

Site Management

HC-SM-1	Low Impact Development and Minimizing Site Disturbance
HC-SM-2	Use of City-Approved Dust Palliatives

Energy Management

HC-EM-1	Project Energy Requirements and Management Plan/Stationary Power
HC-EM-2	Energy Efficient Lighting and Equipment and Energy Requirements Plan
HC-EM-3	Energy Systems Commissioning and Installed Systems Testing

Materials & Resources

HC-MR-1	Construction Waste Management Plan
HC-MR-2	ON-SITE Reuse or Recycling of Construction Materials and Infrastructure
HC-MR-3	OFF-SITE Recycling for Reuse of Construction Materials and Infrastructure
HC-MR-4	Use of Recycled Content Materials

Environmental Quality

HC-EQ-1	Noise and Vibration Mitigation Plan
HC-EQ-2	Light Pollution Reduction

Innovation

HC-IC-1	Innovation in Horizontal Construction
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4.2 Horizontal Construction (HC) Checklist

	Maybe						
Yes	SM	DM	No	Possible Points	Performance Standard	Performance Standard Title	Notes
Implementation							
				Required	HC-IM-1	Construction Health and Safety Planning	
				Required	HC-IM-2	LEED® Accredited Professional/Construction Sustainability Liaison	
				1	HC-IM-3	Contractor and Subcontractor Sustainability Training	
				1	HC-IM-4	Sustainability Inspection Program and Reporting	
				1	HC-IM-5	Construction Scheduling and Sequencing	
				Multiple	HC-IM-6	Promote Use of Regional Materials and Local Suppliers	
				1		Local supplier-preferred procurement policy and 20%-40% utilization of local suppliers	
				1		Regional materials procurement policy and 20%-40% use of regional materials	
				1		40% or more regional materials used	
0	0	0	0	6		TOTAL	
Construction Air Quality							
				Multiple	HC-AQ-1	Low-Emission Diesel Construction Vehicles, Equipment and Generators	
				1		Using alternative fuels	
				1		25% increase of low emission vehicles	
				1		50% increase of low emission vehicles	
				1		75% increase of low emission vehicles	
				1		100% increase of low emission vehicles	
				2	HC-AQ-2	Construction Vehicles, Equipment and Material Delivery - Idling Restrictions	
				1	HC-AQ-3	Alternative Transportation Plan During Construction	
				1	HC-AQ-4	Track Project Criteria Air Pollutant Emissions	
				1	HC-AQ-5	Construction Materials Conveying Plan	
0	0	0	0	10			
Site Management							
				Multiple	HC-SM-1	Low Impact Development and Minimizing Site Disturbance	
				1		Develop Construction Site Plan	
				1		Successful follow through of Construction Site Plan	
				1	HC-SM-2	Use of City-Approved Dust Palliatives	
0	0	0	0	3		TOTAL	
Energy Management							
				Multiple	HC-EM-1	Project Energy Requirements and Management Plan/Stationary Power	
				1		Develop and implement Project Energy Requirements Plan	
				1		Stationary power can be used for at least one process	
				Multiple	HC-EM-2	Energy Efficient Lighting and Equipment and Energy Requirements Plan	
				1		Develop and implement Project Energy Requirements Plan	
				1		Utilize energy efficient or less emitting equipment or renewable energy sources	
				2	HC-EM-3	Energy Systems Commissioning and Installed Systems Testing	
0	0	0	0	6		TOTAL	
Materials & Resources							
				Required	HC-MR-1	Construction Waste Management Plan	
				Multiple	HC-MR-2	ON-SITE Reuse or Recycling of Construction Materials and Infrastructure	
				1		15% to 25% reused or salvaged	
				1		26% to 40% reused or salvaged	
				Multiple	HC-MR-3	OFF-SITE Recycling for Reuse of Construction Materials and Infrastructure	
				1		15% recycled	
				1		25% recycled	
				1	HC-MR-4	Use of Recycled Content Materials	
0	0	0	0	5		TOTAL	

	Maybe						
Yes	SM	DM	No	Possible Points	Performance Standard	Performance Standard Title	Notes
Environmental Quality							
				2	HC-EQ-1	Noise and Vibration Mitigation Plan	
				1	HC-EQ-2	Light Pollution Reduction	
0	0	0	0	3		TOTAL	
Innovation							
				Variable	HC-IC-1	Innovation in Horizontal Construction	
0	0	0	0				
0	0	0	0			GRAND TOTAL (Selected Performance Standard points plus Innovation points)	
SM - Submittal Maybe - Analysis under development by contractor; attempting as a Yes for approval from City.							
DM - Decision Maybe - Waiting on City approval of analysis or plan.							

4.3 Certification Statement

CERTIFICATION STATEMENT

FOR THE SUBMISSION OF DOCUMENTATION TO RECEIVE CREDIT FOR ACHIEVEMENT OF THE PERFORMANCE STANDARDS INCLUDED IN THE SUSTAINABLE DESIGN AND CONSTRUCTION GREEN GUIDE

For airport projects, the Sustainable Airport Design and Construction Guide (Green Guide) is required to be implemented throughout the project life cycle. As part of the Green Guide implementation process, Project Delivery Teams are obligated to submit documentation as verifiable evidence that the requirements of the performance standards included in the Green Guide were met for the project. This Certification Statement must be submitted, in conjunction with all relevant and required documentation, in order to receive credit for the actions taken to accomplish each performance standard for the project.

“I certify, based upon my knowledge, information and belief obtained from my personal observation and observation of the staff under my direct supervision, that the requirements for the performance standard listed below were met for the indicated project and that all relevant and required documentation is contained herein.

Project Name

Project Location

Contractor or Entity Responsible for Project

Performance Standard Name and Number

PREPARED BY:

Printed Name

Title

Signature

Date

APPROVED BY:

Printed Name

Title

Signature

Date

4.4 Horizontal Construction Performance Standards

Implementation Performance Standard 1 – Construction Health and Safety Planning	IM-1 (0 points) Required
<p>Intent Prepare a project-specific health and safety plan and provide the construction team with health and safety management. Include hazard awareness, hazard prevention techniques and worker personal protective equipment, as required by the Occupational Safety and Health Administration (OSHA).</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ This performance standard is achieved by developing a project-specific Health and Safety Plan (HASP) as required by OSHA and in conjunction with the FAA-approved project Construction Safety Plan; AND ■ Contact the Aviation Department Environmental Section (602-273-8861) and ask if a “Phase I/II” and an asbestos survey has been done for the project site, and if there is an existing site condition that would require any special worker precautions; AND ■ Include the following sections in the HASP: <ul style="list-style-type: none"> – Project Information, including task descriptions; – Hazards of Concern, including chemical, based from Material Safety Data Sheets (MSDS) from products to be used; – Preventative Actions and protective equipment, including respirators and masks as needed; – Written policy indicating when respirators and masks are required to be used for dust or fume emissions; – Contingency Plans for response to unsafe conditions; – Personnel training and responsibilities; – Emergency contacts and directions to emergency facility; AND ■ Report health and safety incidences and complete weekly safety inspections and reports. Also summarize incidents that may have resulted in an accident, evaluating steps that can be taken to prevent them; AND ■ All construction equipment to have exhaust stacks that meet NIOSH recommendations. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Appoint a Site Health and Safety Manager (SHSM). Involve SHSM in pre-construction design and planning meetings, and develop a comprehensive health and safety plan. ■ Establish an Emergency Notification Program. ■ Develop job-specific hazard analyses that outline potential hazards within a certain job and ways to mitigate accidents. ■ Address health and safety in the project planning stage. ■ Conduct safety observations to ensure workers are abiding by the HASP. ■ Conduct a Health and Safety ‘tailgate’ meeting at the start of every day and at the conclusion of the workday, as needed. ■ Create a sign-off sheet in the HASP and require all onsite personnel to sign the Plan indicating they have read it prior to commencing work. ■ Require all subcontractors to either implement the PHX project-specific HASP or provide their own Plan, along with MSDS chemical information, to the SHSM for approval prior to commencing work. ■ Determine conclusively if dusts or fumes exist or will enter breathing space during construction and provide personal protective equipment and training following the OSHA program. ■ Insure all equipment exhaust stacks meet NIOSH and OSHA recommendations, and emit exhaust away from worker and driver breathing spaces.

<p>Implementation Performance Standard 1 – Construction Health and Safety Planning</p>		<p>IM-1 (0 points) Required</p>
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Qualifications of the project Health and Safety Manager. ■ Record of communication, including date, contact information and results, with the Aviation Environmental Section on existing site conditions. ■ Submit a comprehensive Health and Safety Plan along with the FAA Construction Safety Plan, and include any project-specific measures to the City project manager. ■ A certification from the project Health and Safety Manager that the plan meets all project and OSHA requirements. ■ Certification from the project Health and Safety Manager that site personnel have the appropriate health and safety training and professional experience/credentials to perform specific tasks. ■ Weekly safety reports documenting accidents and identifying any work hazards, accidents or incidents to be corrected. ■ A final tally of accidents for the entire project at work completion. ■ Documentation (photos, etc.) that all equipment exhaust stacks meet NIOSH standards. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Required to complete the required actions and submit the required documentation. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1.Reduces impacts to the environment by reducing chemical and fuel spills associated with workplace accidents. 2.Improves air quality for workers. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces costs and time delays associated with worker injuries. 2.Reduces likelihood of incurring costs associated with litigation and liability cases from worker injury or construction accidents. 3.Reduces unnecessary and expensive medical expenses to correct respiratory ailments due to exposure to emissions. ■ Social Considerations <ol style="list-style-type: none"> 1.Improves moral and productivity of construction workers. 2.Reduces health risks due to dust and other emissions. 		

Implementation Performance Standard 1 – Construction Health and Safety Planning	IM-1 (0 points) Required
<p>Resources</p> <p>OSHA provides free software (eHASP) to assist in the development of HASPs and Job Hazard Analysis forms. The software can be downloaded at: www.osha.gov/dep/etools/ehasp/index.html</p> <p>During preparation of a HASP it may be helpful to reference the Accident Prevention Plan Review Checklist created by the Texas Department of Insurance, Division of Workers' Compensation, Workers' Health and Safety and located at: www.tdi.state.tx.us/pubs/videoresource/cklapp.pdf</p> <p>Guidance on how Arizona's state health and safety program compares to OSHA's is available at: www.osha.gov/dcsp/osp/stateprogs/arizona.html</p> <p>Arizona's Department of Occupational Safety and Health is found at: www.ica.state.az.us/ADOSH/ADOSH_main.aspx</p> <p>Article on equipment exhaust stack configurations at: www.enginebuildermag.com/Article/71928/diesel_and_gasoline_exhaust_how_to_help_protect_your_business_and_your_employees.aspx</p>	

<p>Implementation Performance Standard 2 – LEED® Accredited Professional/Construction Sustainability Liaison</p>		<p>IM-2 (0 points) Required</p>
<p>Intent Support and encourage the integration of sustainable concepts and practices into construction processes with the inclusion of LEED® Accredited Professionals (AP) on the Construction Team. The LEED-AP will be used to plan and assist in the implementation of the Performance Standards for the project. The LEED-AP will provide tracking and documentation of sustainability goals and coordinate consistent communication with the Aviation Department. The LEED-AP can also be used to train the project team and inspect the project sustainability measures (see HC-IM-3, Contractor and Subcontractor Sustainability Training and HC-IM-4, Sustainability Inspection Program and Reporting).</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ At least one (1) person who has a significant role on the construction team shall be a LEED-AP; AND ■ Designate the project LEED-AP as the Contractor Sustainability Liaison, WHO: ■ Documents the Checklist at the direction of the City’s project manager and prime contractor and reviews and compiles all necessary documentation of sustainable activities and plans for the chosen Performance Standards; AND ■ Assists in the development of the Performance Standard actions; AND ■ Assists with inclusion of sustainability requirements and direction in subcontractor documents; AND ■ Identifies the resolution of sustainability issues and actions related to achieving the project sustainability goals. If original goals are changed, alternative actions to maintain the project sustainability goals must be approved by the City’s project manager. Actions must be directed and tracked for the resolution of issues; AND ■ Documents compliance with requirements of the chosen Performance Standards. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Prior to the NTP, assign Construction Team Member(s) to take the LEED® Professional Accreditation Exam, if not accredited already or hire a LEED® AP with similar project experience. ■ Assign the project LEED-AP to review the information regarding sustainable construction methods and practices with the Construction Team Members, and the application of the Guidelines early in the project life cycle. ■ Identify the Construction Sustainability Liaison in the Pre-Construction Meeting. ■ Provide a mix of general contractors and subcontractors with sustainability experience. ■ Require sustainability be an agenda item at regularly scheduled Construction Meetings to ensure smooth integration of sustainability goals. Review the current status, actions/issues since last meeting and anticipated within the next two meeting cycles. ■ Have regular meetings between the Contractor Sustainability Liaison and the City project manager. ■ Promote the use of subcontractors with sustainability experience to provide firsthand experience in the daily management of sustainability goals for the project. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide the following documentation: <ul style="list-style-type: none"> – Name of the project LEED-AP – Name of the LEED-AP’s company – Brief description of the LEED-AP’s project role(s). 	<p>Credits</p> <ul style="list-style-type: none"> ■ Required to have at least one (1) LEED-AP on the Construction Team, with experience, designated as Contractor Sustainability Liaison. 	

Implementation Performance Standard 2 – LEED® Accredited Professional/Construction Sustainability Liaison	IM-2 (0 points) Required
<ul style="list-style-type: none"> – Copy of the LEED-AP's certificate. ■ Documentation that the identified sustainability goals of the project were met, including the Performance Standards checklist, and required plans and statements from the contractor. ■ Timely submittals of copies of meeting minutes, including for the development of the Performance Standards actions and reviews for the sustainability compliance status of the project. ■ Indicate deviations and correction methods implemented to maintain project sustainability goals. ■ Up to date progress template (Gantt chart or similar visual documentation) on a monthly basis and at 30/60/90% and project completion for indicating the original, current and final status of sustainability compliance. ■ Table 1 below is an example of the submittal format for the reporting requirements related to the above-required documentation. Attach the sustainable item roll-up schedule and include it in the project meeting minutes. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Promotes the environmental, economic and social benefits associated with the successful completion of sustainable projects by involving experienced contractors, sub-contractors, suppliers and manufacturers in the project. ■ Environmental Considerations <ol style="list-style-type: none"> 1. Requires the Contractor Sustainability Liaison be a LEED-AP for the successful implementation of the chosen performance standards. ■ Economic Considerations <ol style="list-style-type: none"> 1. Monitors progress through the construction phase and identifies conflicts early to reconcile overall project and sustainability goals. 2. Shares “lessons learned” to benefit the project and aid in the avoidance of Stop Work Incidences, Change Orders and other potential obstacles and setbacks that could increase project costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Provides in-house expertise and experiences in coordinating the documentation process similar to that required for other sustainable Certification. 2. Provides incentives to track and focus on achieving sustainability goals. 3. Reviewing and monitoring sustainable construction provides assurances to stakeholders that the sustainability goals will be met. Reduces the opportunity to replace planned sustainable actions with non-approved actions that may contradict the agreed upon sustainability goals. 	

Implementation Performance Standard 2 – LEED® Accredited Professional/Construction Sustainability Liaison	IM-2 (0 points) Required
<p>Resources Information on how to receive LEED® Professional Accreditation: www.usgbc.org/DisplayPage.aspx?CMSPageID=1815</p>	

Table 1: Example of Minimum Reporting Requirements Submittal by Sustainability Liaison

Item	Description	PS	Responsibility	Status*	Actions Required
1	Designation and Actions of Contractor Sustainability Liaison	CE-IM-2	General Contractor	Change since last meeting; Hired sustainability inspector since last meeting to perform through end of Project	Ongoing reporting included as attachment to Meeting Minutes.
2	On-site Reuse of Construction Materials/ Infrastructure	CE-MR-2	General Contractor Engineer	Change since last meeting: Completed subcontractor training during weekly Work Tailgate Meeting. The mason noted that buy-back program would be used for excess materials with Supplier. Site/Civil Engineer will request crushed stone from blasting to be evaluated as fill.	Masonry Submittal will note “buy-back” provision. Crushing excess material for fill is not anticipated. Site/Civil Engineer will require testing for proposed fill for approval.

**Include available information related to current status, status since last meeting and anticipated status of sustainability compliance for the next two meeting cycles.*

Note: This template must be completed and signed by the Contractor Sustainability Liaison.

Implementation Performance Standard 3 – Contractor and Subcontractor Sustainability Training		IM-3 (1 point)
Intent		
<p>Prior to the start of construction, make onsite construction team members aware of sustainability practices and initiatives chosen for the project in order to gain an understanding of implementation roles and responsibilities. Facilitate sustainable and proactive ideas, decisions and best practice methods to minimize environmental, social and economic impacts.</p>		
Required Actions for Credit		Strategies
<ul style="list-style-type: none"> ■ Develop a customized sustainability training plan for the project team regarding chosen Sustainability Performance Standards; AND ■ The plan shall include the following elements as a minimum: <ul style="list-style-type: none"> – List of the types of project personnel to be trained by responsibility by duty/project phase. – Description of the types of training and project-specific planning to be held. – A process to track training efforts, including dates, means (e.g., online, classroom, field training), topics and the identification of those participating in training; AND ■ Include the following concepts in the plan: <ul style="list-style-type: none"> – Sustainability: To develop and have the least negative impact on the environment, economy and local community. – Construction sustainability: Plans to mitigate project impacts. – Proactive sustainability: Examples of actions workers can do to be more sustainable; AND ■ The Prime contractor or an outside specialty consultant shall conduct the sustainability training. The person conducting the training must be qualified, such as a LEED® Accredited Professional (AP). Approval of the training modules by the City is required. 		<ul style="list-style-type: none"> ■ Review the Performance Standards selected and the expected outcome. ■ Communicate sustainability commitment to employees and explain their roles on each chosen initiative. ■ Engage workers to develop sustainability ideas and real issues confronting the project workers. ■ Review all developed environmental and sustainability plans required for the project and clearly go over roles, how each initiative will be done and their importance to the project. ■ Management should also attend a sustainability training program in order to have a meaningful understanding of sustainability and to build and promote the project team’s commitment. ■ Emphasize environmentally, economically and socially sensitive areas on the project. ■ Review the research results of Transportation Research Board’s (TRB’s) Airport Cooperative Research Program (ACRP) Project o8-01: Sustainable Airport Construction Practices.
Required Documentation		Credits
<ul style="list-style-type: none"> ■ Agendas for Sustainable Construction Training. ■ Meeting materials (handouts, presentation slides, etc.). ■ Meeting minutes, decisions, ideas and the duties/responsibilities given and their due dates. 		<ul style="list-style-type: none"> ■ 1 point for developing and implementing a contractor/subcontractor sustainability training program.

<p>Implementation Performance Standard 3 – Contractor and Subcontractor Sustainability Training</p>		<p>IM-3 (1 point)</p>
<ul style="list-style-type: none"> ■ Attendance list including name, company, department, role on the project and contact information. ■ Explanation for the absence of key stakeholders and documentation that a separate meeting was held for those stakeholders that could not make the initial meeting. ■ Follow-up training to accommodate new employees on the information described above. 		
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Improves construction sustainability performance. ■ Economic Considerations <ol style="list-style-type: none"> 1. Assists in the avoidance of Stop Work Incidences and Change Orders that could potentially increase project costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Creates work environments where team members can proactively support sustainability. 		

Implementation Performance Standard 4 – Sustainability Inspection Program and Reporting	IM-4 (1 point)
<p>Intent Ensure compliance with chosen sustainable construction Performance Standards and promote sustainability as an active and on-going construction goal. Capture quantifiable information regarding sustainability activities on the construction project.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Designate an inspector to review activities and document field compliance with required performance standards on a regular basis. The selected inspector may be an experienced member of the contractor’s project team or the contractor’s LEED® Accredited Professional (AP). The inspector will work in conjunction with the sustainability trainer for this projects; AND ■ The designated inspector should be made available to answer questions about construction sustainability performance; AND ■ Work with the Aviation Department construction inspector, as requested; AND ■ Provide weekly inspection reports for submittal with the monthly payment requests, outlining the sustainability activities reviewed in the field, any problems noted and their resolutions; AND ■ Develop a Final Sustainable Construction Project Inspection Report within three months of substantial completion of the project, for the Sustainability Liaison to include in the final project documentation. Include field documentation of sustainable activities, such as photos, logs and synopsis of problems found and resolutions developed with the prime and subcontractors. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ The selected inspector, in conjunction with project and site managers, will develop the actions to be taken by the inspector in the field for any poor performance on chosen Performance Standards. This includes any follow up with the Sustainability Liaison. ■ Introduce the selected inspector to the construction team and allow them to have an introductory question and answer (Q&A) session. ■ Have the sustainability inspector assist in the sustainability training, and describe the inspection process and reporting. ■ Document sustainable activities. Develop weekly inspection logs customized to the project’s sustainable construction activities and record pertinent information. ■ Track progress at several stages throughout the construction process to provide continual feedback on sustainability performance. ■ Prepare interim progress reports to track and document gaps that may occur during the construction phase and report these to the Sustainability Liaison.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Credentials of the sustainability inspector to perform the inspections and the percentage of time made available to dedicate to Performance Standard activities inspections. ■ Submitted weekly progress reports included with the monthly payment request. ■ Final Sustainable Construction Project Report. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for designating an inspector and submitting weekly and a Final Sustainable Construction Inspection Project Report.

<p>Implementation Performance Standard 4 – Sustainability Inspection Program and Reporting</p>	<p>IM-4 (1 point)</p>
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Improves construction sustainability performance. 2. Ensures that construction sustainable requirements are met. ■ Economic Considerations <ol style="list-style-type: none"> 1. Assists in the avoidance of Stop Work Incidences and Change Orders that could potentially increase project costs. ■ Social Considerations <ol style="list-style-type: none"> 1. Maintains and creates a sustainable work environment where workers can proactively support sustainability. 2. Documents progress toward overall improvement in sustainability performance. 3. Facilitates knowledge transfer. 4. Provides on-going data to identify areas where improvement can be made. 	

Implementation Performance Standard 5 – Construction Scheduling and Sequencing	IM-5 (1 point)
<p>Intent Increase project efficiency and reduce environmental impacts by coordinating delivery of materials more exactly with installation times. This reduces the impacts on materials, including moisture exposure and physical damage, due to unnecessary on-site storage of materials. Have deliveries made during off-peak hours and by using designated haul routes. Prevent impacts to surrounding environment due to storage and transportation activities.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Closely coordinate material deliveries with installation and project phasing; AND ■ No staging of construction traffic in residential or other noise-sensitive areas near the airport will be allowed; AND ■ To the maximum extent possible, schedule truck deliveries of bulk materials such as aggregate, bulk cement, dirt, etc. during night hours and avoid peak local traffic periods on designated haul routes; AND ■ Minimize project impacts from materials storage to the site; AND ■ As early as possible, coordinate with the airport Operations Division, who will organize approvals and contact with interested Aviation Department divisions, the FAA, tenants and other contractors working onsite, as needed; AND ■ Recycle or send excess materials to another job site for use; AND ■ Develop and plan for a traffic control system through timely and frequent communication between contractors and Airport Operations; AND ■ Restrict the closure of existing roadways; AND ■ Ensure that construction traffic, deliveries and employees use the designated haul routes. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Publish a construction schedule with a focus on tight “just in time” scheduling and off-peak delivery of materials. Procure materials by project phase. ■ Reduce carbon footprint of the project by night and off-peak vehicle traffic and materials deliveries. ■ Minimize the extent and duration of exposure of bare ground surface to be opened at one time to prevent erosion at the source. Look at efficiencies with project stockpiling to reduce materials movement activities. ■ Schedule construction activities to minimize operational impacts on airside and landside airport activities. ■ Use approved traffic control contractors and signage that is appropriate for traffic control at appropriate locations. ■ Provide sufficient advance notification to the local community and Streets Department about upcoming lane closures. ■ Locate traffic staging areas away from residential development and comply with local regulations.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Pre-construction plans and schedules that phase material deliveries and installations and bring materials deliveries during off-peak hours. ■ Pre-construction plans and schedules that denote ecologically sensitive times and mitigation plans to avoid activities that will 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point awarded if all the required documents (pre-construction plans and schedules) are implemented with a focus on sustainability.

<p>Implementation Performance Standard 5 – Construction Scheduling and Sequencing</p>	<p>IM-5 (1 point)</p>
<p>adversely affect the environment during these times.</p> <ul style="list-style-type: none"> ■ Pre-construction plans and schedules that show restoration activities in collaboration with other project phases, including, but not limited to, restoring sidewalks, pavement and vegetation. ■ Documentation that excess materials from the job was transferred for use at another jobsite or recycled. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces impacts of construction activities from materials transport and storage. 2. Reduce the amount of raw materials that are used during construction by only ordering what is needed. 3. Reduce carbon footprint from excess deliveries and rework associated with scheduling conflicts. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces impacts and costs due to installation and replacement of damaged materials. 2. Reduces material costs by ordering only what is needed. 3. Reduces likelihood of incurring costs associated with permit violations. ■ Social Considerations <ol style="list-style-type: none"> 1. Minimizes impacts on airport activities and landside passenger traffic. 2. Improves morale and productivity of construction workers by reducing overtime hours. 	
<p>Resources</p> <p>USEPA resource for Lean Manufacturing and the environment focusing on “just in time” (JIT) implementation: www.epa.gov/lean/thinking/kanban.htm</p> <p>An independent study produced by UCSB explores the environmental impacts of JIT. Impacts can be categorized into three groups, based on their source change: a) Production - decreased waste and emissions due to increased efficiency and reduced overproduction; b) Personnel - increased ability to make environmental improvements due to better integration and training of personnel; and c) Suppliers - decreased energy use and emissions due to better transportation requirements. Appendix B to the study a table details the effects on air emissions, land use, energy use and solid and liquid wastes. The study is found at: www.bren.ucsb.edu/academics/courses/289/Readings/Nathan-2007.pdf</p> <p>Various white papers and reports specific to Lean Construction methodology can be found at the Lean Construction Institute: www.leanconstruction.org</p> <p>Examples include:</p> <ul style="list-style-type: none"> - More Just-In-Time: Location of Buffers in Structural Steel Supply and Construction Processes - Just-In-Time Concrete Delivery: Mapping Alternatives for Vertical Supply Chain Integration - Toward Construction JIT 	

Implementation Performance Standard 6 – Promote Use of Regional Materials and Local Suppliers (within 500 miles of the project)	IM-6 (1-3 points)
<p>Intent Maximize the use of regional materials and local suppliers to benefit the local community. Increase the demand for materials and products that are extracted and manufactured in the region. Reduces environmental, economic and social impacts associated with long distance transport of construction materials.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Generate a report detailing the typical (baseline) purchasing statistics with respect to local (within 500 miles) and non-local materials and suppliers awards; AND ■ Establish a policy for preferential use of regional materials and local suppliers; AND ■ Encourage subcontractors to use regional materials and local suppliers during contracting and bidding process; AND ■ Meet the requirement that 20% to 40% of the total cost of the project materials is from the use of regional materials and products and/or local suppliers; AND ■ Create a Materials Submittal Cover Sheet to be completed and submitted by all contractors and subcontractors for the project. It will indicate where their materials are extracted and manufactured and give information on the use of local suppliers. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Review materials needed for the job and require that subcontractors do the same for products that can be bought regionally (within 500 miles of the project site). ■ Evaluate materials for potential regional sources, including: concrete, architectural precast concrete, asphalt, structural steel, unit masonry, stone masonry, concrete pipe, manholes and handholes, electric duct banks, cable, gas and water piping and landscape material and seed. ■ Before project start, establish a project goal by material type for regional materials utilization. Identify suppliers and services available. Allow for possible longer order times. ■ Seek out regional materials and local suppliers for the project. ■ Introduce process efficiencies and reduce transportation costs due to shorter shipping distances, and develop a long-term collaborative relationship with local service providers.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Documentation of regional materials and local supplier selection that ensures that the contractors utilize local resources and companies. ■ List of local suppliers utilized and purchases made, by category and dollar amount. ■ Documentation, including a narrative, with completed attached “Materials Submittal Cover Sheet” and calculations showing that a percentage of project materials (by cost) were local products. ■ A procurement standard operating procedure (SOP) for applying benefit to local material and suppliers contracts. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point awarded if a local supplier-preferred procurement policy exists and was utilized to select a local supplier over non-local supplier for a minimum of 20% to 40% of project materials, based on cost, of the total value of the materials in the project. ■ 1 point awarded if a regional materials procurement policy exists and was utilized to select regional materials over non-regional for a minimum of 20% to 40% of the total cost of the materials in the project. ■ An additional point may be received if the percentage of regional materials used is over 40% of the total value of the materials in the project.

Implementation Performance Standard 6 – Promote Use of Regional Materials and Local Suppliers (within 500 miles of the project)	IM-6 (1-3 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces use of fossil fuels in the transport of materials and components. 2. Supports the use of indigenous resources. 3. Improves construction sustainability performance. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces costs associated with out-of-County transportation fees. 2. Improves local economy and increases local product availability. ■ Social Considerations <ol style="list-style-type: none"> 1. Stimulates the growth of local and regional economies. 2. Utilizing local materials and suppliers can increase the public pride and perception of the airport. 	
<p>Resources</p> <p>Adapt the LEED® Materials Submittal Cover Sheet to be included on all submittals, as created by Harvard University as part of the Harvard Green Building Resource. Track regional materials throughout project and give regular updates. Use the Materials Tracking Sheet.</p> <ul style="list-style-type: none"> – For the Materials Submittal Cover Sheet see: http://green.harvard.edu/theresource/new-construction/specifications/documents/Materials_Submittal_Cover_Sheet_LEED-NC.doc – For the Materials Tracking Sheet see: http://green.harvard.edu/theresource/new-construction/specification/documents/NC_Materials_Credit_Tracking_Sheet.xls – Create a regional materials map showing the 500-mile radius from Phoenix for use in materials and local supplier selection and to understand the definition of regional materials for the worksite: www.freemaptools.com/radius-around-point.htm 	

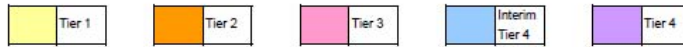
Air Quality Performance Standard 1 – Low-Emission Diesel Construction Vehicles, Equipment and Generators	AQ-1 (1-5 points)
<p>Intent The Aviation Department is dedicated to decreasing the impact of its construction activities by reducing air emissions generated from construction vehicles and equipment and encouraging the use of newer, cleaner units.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Use “low emissions” construction vehicles, equipment and generators as rated by USEPA and/or CARB*. Retrofit older equipment with warranty-covered lower emission reduction technology; AND ■ Comply with the appropriate USEPA Tier emission standards for equipment. Please see the Resources section in this Performance Standard to determine the vehicle Tiers by year and horsepower (hp); AND ■ Use alternative fuels such as biodiesel, where technologically feasible, or Arizona required ultra-low sulfur diesel (ULSD) fuel; AND ■ Develop and maintain an inventory of construction vehicles and equipment used during construction. The inventory must use the attached spreadsheet to include a listing, by vehicle type and rating, overall fuel usage and hours of operation, updated monthly during each phase of construction. <p>* CARB is the California Air Resource Board</p>	<p>Strategies</p> <ul style="list-style-type: none"> ■ Maximize the use of diesel vehicles that comply with the highest USEPA Tier diesel emission standard available. ■ Replace inefficient construction vehicles with low-emission models when available and feasible. ■ Retrofit less efficient equipment with low-emission retrofit technology (i.e., diesel particulate filters (DFPs), diesel oxidation catalysts (DOCs) and flow through filters (FTFs) or a muffler replacement device). ■ Encourage the use of alternative fuels such as biodiesel, as well as Arizona required ULSD fuel. ■ Properly maintain vehicles and equipment in accordance with manufacturers’ specifications and schedules to maintain the original vehicle emission levels.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Inventory of construction equipment and vehicles scheduled for use during the construction project. The inventory must use the attached spreadsheet and include equipment type; horsepower rating, year and other information shown, by owning contractor/subcontractor; and if retrofitted with an emission control device, the make, model and USEPA verification number for the device. ■ Submit an updated inventory spreadsheet with each payment request. Include the fuel usage by type (biodiesel/ULSD) and hours of equipment operation (by piece), broken into project phase, if applicable. 	<p>Additional Credits</p> <ul style="list-style-type: none"> ■ 1 point for using alternative fuels such as biodiesel, which are scientifically shown to reduce criteria pollutant emissions. ■ An additional point for each 25% increase of low emission vehicles. Maximum of four (4) additional points, up to 100% ‘low emissions technology’ for the project equipment.

Air Quality Performance Standard 1 – Low-Emission Diesel Construction Vehicles, Equipment and Generators	AQ-1 (1-5 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces emissions of criteria pollutants, hazardous air pollutants (HAPs) and greenhouse gases (GHGs) and decreases health impacts associated with diesel particulate matter. 2. Decreases fossil fuel consumption. 3. Assists in compliance with existing regulations. For example, ULSD is required by Federal law for use in all model year 2007 and later highway diesel engines and is recommended for use in all diesel engines. ■ Economic Considerations <ol style="list-style-type: none"> 1. Potential decreases in project permitting and approval costs. 2. Project costs may increase due to retrofits and replacements of engines. ■ Social Considerations <ol style="list-style-type: none"> 1. Improves work environment due to enhanced air quality. 2. Serves as a sustainable practice example for other businesses, airports and municipalities. 3. Shows leadership in sustainable construction practices. 	
<p>Resources:</p> <p>See attached Equipment and Generators Inventory Spreadsheet</p> <p>Off-Road Compression-Ignition (Diesel) Engine Tiers table by manufacture year. (see below)</p> <p>Two excellent 'how to guides' for types of diesel engine retrofits and how they work, including case studies of projects, is available from the Massachusetts Department of Environmental Protection at: www.mass.gov/dep/air/diesel/conretro.pdf and another from the Vermont Department of Transportation at: www.aot.state.vt.us/matres/Documents/ACROBAT.pdf/R&DDox/AOT-DieselOxidationCatalystRetrofitFinalReport.pdf</p> <p>U.S. Environmental Protection Agency's approved list of retrofit technology for construction equipment by manufacturer: www.epa.gov/otaq/retrofit/verif-list.htm</p> <p>The Associated General Contractors of America: www.agc.org</p>	

Off-Road Compression-Ignition (Diesel) Engine Tiers

Maximum Power	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+	
50≤bhp<75				Tier 1				Tier 2				Tier 3				Interim Tier 4		Tier 4				
75≤bhp<100				Tier 1				Tier 2				Tier 3			Interim Tier 4		Tier 4					
100≤bhp<175				Tier 1				Tier 2				Tier 3			Interim Tier 4		Tier 4					
175≤bhp<300				Tier 1				Tier 2				Tier 3 *			Interim Tier 4		Tier 4					
300≤bhp<600				Tier 1			Tier 2				Tier 3 *			Interim Tier 4		Tier 4						
600≤bhp<750				Tier 1			Tier 2				Tier 3 *			Interim Tier 4		Tier 4						
> 750bhp				Tier 1				Tier 2				Tier 3				Interim Tier 4		Tier 4				

* Certain manufacturers complied with the Tier 3 standards in 2005.



Air Quality Performance Standard 2 – Construction Vehicles, Equipment and Materials Delivery – Idling Restrictions	AQ-2 (2 points)
<p>Intent Reduce emissions and noise generated by restricting idling from construction vehicles, equipment and on- and off-road materials delivery vehicles.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Implement idling restrictions whereby no owner or operator of a vehicle shall permit the engine of such vehicle to idle for more than five (5) consecutive minutes within any 60-minute period. The only exception is where required by airport operations as directed for safety; AND ■ Develop a project-specific vehicle and equipment idling plan that outlines the development and implementation of a training program for drivers and equipment operators. This includes subcontractors and materials delivery trucks; AND ■ Implement a field citation program for non-compliance. The Prime contractor, airport operations or the City inspector may give Field citations. Citations issued must be noted in the project monthly report; AND ■ Idling exemptions are limited to manufacturer recommended minimum idle warm-up times (maximum 5 minutes) AND ■ Pre-2006 engines get a 2-minute shutdown; newer engines (post-2006) need none; AND ■ Post ‘No Idling’ signage in the project area. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Comply with Maricopa County idling ordinance for “on-road” diesel vehicles and submit a project-specific “off-road” vehicle and equipment idling plan, restricting idling time to less than 5 minutes in any 60-minute period. ■ Use auxiliary power units (APUs) or other “idle reduction technology”. The owner must prove that the APU is designed to provide air conditioning or electricity to the equipment that would otherwise require the operation of the main drive engine while the vehicle is stationary and that the APU exhaust runs through the particulate trap or other control device. ■ Establish truck and equipment staging zones where diesel emissions do not impact building air intakes and have the least impact on the public. ■ Note: See Resources section for website outlining federal tax exemptions for idling reduction devices.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Vehicle Idling Policy and training records, including subcontractor sign-on to initiative. ■ Identify areas on a site map where signage will be installed per the anti-idling plan. Provide evidence of installation (i.e., photographs). ■ Monthly report by vehicle/equipment number, of policy non-compliance citations given. ■ Inventory of vehicles making use of alternative idling reduction technologies. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for developing and implementing a vehicle and equipment idling plan.

Air Quality Performance Standard 2 – Construction Vehicles, Equipment and Materials Delivery – Idling Restrictions	AQ-2 (2 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Decreases fossil fuel consumption. 2. Reduces emissions of criteria pollutants, hazardous air pollutants (HAPs) and greenhouse gases (GHGs) and minimizes health impacts associated with diesel particulate matter. ■ Economic Considerations <ol style="list-style-type: none"> 1. Decreases project costs related to fuel consumption. 2. Reduces engine maintenance costs and extends engine life. ■ Social Considerations <ol style="list-style-type: none"> 1. Reduced noise pollution. 2. Improves worker and adjacent property environment. 	
<p>Resources</p> <p>Maricopa County Vehicle Idling Ordinance for On-Road (road licensed) Vehicles: www.maricopa.gov/Clk_board/Ordinances/P21_Vehicle_Idling_Restriction.pdf</p> <p>For further information, go to the website of The Associated General Contractors of America discussing their collaborating with the EPA on equipment idling programs.</p> <p>Also see National Idling Reduction Network News: www1.eere.energy.gov/vehiclesandfuels/resources/fcvt_national_idling.html</p> <p>For funding programs for diesel equipment retrofits see: http://westcoastcollaborative.org/programs.htm</p> <p>A Calculator for estimating potential savings from using auxiliary power, versus idling, is available at the Kenworth Truck site at: www.kenworth.com/flashpopup.asp?name=idle_calc_0508&w=640&h=480</p> <p>Or from Kohler Powers: www.kohlerpower.com/mobile/solutions/apucalculator.htm?sectionNumber=13361&nodeNumber=1&contentNumber=102</p> <p>National Clean Diesel Program funding available for public fleets or contractors working on public projects. Funding applicable for idle reduction technologies, cleaner fuels and engine replacement and/or upgrades. See www.epa.gov/diesel/grantfund.htm.</p>	

Air Quality Performance Standard 3 – Alternative Transportation Plan During Construction		AQ-3 (1 point)
<p>Intent Reduce vehicle emissions by providing alternative transportation to the job site for contractor staff. Reduces airport road congestion and fuel consumption from use of construction personnel private vehicles and company vehicles.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop and implement an Alternative Transportation Options Plan for construction personnel for both personal and company vehicles. Include carpooling, public transportation options and shuttle information. Require subcontractors to develop a plan to reduce vehicle miles driven to the jobsite and around the airport; AND ■ Where applicable, have contractor staff meet at the company’s office and provide a shuttle bus to the construction site; AND ■ Where applicable, ask for satellite parking for personal vehicles or satellite staging for company vehicles and carpool or have staff use the airport bus or city bus to the job site during the project. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Encourage use of existing mass transportation to the jobsite, including METRO Light Rail in conjunction with the Free Phoenix Airport Shuttle or city bus airport connections (Routes 13, 15 and 40). ■ Provide free passes to employees for Valley Metro Bus and Light Rail System. ■ Provide coordinated and staged private vehicle parking off the jobsite during construction. Provide shuttles to replace frequent vehicle travels between sites. ■ Create incentives for car sharing or carpooling with preferential parking. Develop disincentives to those that drive in single-occupancy vehicles, such as parking fees or permits. ■ Encourage employee carpooling by designating preferential parking locations for carpool vehicles. ■ Include bike racks at staging locations. ■ Encourage employees to leave personal vehicles at contractors’ trailer site and carpool in company-owned vehicles to and from the trailer site to the actual airport construction project location. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Alternative Transportation Options Plan. ■ Track use of carpools, shuttles and bikes, and bus passes given to employees. ■ Identify where preferential parking for carpooling and staged vehicle parking areas are located during construction. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for developing and implementing an Alternative Transportation Options Plan. 	

<p>Air Quality Performance Standard 3 – Alternative Transportation Plan During Construction</p>	<p>AQ-3 (1 point)</p>
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces emissions and minimizes health impacts. 2. Reduces land allocation for vehicle parking. 3. Decreases fossil fuel consumption. ■ Economic Considerations <ol style="list-style-type: none"> 1. Decreases costs related to fuel consumption. 2. Reduces lost time and wages related to vehicle accidents and injury. ■ Social Considerations <ol style="list-style-type: none"> 1. Reduces congestion from single occupancy vehicles. 2. Reduces road congestion and noise. 	
<p>Resources</p> <p>For information on Phoenix area alternative transportation outlets serving Phoenix Sky Harbor International Airport go to:</p> <p>www.valleymetro.org/ www.erideshare.com/carpool.php?city=Phoenix</p> <p>For information on Phoenix Sky Harbor International Airport transportation and parking options go to:</p> <p>www.skyharbor.com/transportation-and-parking/transportation-and-parking.htm</p> <p>For a list of successful carpooling strategies and to understand how carpooling can help go to :</p> <p>www.commuterpage.com/tentips www.italladdsup.gov/resources/what can i do.asp</p> <p>A calculator for estimating potential savings from ridesharing or carpooling is available at:</p> <p>www.rideshareonline.com/CostCalculator.htm www.valleymetro.org/cost_calculator</p>	

Air Quality Performance Standard 4 – Track Project Criteria Air Pollutant Emissions	AQ-4 (1 point)
<p>Intent The project information collected in this Performance Standard will be used by the airport to calculate the amount of project emissions reduced by the contractor’s mitigation measures, as selected.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Track criteria pollutants air emissions information for the project by submitting the following information to the Aviation Department : <ul style="list-style-type: none"> – Duration of construction phase. – Size of project site and staging area(s). – Quantity of cut/fill both onsite and offsite for the project. – Haulage distance and number of trips to offsite location(s). ■ From Performance Standard HC-AQ-1, Low-Emission Diesel Construction Vehicles, Equipment and Generators spreadsheet: <ul style="list-style-type: none"> – Air quality EPA rating information on construction vehicles and equipment. – Amount and type of fuel used in construction vehicles and equipment. – Hours of equipment operation. ■ Assess feasibility of including dust mitigation control measures above the minimum requirements, as set by the Maricopa County Department of Air Pollution Control; AND ■ Assess feasibility of including air emissions reduction measures as part of construction operations including, but not limited to, additional soil stabilizing measures, alternative fuels, use of diesel particulate filters, use of diesel oxidation catalyst and use of low Volatile Organic Compound (VOC) products; AND ■ Maximize reduction of criteria air emissions. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Use the spreadsheet in Performance Standard HC-AQ-1 to track criteria pollutant air emissions information for each phase of construction. ■ Identify construction operational changes to mitigate air emissions, such as alternative-fuel equipment, efficient construction scheduling and operations, retrofitting exhaust equipment on non-road vehicles and reducing traffic congestion from additional construction traffic or reducing traffic diversions due to construction. (See Performance Standards HC-AQ-1 through HC-AQ-5) ■ Use low VOC (i.e., friction-based, etc.) adhesives and coatings.

Air Quality Performance Standard 4 – Track Project Criteria Air Pollutant Emissions		AQ-4 (1 point)
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Completed Performance Standard HC-AQ-1 spreadsheet for off-road equipment and generators. ■ Project information on cut/fill, haul distances and number of trips, the duration of construction phase, size of project site and staging areas and other detailed information from the project to allow the Aviation Department to quantify actual air emissions reductions on the project. ■ Documentation of mitigation measures implemented. ■ Documentation of compliance with Maricopa County Rule 310, Fugitive Dust from Dust-Generating Operations. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for providing documentation on criteria air pollutants emissions information. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduction of overall criteria air emissions during construction phase. ■ Economic Considerations <ol style="list-style-type: none"> 1. Streamline compliance with current air quality regulations and requirements. ■ Social Considerations <ol style="list-style-type: none"> 1. Prevents health impacts associated with criteria air emissions. 		
<p>Resources: See air emissions tracking spreadsheet in Performance Standard HC-AQ-1. Maricopa County Air Quality Department, Dust Compliance Division website: www.maricopa.gov/airquality/divisions/compliance/dust/Default.aspx Maricopa County Rule 310, Fugitive Dust from Dust-Generating Operations: www.maricopa.gov/airquality/divisions/planning_analysis/rules/docs/310.pdf Maricopa County Rule 330, Volatile Organic Compounds: www.maricopa.gov/airquality/divisions/planning_analysis/rules/docs/330-9606.pdf</p>		

Air Quality Performance Standard 5 – Construction Materials Conveying Plan	AQ-5 (1 point)
<p>Intent Reduce emissions from construction vehicles related to transporting materials around the site.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Prepare and implement a Construction Materials Conveyance Management Plan which has the following: <ul style="list-style-type: none"> • List activities that will require repetitive shuttling from the same points; AND • When vehicles are being used for repetitive transportation, a conveyor should be evaluated for use to transport equipment; AND ■ Use GPS devices on construction vehicles and equipment to increase the accuracy and reduce the number of passes needed while grading to get the fill placed. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Evaluate the use of conveyor systems to transport materials from stockpile areas. ■ Set one supply delivery point so materials originate from the same area, thus maximizing use of a conveyor. ■ Use GPS devices on construction vehicles and equipment.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Pre-project Construction Materials Conveyance Management Plan and post-construction narrative describing how the goals of the plan were achieved during construction. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point awarded for preparing and implementing a Construction Materials Conveyance Management Plan
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces vehicle emissions. 2. Reduces environmental impacts from oil extraction and refinement. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces costs associated with running and maintaining vehicles. ■ Social Considerations <ol style="list-style-type: none"> 1. Reduces health impacts associated with diesel emissions, including asthma and acute bronchitis. 2. Minimizes site vehicle congestion. 	
<p>Resources</p> <p>Determining the correct size and load for conveyor systems to maximize the benefits of transporting materials via conveyors is outlined in the article written in the Engineering and Mining Journal: www.womp-int.com/story/2009vol05/story028.htm</p> <p>Unique conveyor problems and solutions are presented in this industry article: www.fennerdunlopamericas.com/pdf/UniqueProblemsFDAo105.pdf</p>	

Site Management Performance Standard 1 – Low Impact Development and Minimizing Site Disturbance	SM-1 (1-2 points)
<p>Intent Minimize unnecessary disturbance of soil, vegetation and other features during construction.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop a construction site plan that focuses on minimizing site disturbance and include: <ul style="list-style-type: none"> – A map of the limits of areas to be disturbed by project construction. – Strategic placement of staging areas to reduce traffic at the project site. – Landscape features to be preserved. – Vehicular traffic areas and facilities. – On-site chemical storage areas, showing secondary containment for all chemicals, fuels, lubricants, etc. – Locations of spill containment materials and emergency alarms (if applicable); AND ■ Train construction personnel on spill containment procedures and immediately report any spills onsite to the Aviation Department Communications Center at 602-273-3311 and follow required clean-up procedures; AND ■ Restrict construction access roads to areas that are already used, are graveled, will be paved during construction or are already paved; AND ■ Use trenchless technology when installing utility conduits; AND ■ Avoid disturbing vegetation for staging areas. If a previously stabilized area is disturbed during construction, the contractor must return the area to its original condition; AND ■ Develop a lined pit washout area for concrete trucks and equipment; dig up and remove at the completion of construction; AND ■ Follow track out controls as required by the air quality dust permit. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Use construction documents to develop a site construction and staging plan and delineate access roads and staging areas. Reduce the areas of disturbance to the extent practical. ■ Work with the City project manager and/or project designer to locate and protect existing infrastructure, including monitoring wells and utilities. If an unknown feature is found, immediately contact the City project manager and the Aviation Department Environmental Section at 602-273-8861. ■ Ensure that subcontractors have been briefed on access roads and staging area locations, and enforce those procedures. ■ Flag or otherwise mark areas not to be disturbed. ■ Use just-in-time delivery of materials to reduce staging needs. ■ Protect unconsolidated material to be staged from weather by covering or otherwise securing it. ■ Prepare a Spill Prevention Plan for construction activities, including fuel, lubricant and chemical storage areas.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Prior to the NTP, submit a Construction Site Plan showing compliance with required actions for approval by the City project manager. ■ After construction, provide a narrative detailing how site disturbance was minimized during construction. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Points will be awarded according to the following schedule: <ul style="list-style-type: none"> – 1 point for development of an approvable Construction Site Plan – 1 point for successful follow through of the Construction Site Plan elements with no significant spills or issues.

Site Management Performance Standard 1 – Low Impact Development and Minimizing Site Disturbance	SM-1 (1-2 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Minimizes need for erosion and sedimentation control. 2. Reduces spills from fuel, lubricant and chemical storage. ■ Economic Considerations <ol style="list-style-type: none"> 1. Minimizes need and cost for landscaping materials. 2. Maintains infiltration rate of stormwater by reducing soil compaction. ■ Social Considerations <ol style="list-style-type: none"> 1. Preserves existing vegetation and habitat. 	
<p>Resources</p> <p>USEPA, “Storm Water Management Fact Sheet Spill Prevention Planning”, www.epa.gov/owm/mtb/spillprv.pdf</p> <p>Website about trenchless technology: www.trenchlessonline.com/</p> <p>Arizona’s Multi-Sector General Permit (MSGP) 2010: www.azdeq.gov/enviro/water/permits/msgp.html</p>	

Site Management Performance Standard 2– Use of City-Approved Dust Palliatives		SM-2 (1 point)
<p>Intent Use only City-approved Dust Palliatives to prevent air and water pollution from wind erosion at construction sites.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Use only acrylic polymer dust palliatives; AND ■ Provide the Material Safety Data Sheets (MSDSs) for proposed palliative products, the proposed application rate, application methodology and cure time to the City project manager for approval before using at the project site. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Research acrylic polymer dust palliative products for available types, application rates and soil preparation needs. ■ Use City-approved dust palliatives. ■ Consider use of dust palliatives to reduce construction-generated dust during the project and on haul roads. ■ Do not allow traffic after final application of palliative. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ MSDSs of acrylic polymer dust palliatives products to be used on the project, map of application area, application rate and methodology. ■ The City project manager’s approval of product. ■ Invoice for purchase of product approved for use by the City project manager. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for using City-approved palliatives. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Prevents environmental compliance issues with regulatory agencies responsible for dust control and stormwater run-off quality. ■ Economic Considerations <ol style="list-style-type: none"> 1. Prevents lost of valuable topsoil from construction site. ■ Social Considerations <ol style="list-style-type: none"> 1. Prevents health impacts, such as asthma, from wind-borne dust. 2. Prevents complaints from neighbors to the project site. 		
<p>Resources Clark County, Nevada’s excellent dust handbook is available at: www.cleanairnet.org/caiasia/1412/articles-58190_resource_1.pdf. See Appendix 2, Table 2 and following notes. Maricopa County Air Quality Department’s Dust Compliance Division website: www.maricopa.gov/aq/divisions/compliance/dust/Default.aspx Arizona Department of Environmental Quality Air Quality Division website: www.azdeq.gov/environ/air/index.html</p>		

<p>Energy Management Performance Standard 1 – Project Energy Requirements and Management Plan/Stationary Power</p>	<p>EM-1 (1-2 points)</p>
<p>Intent Determine construction project energy needs for the initial and long-term phases of the construction project. Reduce the use of non-stationary power units, where feasible.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop a Project Energy Requirements Plan with an inventory for a minimum of the top five energy usage construction processes (e.g., batch plants, job trailers, processes run by generators, etc.). List the equipment and proposed schedule of use for each process. <p>AND for an additional point:</p> <ul style="list-style-type: none"> ■ Prior to the NTP, request information from the design team on stationary power sources in or near the project area. Work with the City project manager and Aviation Facilities and Services to determine if stationary power is available; AND ■ If so, contact the power utility with a request for access to a stationary power source for energy consuming activities. Develop the request at least one month in advance of equipment set up for a connection and metering at the stationary power source. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Gather input from project mobilization/set up staff, subcontractors and the project delivery team to develop a Project Energy Requirements Plan. ■ Create an inventory of energy use processes, project electrical uses and schedule of use for each process. ■ List the inventory from highest energy usage to lowest energy usage, including energy source (e.g., generator, etc.) and size in horsepower (hp). ■ Identify top energy-intensive processes and evaluate for alternatives to generating units. ■ Use the Project Energy Requirements Plan to inventory, manage and plan energy-intensive processes and to identify less efficient processes. ■ Develop an energy use budget for the duration of the construction phase of the project. Identify strategies that can be used to reduce energy consumption for the construction phase. <p>For the additional point:</p> <ul style="list-style-type: none"> ■ Request a map and additional information from the design team on stationary power supply in the project and staging areas. ■ Contact the City project manager, Aviation Facilities and Services and Arizona Public Service (APS) with a stationary power connection request, where feasible.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ (1 Point) Narrative describing top five energy usage construction processes and how energy related devices were designated and selected to be as energy efficient as possible. ■ (1 Additional Point) Provide a map of stationary power sources in and near the project area and a log of communication with City staff and APS attempting to obtain stationary power connection for at least one of the top five power uses. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for developing and implementing a Project Energy Requirements Plan. ■ 1 additional point if stationary power can be used for at least one process.

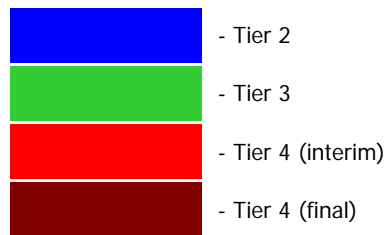
<p>Energy Management Performance Standard 1 – Project Energy Requirements and Management Plan/Stationary Power</p>	<p>EM-1 (1-2 points)</p>
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces carbon footprint and project air emissions. 2. Reduces consumption of non-renewable resources. 3. Reduces environmental impacts from oil extraction and refinement. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces energy costs and buffers against volatile energy markets. ■ Social Considerations <ol style="list-style-type: none"> 1. Reduces health impacts associated fuel emissions, including asthma and acute bronchitis. 	
<p>Resources Contact for APS connection: www.aps.com/main/services/construction/corner/corner_36.html</p>	

Energy Management Performance Standard 2 – Energy Efficient Lighting and Equipment and Energy Requirements Plan	EM-2 (1-2 points)
<p>Intent Determine construction project energy needs for the initial and long-term phases of the projects and reduce energy use by utilizing energy efficient lighting, equipment and generator sets during construction.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop a Project Energy Requirements Plan with an inventory for a minimum of the top five construction energy usage processes (e.g., materials batch plants, job trailers, processes run by generators, etc.). List the equipment and proposed schedule of use for each process. <p>AND for an additional point:</p> <ul style="list-style-type: none"> ■ Meet two of the three following initiatives: <ul style="list-style-type: none"> – Utilize energy-efficient, solar powered or bio-fuel run equipment; OR – Use equipment that has been shown to result in greater energy savings during construction activities; OR – Use generator model set(s) 2007 or newer and meet the EPA Tier certification ratings (See attached Tier ratings by manufacture year for ease of identification). 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Gather input from project mobilization/set up staff, subcontractors and the project delivery team to develop a Project Energy Requirements Plan. ■ Create an inventory of energy use processes, project electrical uses and schedule of use for each process. ■ List the inventory from highest energy usage to lowest energy usage, including energy source (e.g., generator, etc.) and size in horsepower (hp). <p>For the additional point:</p> <ul style="list-style-type: none"> ■ Use equipment that has high-energy efficiency, utilize sustainable fuels (i.e., biodiesel) or generate power through renewable resources (i.e., solar). ■ Utilize light emitting diodes (LED), organic LEDs, compact fluorescent lights (CFLs) or best available technology for lighting solutions. ■ Use solar powered (battery) lighting banks. ■ If generators are used at the jobsite, use only post-2007 manufactured generators and meet the project efficiency ratings for those generators.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ (1 Point) Narrative describing top five energy usage construction processes and how energy related devices were designated and selected to be as energy efficient as possible. ■ (1 Additional Point) Provide cut sheets or other product documentation for energy-efficient equipment, lighting and generators used during construction that show their EPA or energy rating. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for developing and implementing a Project Energy Requirements Plan. ■ 1 additional point for utilizing energy efficient or less emitting equipment or renewable energy sources during construction activities.

<p>Energy Management Performance Standard 2 – Energy Efficient Lighting and Equipment and Energy Requirements Plan</p>	<p>EM-2 (1-2 points)</p>
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces the carbon footprint and project air emissions, and saves energy. 2. Reduces environmental impacts from oil extraction and refinement. 3. Reduces pollution and environmental impacts due to production of energy. 4. Conserves natural limited resources by reducing global greenhouse gasses produced from fossil fuel-based power plants. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces energy costs and buffers against volatile energy markets. ■ Social Considerations <ol style="list-style-type: none"> 1. Reduces health impacts associated fuel emissions, including asthma and acute bronchitis. 2. Encourages use of new technologies. 3. Reduces dependence on coal, oil and natural gas for energy production. 	
<p>Resources</p> <p>U.S. Department of Energy (USDOE) website indicates that use of new lighting technologies can reduce lighting energy use by 50% to 75%: www.energysavers.gov/</p> <p>The energy star program identifies products that can assist in reaching energy reduction goals. www.energystar.gov/index.cfm?c=products.pr_find_es_products</p>	

This chart identifies the timed structure of the emission reduction program applicable to diesel generator sets (gensets) manufacturing:

<u>kW</u>	<u>hp</u>	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
0 - 7	0 - 10	Blue	Blue	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red
8 - 18	11 - 24	Blue	Blue	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red
19 - 36	25 - 48	Blue	Blue	Red	Red	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red
37 - 55	49 - 74	Blue	Blue	Green	Green	Green	Green	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red	Dark Red
56 - 74	75 - 99	Blue	Blue	Green	Green	Green	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red
75 - 129	100 - 173	Blue	Green	Green	Green	Green	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red
130 - 224	174 - 301	Green	Green	Green	Green	Green	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red
225 - 449	302 - 602	Green	Green	Green	Green	Green	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red
450 - 560	603 - 751	Green	Green	Green	Green	Green	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red
> 560	> 751	Blue	Blue	Blue	Blue	Blue	Red	Red	Red	Dark Red	Dark Red	Dark Red	Dark Red



Tier 1 engine conversions were implemented from 1994 to 2006.

Tier 2 and 3 emission reductions began for certain sizes and applications of diesel engines, phased in during 2000-2008.

Therefore, diesel gensets manufactured after January 1, 2007, use newer Tier 2 and Tier 3 compliant engine designs.

<p>Energy Management Performance Standard 3 – Energy Systems Commissioning and Installed Systems Testing</p>	<p>EM-3 (2 points)</p>
<p>Intent Work with the commissioning agent to verify that mechanical and electrical systems and controls have been installed and calibrated correctly and perform according to the design. Provide contractor input into development of procedures for operation, maintenance and recalibration for installed system(s). OR Use thermal infrared imaging procedures for identifying mechanical and electrical installation issues.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Designate an individual to be the main point of contact for the verification and commissioning of contractor-installed energy systems to assure their correct performance; AND ■ Develop and perform the “contractor role” for the Commissioning Plan. Assist in the startup requirements, coordinate schedules for testing and assist with the requirements to document and verify the commissioning process; AND ■ Submit product information and assist in the compilation of an O&M Manual for operation and maintenance staff to keep equipment consistently performing. Include checklists, schedules and data log sheets. <p>OR</p> <ul style="list-style-type: none"> ■ Use thermal infrared imaging methods during the construction process to detect any installation issues. Look for mechanical and electrical heat signals signifying poor connections or parts. Submit findings and correction documentation. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Identify a staff member to communicate with the commissioning agent early on in the startup and commissioning process. ■ Sit in design review and submittal review meetings for HVAC, lighting, power supply, plumbing systems, etc. to be installed by the contractor. ■ Read and understand the developed commissioning plan and the contractor’s role. Incorporate appropriate requirements into subcontractor documents to clearly state all responsibilities in the commissioning process. ■ Complete pre-functional and functional checklists. Work with the commissioning agent to develop system tests, coordinate all fieldwork and schedules for walk-throughs. ■ Respond to all questions on systems installed and adjust deficiencies. ■ Provide a full set of construction documentation. Give all pertinent information, logs, documentation on products, O&M manuals supplied with the equipment and startup testing results to the commissioning agent to complete the commissioning report. ■ Work with the leader of the commissioning process in developing O&M manuals for commissioned energy systems. ■ Discuss with the owner and commissioning agent possible installation and use of sub-metering for later owner measurement and verification and continuous commissioning. <p>OR</p> <ul style="list-style-type: none"> ■ Use thermal imaging techniques for identifying ‘hot connections’, bad bearings, ‘dragging’ or

Energy Management Performance Standard 3 – Energy Systems Commissioning and Installed Systems Testing	EM-3 (2 points)
	other installation issues and correct them and/or report the issue.
Required Documentation <ul style="list-style-type: none"> ■ Documentation verifying attendance at commissioning coordination meetings. ■ Summary of process and startup forms signed by commissioning agent. ■ Copies of the manufacturer’s O&M manuals for all installed systems and a complete set of record drawings showing facility, as constructed. <p>OR</p> <ul style="list-style-type: none"> ■ Written logs of thermal imaging testing, results found and corrective actions taken. 	Credits <ul style="list-style-type: none"> ■ 2 points for the successful assistance in the implementation of a Commissioning Plan and an O&M Manual for all contractor-installed systems. <p>OR</p> <ul style="list-style-type: none"> ■ 2 points for complete thermal imagery testing on contractor-installed electrical or mechanical systems.
Benefits <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces energy and power consumption, which in turn reduces emission of greenhouse gases. 2. Facilitates compliance with federal, state and local air quality and water regulations. 3. Reduces consumption of excess natural & non-renewable resources. ■ Economic Considerations <ol style="list-style-type: none"> 1. Proper commissioning and O&M program ensures design life expectancy of equipment should be achieved. 2. Well run O&M programs can save 5%-20% on energy bills without significant capital investment. ■ Social Considerations <ol style="list-style-type: none"> 1. Safety of staff increased due to safer, properly maintained equipment. 2. Ensures comfort, health and safety of building occupants through properly functioning equipment to provide a healthy indoor environment. 	
Resources <p>USGBC, 2005. LEED® for New Construction and Major Renovations Version 2.2, October.</p> <p>USDOE, 2004. Operations & Maintenance Best Practices – A Guide to Achieving Operational Efficiency, Release 2.0; Prepared by Pacific Northwest National Laboratory for the Federal Energy Management Program, July.</p> <p>Portland Energy Conservation, Inc. (PECI), 1999. Fifteen O&M Best Practices.</p>	

<p>Materials & Resources Performance Standard 1 – Construction Waste Management Plan</p>	<p>MR-1 (0 points) Required</p>
<p>Intent Promote waste diversion and good housekeeping practices at the work site. Create a plan that identifies demolition and construction waste streams from the project. It will outline the goals and methods to divert this waste from landfills and to return appropriate materials into the manufacturing life cycle.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop and implement a Construction Waste Management Plan that: <ul style="list-style-type: none"> – Identifies waste materials from the project and which materials can be diverted from disposal; AND – Establishes goals for diversion from disposal in landfills ; AND – Identifies the construction haulers and recyclers to handle the designated recyclable materials; AND – Locations where the materials will be sorted on-site and stockpiled; AND – Describes the plan for communicating, training and implementing, monitoring and maintaining appropriate recycling and diversion sites and practices on the project; AND – Establishes the procedures to make salvaged resources available to other airport projects and the regional construction community; AND – Tracks recycling efforts throughout the construction process, by waste type and destination; AND – Tracks separately the amount(s) of soil, asphalt and concrete saved or recycled for future airport projects; AND ■ Include procedures for requiring the purchase of products with reduced and/or recyclable packaging in the plan. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Evaluate, at a minimum, the following project waste for recycling: <ul style="list-style-type: none"> ■ Cardboard ■ Land-clearing debris ■ Metal ■ Brick ■ Gypsum wallboard ■ Concrete ■ Asphalt ■ Plastic ■ Clean wood ■ Cable/wire ■ Identify project waste that can be used as a resource to another project such as: <ul style="list-style-type: none"> ■ Concrete ■ Fill ■ Asphalt ■ Land-clearing debris ■ Small ancillary buildings or structures ■ Prior to the project, identify recyclers for each waste stream and advertise wastes that could be used or salvaged. ■ Designate a specific area(s) for each recycling stream, map them on to project plans and distribute to involved staff and subcontractors. Coordinate salvaged material efforts. ■ Track recycling efforts throughout the construction process. ■ Make as a contract condition the requirement that the subcontractors evaluate and develop a plan for subcontractor materials practices for refused or rejected materials. ■ Avoid the use of non-recyclable or excessive packaging, when possible. Specify to suppliers the use of metal strapping versus shrink wrap; paper versus foam or plastic packaging, etc.

Materials & Resources Performance Standard 1 – Construction Waste Management Plan	MR-1 (0 points) Required
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Construction Waste Management Plan by prime and subcontractors, including site map indicating recyclable material holding areas, and the signatures by project team members to adhere to their developed plans. ■ Completed LEED® waste management template outlining the type/category of waste, waste recycled, location of receiving agent, quantity of waste and narrative describing approach. ■ Final documentation of wastes recycled, reused, sold, used on another job, by weight/volume and signed receipts by waste acceptor. ■ Documentation of purchases of products and construction materials with reduced packaging, including photos of deliveries with reduced packaging methods shown or invoices specifying packaging methods. 	<p>Credits</p> <ul style="list-style-type: none"> ■ Required to develop and implement a Construction Waste Management Plan
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Extends the life of existing landfills and reduces the need for new landfills through the reduction of total waste disposed. 2. Reduces the demand for raw materials. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces the need and the cost to haul waste materials off-site. 2. Decreases costs associated with landfill disposal. ■ Social Considerations <ol style="list-style-type: none"> 1. Promotes environmental stewardship with project employees and sub-contractors through good housekeeping practices at the work site. 	
<p>Resources</p> <p>“Construction Waste Management Database” provided by the Whole Building Design Guide contains information on companies that haul, collect and process recyclable debris from construction projects: www.wbdg.org/tools/cwm.php</p> <p>Facilities in the U.S. that accept construction and demolition waste, sorted by USEPA Regions, are provided by the Construction Industry Compliance Assistance Center (CICA): www.cica.org</p> <p>The USEPA report, “RCRA in Focus: Construction, Demolition and Renovation” is available at www.epa.gov/waste/inforesources/pubs/infocus/rif-c&d.pdf. This report provides suggested strategies for inclusion in a waste management plan without violating regulatory requirements and discusses special materials-handling issues in construction and demolition waste.</p> <p>The King County Solid Waste Division provides some helpful tools for writing clear and manageable recycling and diversion expectations into contract documents at: www.greentools.us.</p> <p>An example reporting template for waste streams diverted during the project is at: www.ga.wa.gov/eas/cwm/CWMPPlan-ReportingForm.xls</p>	

<p>Materials & Resources Performance Standard 2 – ON-SITE Reuse or Recycling of Construction Materials and Infrastructure</p>		<p>MR-2 (1- 2 points)</p>
<p>Intent Avoid use of landfills for construction debris. Maximize the reuse or recycling of material on-site and reduce the amount of construction waste taken from the jobsite.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Using the Construction Waste Management Plan (HC-MR-1) develop a plan and goals for City approval to reuse or salvage on-site a percentage of construction and demolition waste; OR ■ Get City project manager approval to apply salvaged material from another construction site to the project site; OR ■ Identify project waste that is a resource to another airport project, such as concrete, fill, asphalt, etc; AND ■ Track all wastes by quantities of wastes recycled, either by volume or weight (used consistently). 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Review the Construction Waste Management Plan for materials that can be reused or recycled on site. ■ Evaluate clean salvageable materials from other jobsites for project use. ■ Work with the project engineer or designer to get approval for proposed reusable materials as satisfying the specifications. Assist with any material testing, as directed by the designer or City, for appropriate substitution parameters. ■ Develop a detailed Lay-Down/Sequencing Plan for the materials to be reuse/recycled. ■ Require by contract the subcontractors to evaluate their materials. Coordinate their wastes with salvaged material efforts. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ City and/or designer approval that the waste meets the specifications as a substitution for virgin product. ■ Track salvaging efforts throughout the construction process. Calculation of percentage of the materials salvaged, either by weight or by volume, but done consistently throughout. ■ Document the end-use of the salvage materials with a narrative report, including any special circumstances, with materials quantities spreadsheets (see LEED®). ■ Document haul miles saved by recycling on-site versus distance to the landfill. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 Potential Points ■ Points will be awarded according to the following schedule: <ul style="list-style-type: none"> - 15%to 25% reused or salvaged = 1 point - 26% to 40% reused or salvaged = 2 points 	

Materials & Resources Performance Standard 2 – ON-SITE Reuse or Recycling of Construction Materials and Infrastructure	MR-2 (1- 2 points)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Extends the life of existing landfills through the reduction of total waste generated. 2. Reduces the demand for raw materials. 3. Diverts construction waste from landfills. 4. The reuse of materials promotes the reduction of extraction and processing of virgin materials for new products. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reuse of on-site materials reduces the need and the cost to haul offsite materials. 2. Decreases costs associated with landfill disposal. ■ Social Considerations <ol style="list-style-type: none"> 1. Promotes environmental stewardship with project employees and subcontractors through good housekeeping practices at the work site. 	
<p>Resources</p> <p>“Construction Waste Management Database” provided by the Whole Building Design Guide contains information on companies that haul, collect and process recyclable debris from construction projects: www.wbdg.org/toos/cwm.php</p> <p>USEPA National Service Center for Environmental Publications (NSCEP), “Characterization of Building-Related Construction and Demolition Debris in the United States” is a report characterizing building-related construction and demolition debris generated in the US: www.epa.gov/wastes/hazard/generation/sqg/c%26d-rpt.pdf</p>	

<p>Materials & Resources Performance Standard 3 – OFF-SITE Recycling for Reuse of Construction Materials and Infrastructure</p>		<p>MR-3 (1-2 points)</p>												
<p>Intent Avoid use of landfills for construction debris and recycle or reuse material off-site, if on-site recycling is not an option.</p>														
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Using the Construction Waste Management Plan (HC-MR-1) develop a plan and goals for City approval to reuse or salvage off-site a percentage of construction and demolition waste; OR ■ Develop a plan for City approval that allows recycled material from another construction site to be used on the project site; AND ■ Track all recycled wastes by quantities of wastes recycled, either by volume or weight (use consistently). 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Prior to the beginning of site activities, review opportunities from the Construction Waste Management Plan for materials that can be reused or recycled off-site. ■ Advertise salvageable materials before project starts for off-site acceptance and contact facilities that accept waste for recycle. ■ Implement the Construction Waste Management Plan. ■ Develop and implement a detailed Lay-Down and Sequencing Plan for the materials to be reuse/recycled. Designate a specific site area for collection and storage of materials to be recycled off-site. ■ Require by contract that subcontractors evaluate their job for waste materials and propose wastes that can be recycled. Evaluate all subcontractor wastes. ■ Have subcontractors propose recycling procedures and/or have subcontractors sign on to existing plans. Coordinate their wastes with salvaged material efforts. ■ Recycle, sell or reuse off-site the following waste: <table border="0" data-bbox="873 1367 1382 1688"> <tr> <td>■ Cardboard</td> <td>■ Asphalt</td> </tr> <tr> <td>■ Land-clearing debris</td> <td>■ Plastic</td> </tr> <tr> <td>■ Metal</td> <td>■ Clean wood</td> </tr> <tr> <td>■ Brick</td> <td>■ Job staff wastes</td> </tr> <tr> <td>■ Concrete</td> <td>■ Rebar and utility waste</td> </tr> <tr> <td>■ Gypsum wallboard</td> <td>■ Cable/wire</td> </tr> </table> 		■ Cardboard	■ Asphalt	■ Land-clearing debris	■ Plastic	■ Metal	■ Clean wood	■ Brick	■ Job staff wastes	■ Concrete	■ Rebar and utility waste	■ Gypsum wallboard	■ Cable/wire
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■ Brick	■ Job staff wastes													
■ Concrete	■ Rebar and utility waste													
■ Gypsum wallboard	■ Cable/wire													

Materials & Resources Performance Standard 3 – OFF-SITE Recycling for Reuse of Construction Materials and Infrastructure		MR-3 (1-2 points)
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ City approval that the waste can be taken off-site for recycling or salvaging and is not useful for the project. ■ Track salvaging efforts throughout the construction process. Calculation of percentage of the materials salvaged, either by weight or by volume but done consistently throughout (see LEED® spreadsheets). ■ Document the end-use of the salvage materials with a narrative report, including any special circumstances, with materials quantities spreadsheets, and waste acceptance receipts. ■ Document haul miles saved by recycling versus distance to the landfill. Track the salvaging efforts throughout the construction process. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 Potential Points ■ Points will be awarded according to the following schedule: <ul style="list-style-type: none"> – 15% recycled (by weight) = 1 point – 25% recycled (by weight) = 2 points 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Extends the life of existing landfills and reduces the need for new landfills through the reduction of total waste generated. 2. Reduces the demand for raw materials. ■ Economic Considerations <ol style="list-style-type: none"> 1. Decreases costs associated with landfill disposal. ■ Social Considerations <ol style="list-style-type: none"> 1. Promotes environmental stewardship with project employees and sub-contractors through good housekeeping practices at the work site. 		
<p>Resources</p> <p>“Construction Waste Management Database” provided by the Whole Building Design Guide contains information on companies that haul, collect and process recyclable debris from construction projects: www.wbdg.org/toos/cwm.php</p> <p>Facilities in the U.S. that accept construction and demolition waste, sorted by EPA Regions, are provided by the Construction Industry Compliance Assistance Center (CICA): www.cica.org</p>		

<p>Materials & Resources Performance Standard 4 – Use of Recycled Content Materials</p>		<p>MR-4 (1 point)</p>
<p>Intent Use products that incorporate recycled content materials for the project, thereby reducing impacts resulting from extraction and processing of virgin materials.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Use materials made with a recycled content of at least 20% of the product; AND ■ Use these recycled content products for at least 5% of the total value of the materials cost of the project; AND ■ Develop a plan for the City project manager or designer approval to use these recycled content products. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Review materials needed for the job and require subcontractors to do the same for products that can be bought with recycled content. ■ Establish a project goal by material type for recycled content. ■ Early in the project planning, identify material suppliers that can provide recycle content products to achieve the goal, and schedule any early ordering needed to procure these recycled content products. ■ Use materials with both post-consumer (i.e., plastics, steel or rubber tires) and post-industrial recycled content (i.e., concrete with fly ash component, recycled asphalt). ■ During construction, verify that the specified recycled content materials are installed, and quantify the total percentage of recycled content materials used. ■ Multiply the recycled content in the material by the total weight of the material to determine the percent of recycled material per product. ■ Specify asphalt (airfield and non-airfield) with a minimum percentage of recycled content. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide technical fact sheets on available materials with recycled content for the project to the City and designer for product acceptance early in the project planning. ■ Document products used with recycled content, amounts used, cost, the percentage of pre- and post-consumer recycled content per product and a narrative. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point is awarded for using products with at least 20% recycled content for a minimum of 5% of the total value of the materials in the project. 	

Materials & Resources Performance Standard 4 – Use of Recycled Content Materials	MR-4 (1 point)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Minimize use of fossil and other non-renewable energy sources in the harvesting of raw materials and the manufacture of components. 2. Improves construction sustainability performance. 3. Diverts solid waste from landfills and incinerators by turning them in to new products. ■ Economic Considerations <ol style="list-style-type: none"> 1. Increases market demand for recycled materials. ■ Social Considerations <ol style="list-style-type: none"> 1. Creates work environments where team members can proactively support sustainability. 	
<p>Resources</p> <p>Definitions:</p> <ul style="list-style-type: none"> – <i>Recycled content</i> is defined by the International Organization of Standards document: ISO 14021 – Environmental Labels and Declarations. Recycled content materials should be clearly defined in accordance with the Federal Trade Commission document, <i>Guides for the Use of Environmental Marketing Claims</i>, 16 CFR 260.7 (e), available at: www.ftc.gov/bcp/grnrule/guides980427.htm. – <i>Post consumer material</i> is defined as waste material generated by households or by commercial, industrial and institutional facilities, and manufactured into usable products. – <i>Pre-consumer material</i> is defined as material diverted from the waste stream of a manufacturing process, and manufactured in to a usable product. <p>Websites with recycled content directories include the California Integrated Waste Management Board at www.ciwmb.ca.gov/rcp and Building Green, Inc. at www.buildinggreen.com/menus/index.cfm.</p> <p>USEPA Recon Tool:</p> <p>USEPA created the Recycled Content (ReCon) Tool to help companies and individuals estimate life-cycle greenhouse gas (GHG) emissions and energy impacts from purchasing and/or manufacturing materials with varying degrees of post-consumer recycled content. www.epa.gov/climatechange/wycd/waste/calculators/ReCon_home.html</p> <p>Consider the following major building components for specifying a minimum recycled content:</p> <ul style="list-style-type: none"> • Aggregate in cast-in-place concrete • Fly ash in cast-in-place concrete • Aluminum doors and windows • Bituminous concrete pavement • Unit pavers • Steel reinforcement • Structural steel • Fly ash in pre-cast concrete, including site work and infrastructure piping • Aggregate in pre-cast concrete, including site work and infrastructure piping • Miscellaneous Steel • Steel fencing • Unit masonry • Aluminum products • Ductile iron pipe • Acoustic ceilings • Drywall • Plaster • Terrazzo • Steel doors and frames • Toilet sand showers • Sheet metal ductwork • Site lighting • Special finishes 	

<p>Environmental Quality Performance Standard 1– Noise and Vibration Mitigation Plan</p>	<p>EQ-1 (2 points)</p>
<p>Intent Prior to the commencement of construction, establish acceptable noise and vibration levels for stationary, portable and power-actuated construction equipment. For each construction phase, develop control measures as indicated to reduce noise and vibration levels from construction activities adjacent to commercial and residential communities and for passenger and employee comfort.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Prior to the start of construction, develop a Noise and Vibration Mitigation Plan based on equipment to be used and by project phase. Establish target noise and vibration levels in relation to commercial and residential communities and passenger areas adjacent to the project; AND ■ In the Plan, provide a list of equipment to be used by type and noise level rating (from the equipment manufacturer specification sheet). The list will include the hours and days of operation expected for the project. Submit a map of the project area and nearby noise sensitive areas in the noise and vibration Plan; AND ■ Submit the Plan to the City project manager. The Plan will include the recommended noise and vibration mitigation measures or special work schedules for certain activities. This will help establish construction equipment and land-use-specific noise and vibration limits for both daytime and nighttime activities; AND ■ Implement the Plan and the construction noise and vibration control measures recommended in the Noise and Vibration Mitigation Plan; AND ■ As needed, conduct regular weekly review of noise and vibration levels at locations identified in the Noise and Vibration Mitigation Plan to ensure compliance with construction noise and vibration levels; AND ■ If there is specialty equipment that produces unacceptable noise levels or an area of work that is particularly noise sensitive, the City project manager may request monitoring. Mitigation may be required. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Establish a Noise and Vibration Mitigation Plan using local ordinance noise restrictions and input from the City project manager. ■ Base construction noise and vibration levels on construction equipment. Determine if noise control measures are required. ■ Require subcontractors to submit sound and vibration reduction construction plans to mitigate unwanted construction noise and vibration. ■ Program locations of mechanical equipment and other sources of noise away from passenger and adjacent residences and businesses. ■ Require mufflers on construction equipment, as determined. ■ Establish construction vehicle speed limits. ■ Use noise and vibration control measures, which include, but are not limited to, portable and permanent barriers, earthen berms, replacing noisier equipment with quieter units and using rubber-tired equipment in lieu of track equipment, as shown needed. ■ If the hours of operation of noisy equipment cannot be scheduled for times that have less impact, institute a noise buffering strategy.

Environmental Quality Performance Standard 1– Noise and Vibration Mitigation Plan		EQ-1 (2 points)
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Noise and Vibration Mitigation Plan as a pre-construction submittal. ■ As needed, submit monthly construction noise and vibration survey reports summarizing weekly noise level measurements and documenting changes in construction activities or additional mitigation measures to remedy exceedances of construction noise and vibration levels and local noise ordinances. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 2 points for preparing and successfully implementing a Noise and Vibration Mitigation Plan and conducting regular weekly measures of noise and vibration levels, as needed. 	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces overall exterior noise and vibration levels from stationary, portable and power-actuated construction equipment during construction activities. ■ Economic Considerations <ol style="list-style-type: none"> 1. Avoids unnecessary redesign and construction delays that may otherwise occur due to noise and vibration complaints. 2. Allows airport passenger and local business activities to continue. ■ Social Considerations <ol style="list-style-type: none"> 1. Improves the ambient noise quality for nearby affected land uses during construction activities. 2. Supports development of noise and vibration control measures. 		
<p>Resources</p> <p>See Federal Highway Administration, Construction Noise website (www.fhwa.dot.gov/environment/noise/construction_noise/) for links to the Construction Noise Handbook, Roadway Construction Noise Model (RCNM) and the FHWA Special Report, Highway Construction Noise: Measurement, Prediction and Mitigation.</p> <p>Maricopa County Noise Ordinance, www.maricopa.gov/planning/Resources/Ordinances/NoiseOrdinance.aspx</p>		

<p>Environmental Quality Performance Standard 2 – Light Pollution Reduction</p>		<p>EQ-2 (1 point)</p>
<p>Intent Minimize light trespass and glare from construction activities. Reduce development impact on nocturnal environments by improving nighttime visibility through glare reduction. This allows distinction of signage and runway/taxiway lighting and reduces light pollution at adjacent buildings.</p>		
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ Develop construction lighting plans and ensure that the lighting type and placement is appropriately oriented. This will ensure that it will not interfere with aeronautical lights, glare toward the terminals, aircraft or the FAA tower or otherwise impair airport traffic; AND ■ Ensure that lighting is shielded and focused to avoid glare or unnecessary light spillover. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Develop a lighting plan that insures that the construction lighting achieves optimized work illumination without light trespass. ■ Check before each use of construction lighting that the fixtures are aimed correctly for the work. ■ Consider full cutoff luminaries, shielding and low angle spotlights for focused project lighting. ■ Adopt site lighting criteria to maintain safe lighting levels while avoiding off-site lighting and night sky pollution. Focus light toward the earth to minimize night-sky pollution. ■ Establish a schedule for when lighting is required and develop a policy to reduce lighting when not needed. ■ Minimize site lighting where safety and security allow. ■ Use High Pressure Sodium (HPS) lamps, or better, rather than Metal Halide (MH) lamps, where acceptable. HPS lamps produce more lumen per watt, have less mercury content per lamp and have a greater average life expectancy than MH lamps that could potentially decrease maintenance and replacement costs. 	
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide construction lighting plans with lighting type, shielding control and placement. 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for developing construction lighting plans and implementing lighting control mitigation measures. 	

Environmental Quality Performance Standard 2 – Light Pollution Reduction	EQ-2 (1 point)
<p>Benefits</p> <ul style="list-style-type: none"> ■ Environmental Considerations <ol style="list-style-type: none"> 1. Reduces environmental impacts on nocturnal species. 2. Decreases glare impacts at night. ■ Economic Considerations <ol style="list-style-type: none"> 1. Reduces energy consumption. 2. Allows airport operations to continue without impact. ■ Social Considerations <ol style="list-style-type: none"> 1. Increases quality of life in communities surrounding construction sites. 	
<p>Resources</p> <p>For information on outdoor light pollution information, best practices in lighting codes and an example of a Dark Sky ordinance see: www.mag.maricopa.gov/project.cms?item=9895</p> <p>Arizona Revised Statutes, Light Pollution (ARS-49-7): www.dfcaz.org/downloads/ARS-49-7.pdf</p> <p>Phoenix, Arizona Section of the International Dark-Sky Association: www.phoenixdarkskies.org/index.html</p>	

<p>Innovation Performance Standard 1– Innovation in Horizontal Construction</p>	<p>IC-1 (variable points)</p>
<p>Intent Provide the opportunity for projects to earn additional construction points for exceptional performance in a particular Sustainable Performance Standard. Alternatively, additional construction points may be awarded for use of innovative materials, technologies or practices not specifically addressed by this rating system.</p>	
<p>Required Actions for Credit</p> <ul style="list-style-type: none"> ■ In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance and the proposed submittals to demonstrate compliance and the strategies that might be used to meet the requirements; AND ■ Provide a draft of this information to the City project manager as soon as is reasonable for concurrence with the proposed action or innovation. Submit the final documentation for approved innovation credit. 	<p>Strategies</p> <ul style="list-style-type: none"> ■ Substantially exceed a Sustainable Performance Standard. For example, increase the percentage of recycled materials used from 20% to 30%. ■ Create an interactive multimedia display (e.g., video, website, etc.) that would engage and educate visitors about the green aspects of the completed project, with project results and in-situ performance criteria compared to standard performance results. ■ Other examples of innovative construction credits may include: <ol style="list-style-type: none"> 1. Develop a construction site policy banning the use of equipment with HCFCs or CFCs in them. 2. Suggest substitutions of low-VOC products for the project, beyond what is already required by Maricopa County rules. 3. If the site requires the clearing of trees, use a chipper to dispose of the cleared trees and use the chipped material as slope stabilization. 4. Use recycled paper for all correspondence.
<p>Required Documentation</p> <ul style="list-style-type: none"> ■ Provide the following information, as soon as possible in draft for City project manager approval, then in final format at the end of the project in a format similar to the these Sustainable Performance Standards: <ul style="list-style-type: none"> – A title for the credit being pursued. – Narrative statement of the credit intent. – Narrative statement describing the credit’s required actions. – Detailed narrative describing the approach to achieving of the credit. This narrative should include a description of the quantifiable environmental benefits of the credit proposal, to the extent possible. – Copies of specific construction drawings or exhibits, as applicable, that will serve to 	<p>Credits</p> <ul style="list-style-type: none"> ■ 1 point for each innovative construction performance standard submitted and accepted.

Innovation Performance Standard 1– Innovation in Horizontal Construction	IC-1 (variable points)
illustrate the project’s approach to the credit. A separate submittal is required for each innovation pursued.	
<p>Benefits</p> <ul style="list-style-type: none"> ■ Encourages the use of evolving sustainability initiatives and technologies that may provide unanticipated environmental, social and economic benefits to achieve the sustainable goals of the project. ■ Environmental Considerations <ol style="list-style-type: none"> 1. Evaluates a benchmark for sustainable construction practices by surpassing prescribed Sustainable Performance Standards. ■ Social Considerations <ol style="list-style-type: none"> 1. Increases the likelihood of achieving and upgrading the project’s sustainability level. 	
<p>Resources</p> <p>See the CC-1, Custom Credit of the Greenroads Rating System for an example of how to create an innovative performance standard. Download the “CC-X Custom Credit” documentation at the bottom of the page.</p> <p>www.greenroads.us/18/1/custom-credit.html</p>	

Section 5

Acronyms, Glossary and References

5.1 Acronyms

ACI Airports Council International	GHG Greenhouse Gas
ACRP Airport Cooperative Research Program	GPS Global Positioning System
ADEQ Arizona Department of Environmental Quality	HAP Hazardous Air Pollutants
ADOSH Arizona Department of Occupational Safety and Health	HASP Health and Safety Plan
AGCA Associated General Contractors of America	HCFC Hydrochlorofluorocarbon
AMWUA Arizona Municipal Water Users Association	HFC Hydrofluorocarbon
APS Arizona Public Service	HPS High Pressure Sodium
APU Auxiliary Power Units	HPV Human Powered Vehicle
ARS Arizona Revised Statutes	HUD U.S. Department of Housing and Urban Development
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers	HVAC Heating, Ventilation and Air Conditioning
ASTM American Society of Testing and Materials	ICF Insulated Concrete Forms
BMP Best Management Practice	IESNA Illuminating Engineering Society of North America
CARB California Air Resource Board	ISO International Organization of Standards
CFC Chlorofluorocarbons	JIT Just in Time
CFL Compact Fluorescent Lights	LCA Life-Cycle Assessment
CICA Construction Industry Compliance Assistance Center	LED Light Emitting Diodes
CO₂e Carbon Dioxide Equivalent (also abbreviated as CDE)	LEED® Leadership in Energy and Environmental Design
CRRC Cool Roof Rating Council	LEED-AP LEED® Accredited Professional
DFP Diesel Particulate Filters	LID Low Impact Development
DOC Diesel Oxidation Catalysts	MH Metal Halide
EPP Environmentally Preferable Products or Purchasing	MSDS Material Safety Data Sheets
FAA Federal Aviation Administration	MSGP Multi-Sector General Permit
FHWA Federal Highway Administration	NEMA National Electrical Manufacturers Association
FTF Flow through Filters	NEPA National Environmental Policy Act
	NIOSH National Institute for Occupational Safety and Health
	NSCEP National Service Center for Environmental Publications.

NTP Notice to Proceed	SWPPP Stormwater Pollution Prevention Plan
O&M Operation and Maintenance	TRB Transportation Research Board
OSHA Occupational Safety and Health Association	TSA Transportation Security Administration
PaLATE Pavement Life-Cycle Assessment Tool for Environmental and Economic Effects	TSS Total Suspended Solids
PECI Portland Energy Conservation, Inc.	UHI Urban Heat Island
PFC Perfluorocarbon	ULSD Ultra-Low Sulfur Diesel
Q&A Question and Answer	USACE United States Army Corps of Engineers
RFP Request for Proposal	USDOE United States Department of Energy
RFQ Request for Qualifications	USDOT United States Department of Transportation
ROI Return on Investment	USEPA United States Environmental Protection Agency
RRM Rapidly Renewable Materials	USGBC United States Green Building Council
SAGA Sustainable Aviation Guidance Alliance	UV Ultraviolet
SMACNA Sheet Metal and Air Conditioning National Contractors' Association	VFD Variable Frequency Drive
SHSM Site Health and Safety Manager	VOC Volatile Organic Compound
SOP Standard Operating Procedure	ZEV Zero Emission Vehicle
SPCC Spill Prevention, Countermeasures and Control	

5.2 Glossary

Albedo – The fraction of light or solar radiation that is reflected by a surface.

Air Emission Reduction – Reduction of emissions that would normally occur with a combustion process typically from using an advanced combustion process or devices to remediate air emissions.

Air Toxics Emissions – Emissions to the atmosphere that are toxic including but not limited to lead, mercury, sulfur, carbon monoxide, nitrogen oxides, ozone, particulate matter, etc.

Alternative Fuels – Fuels that consist of non-conventional materials and substances that are largely renewable compared to fossil fuels (i.e., biodiesel, hydrogen).

Best Management Practice – Standard and/or widely accepted industry policies, practices,

procedures and/or structures that are implemented on a project site to mitigate the adverse environmental impacts resulting from construction and operations phases of the development.

Carbon Footprint – Measurement of the impact from human activities in terms of the amount of greenhouse gases produced in units of carbon dioxide equivalents (CDE or CO₂e).

Carbon Neutral – Zero net release of carbon to the environment; zero net emissions of greenhouse gases.

Certified Design – Design project where a licensed professional is required to approve, stamp and/or sign the final design.

Change Orders – Addendums made during construction that stray from contract specifications and drawings.

Construction Documents – Drawings, contracts, RFIs, specifications, change orders or other documentation associated with a construction project.

Construction Site Plan – Plan developed to coordinate contractors for construction purposes.

Construction Waste Management Plan – Plan that outlines the goals and methods to divert construction and demolition waste from landfills and to return appropriate materials into the manufacturing life cycle.

Diesel Particulate Filter – A particulate filter used to remove particulate matter created during the combustion of diesel fuels that reduce air quality.

Diesel Oxidation Catalyst – Catalyst to control carbon monoxide, hydrocarbons, odor causing compound and the soluble organic fraction of particulate matter.

Deliverables – Products that are submitted for review at major design and construction project milestones.

Eco-Efficient – Consideration of environmental stewardship and economic growth; maximizing economic returns while minimizing environmental impact.

Ecological Footprint – Impact that a population group, organization or individual imposes on the earth based on natural resources consumed and waste generated.

Embedded Energy – Energy associated with the creation, manufacture or supply of a material or product. Also known as “Embodied Energy”.

Environmental Life Cycle Analysis – An assessment that calculates the resources, energy and emission benefits of a proposed sustainable methodology.

Erosion and Sedimentation Controls – Practices and applications that are employed on the project site to stabilize earthworks and protect conservation areas, buffers, waterways and forest during construction.

Fossil Fuels – Carbon or hydrocarbon fuels that form from the deposition of organisms over

millions of years underground or beneath the sea floor (i.e., coal, oil, natural gas).

Geotextiles – Permeable fabric or synthetic material that, when used in association with soil in difference geotechnical engineering applications, enhance the ability of the soil to filter, reinforce, protect or drain.

Graywater – Stormwater or wastewater produced from baths and sinks (not toilets) that may be reused according to local regulations for purposes such as irrigation.

“Green” – Consideration of environmental stewardship; design, construction and operation that minimizes the negative impacts on the environment.

Greenfields – Land that has not previously been developed.

Greenhouse Gas – Atmospheric gas that traps infrared radiation and contributes to rising temperatures of the planet (global warming). Common examples include carbon dioxide and methane.

Green Roof – Roof that is partially or completely covered with vegetation and soil planted over a waterproofing membrane.

Light Pollution – Illumination of the nocturnal sky by artificial or man-made sources that interfere and alter natural light levels.

Life Cycle Analysis – The assessment and valuation of the potential environmental, economic and social impacts of a given product, process or service over the course of its lifetime. Also referred to as “Life Cycle Assessment”.

Life Cycle Cost – All the costs and durability associated with a proposed technology.

Local – Companies based in the Phoenix Metro area.

Nitrogen Fixing – The conversion by certain soil microorganisms (i.e., diazotrophs) of atmospheric nitrogen into useful compounds for other plants and organisms.

Non-Renewable Energy – Energy sources that exist naturally in limited or finite amounts, such as fossil fuels.

Particulate Matter – Microscopic solid and liquid particles that are easily suspended in the atmosphere.

Pavement Engineering Life Cycle Cost Analysis – An assessment that compares all the costs and durability associated with a proposed technology.

Potable Water – Water that is safe for human consumption.

Project Delivery Team – Those professionals involved in the programming, planning, design, construction and sub-contractor roles for the project. The extent of professional disciplines and technical specialists on the delivery team at any one time will vary depending on the phase of the project. Over the life of the project, the team typically will include a project manager, contracting officer, owner/client representative, A-E professionals, specialty consultants, construction contractor, construction manager, and peer reviewer(s).

Project Life Cycle – In relation to the Sustainability Guidelines and rating system, a project's life cycle includes all phases of design and construction for a project.

Project Milestones – Examples include 30%, 60% and 90% design reviews, submissions to the City, RFP Development, Pre-Bid meetings, Bid Selection and Construction Kick-off and Progress Meetings.

Rain-Harvesting System – Practices and structures by which to capture rainfall for reuse activities such as landscape irrigation.

Recycle and Reuse – The act of using a discarded item for another use. The items must change shape or properties (e.g., capturing concrete and grinding into material for reuse).

Recycled Water – Wastewater that is captured and treated to regulated levels for various reuse activities, such as landscape irrigation. Also known as “Reclaimed Water”.

Return on Investment – A review of upgraded technologies to calculate the energy and maintenance cost savings.

Salvage – The act of saving an item from destruction. The item must be kept in its

original shape and use (e.g., reusing bricks from buildings of a demolished property).

Specifications – Documented standards that include details on the general description, quality, manufacturing requirements and installation procedures necessary for project components and correspond to the construction drawings.

Stakeholders – Individuals or entities internal or external to the Phoenix airports that may affect or be affected by the project. Stakeholders may include the Project Delivery Team, the construction, maintenance and operation teams, users of the final project, members of other Phoenix airport projects that may be impacted or interested in collaboration on construction aspects, City officials, tenants, community participants and members of the FAA, TSA and the USEPA.

Stormwater Discharge – Runoff generated by rainfall events that does not infiltrate into the ground.

Sustainable – Consideration of environmental stewardship, economic growth and social responsibility.

Sustainability Performance – A measure of how well an organization incorporates sustainability concepts and/or practices into its processes and/or operations based on established benchmarks and indicators.

Tailpipe Emissions – Air pollutants and combustion by-products emitted from automobile exhaust systems.

Urban Heat Island Effect – Artificial thermal gradient between developed and undeveloped land as a result of solar heat retention in urban (developed) areas.

Vegetated Surfaces – Surfaces or areas that are covered with vegetation (e.g., meadows, forests, grass fields).

Virgin Materials – Resources that are extracted from the environment in their raw form, such as timber, metal ore and minerals.

Waste Stream – Waste generated that can be characterized from a single sources, common source or common material.

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Appendix A

Sustainable Rating System

APPENDIX A: Example Sustainable Rating Point Structure

Intent

The intent of the point structure is to systematically assess the level of complexity in achieving the design and construction performance standards. The point structure was derived from the University of Washington’s Green Roads rating system. Performance standards are assigned points depending on the difficulty in achieving the standard, whether impacts of the performance standard are short- or long-term or whether regulations, laws and industry standards require a certain level of achievement of the performance standard. By creating a systematic point structure, each standard is judged based on similar criterion.

Additional points may be achieved if the activity and/or the results of that activity go above and beyond the original intent of the performance standard or whether follow-up is required after construction is completed. Therefore, some performance standards may receive up to 10 points. The table below illustrates the point distribution.

Description of Point Allocations

Points	Description
1	Short-term results that tend to affect the specific project. The actions and targets are easily attainable and meet existing regulatory requirements or industry standards. Generally, most construction standards have short-term impacts which are met during construction with limited long-term impact once construction is completed.
2	Long-term results that meet the sustainability goals and initiatives of LAWA. The actions and targets are easily attainable and meet existing regulatory requirements or industry standards.
3	Long-term results that meet the sustainability goals and initiatives of LAWA. Actions and targets are complex and/or innovative. Actions and targets are above and beyond existing regulation or industry standard.
+1	Follow-up is required once construction is completed. In some instances, the performance standard requires that the contractor report back on results a year after construction is completed.
+1	Measures taken or results of those measures go above and beyond the intent and goal of the performance standard. For example, a performance standard may require a 50% reduction. If the project achieves 90%, then an additional point may be given.

Innovation in Planning, Design & Construction

Additional points available for going above and beyond the standard do not replace the Innovation Design and Innovation in Construction performance standards. Those Performance Standards are intended to promote innovative design or goals that are not captured in the existing performance standards. If a project is proposing to submit an innovative performance standard the same point analysis will be conducted for that innovation to determine the number of points that new standard may achieve, thus allowing for up to 4 points per innovative performance standard (3 points for higher difficulty with long-term impacts plus 1 point for follow-up). Up to 3 innovation standards are allowed for a maximum of 12 additional points.

Appendix B

Internal Project Management Implementation Process

APPENDIX B: Internal Project Management Implementation Process

Pending information

Appendix C

Acknowledgements

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The Design and Construction Green Guide reflects the many thoughtful comments and contributions made by an interdivisional focus group composed of Phoenix Sky Harbor International Airport staff. This focus group spent many hours reviewing and discussing documents, and each member deserves special recognition and appreciation:

From Design and Construction Services:

Alice Bimrose
Sam Hanna
Candace Huff
Kyle Kotchou

Dan Rauscher
Norbert Senftleben
Rick Slankard

From Planning and Environmental Division:

Lupe Buys
David Ebeling

Joe Francis
Molly Monserud

Special thanks also to:

Mason Williams, Kiewit

Mark Glock, City of Phoenix, Street
Transportation Department

And CDM Staff:

Michele Kinaan, Principal, Green
Guide Project Manager
Heather Puckett

Kristin Lemaster
Gwen Pelletier
Teresa Sabol Spezio

Our special thanks to **Hampik Dekermanjian**, Executive VP, CDM

Figure 1

Implementation Process for Sustainable
Horizontal Design Guidelines

Figure 2

Implementation Process for Sustainable
Horizontal Construction Guidelines



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