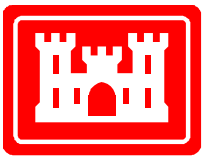

US Army Corps
of Engineers
Baltimore District

DRAFT
GREEN BUILDING MANUAL

Fort George G. Meade,
Anne Arundel County, Maryland

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TABLE OF CONTENTS

SECTION 1. INTRODUCTION....3
1.1 Fort Meade's Green Building Manual 3
1.2 U.S. Army Strategy for the Environment 3
1.3 Sustainability at Fort Meade 4

SECTION 2. GREEN BUILDING MANUAL GUIDANCE 5
2.1 Why this Manual was Developed 5
2.2 Manual Format 5
2.3 How to Use this Manual 5
2.4 Fort Meade Principles, Programs and Policies 6
2.5 Fort Meade's Goals 10

SECTION 3. GREEN BUILDING BACKGROUND 13
3.1 Green Building and Sustainable Design 13
3.2 LEED 13
3.3 LEED-NC Matrix 14

SECTION 4. SUSTAINABLE DESIGN AT FORT MEADE 69
4.1 Integrated Design Process 69
4.2 Review and Approval Process 69
4.3 New Construction at Fort Meade 69
4.4 Demolition 70
4.5 LEED-NC Credit Examples and Resources 70

SECTION 5. EXAMPLE GREEN BUILDING FACILITIES 85
5.1 The Chesapeake Bay Foundation's Philip Merrill Environmental Center 85
5.2 The Bremerton Bachelor Enlisted Quarters Building 1044 88
5.3 The Genzyme Center 91

SECTION 6. POLICY AND RELATED GUIDANCE 97
6.1 E.O. 13423 – Strengthening Federal Environmental, Energy, and Transportation Management 97
6.2 DASA (I&E) Memo – Sustainable Design and Development Policy Update – SpiRiT to LEED Transition 97
6.3 E.0. 12873 – Federal Acquisition, Recycling, and Waste Prevention 97
6.4 EPA Comprehensive Procurement Guidelines (CPG I and II) 98

SECTION 7. RESOURCES 99
7.1 Websites 99
7.2 Agency Resources 99

SECTION 8. REFERENCES 101

SECTION 9. ACRONYMS 103

TABLES

Table 2.1: Balancing Security and Sustainability 9
Table 3.1: LEED Credit Matrix 17
Table 3.2: Financial Benefits of Green Buildings 68
Table 4.1: LEED Credit Examples and Resources 71

APPENDICES

APPENDIX A--SPIRIT TO LEED MEMO, JANUARY 2006
APPENDIX B-- LEED AND ANTI-TERRORISM/FORCE PROTECTION STANDARDS
APPENDIX C-- LEED DOCUMENTATION CHECKLIST
APPENDIX D-- FACILITY TYPE GUIDANCE

SECTION 1. INTRODUCTION

1.1 Fort Meade's Green Building Manual

All new military construction, as of FY08, is required to meet Green Building standards set forth by the U.S. Green Building Council. Green Building is the siting, design, construction and maintenance of buildings (including associated lands, hardened and un-hardened, on the parcel) that are water and energy efficient, use materials and resources that have minimal impact on the environment and human health throughout their complete life cycle. Fort Meade's Green Building Manual is a guide to the sustainable design of all new construction projects on the installation to meet the Green Building standards and enhance sustainability at the Fort Meade installation, Anne Arundel County, Maryland. The Green Building Manual is intended to supplement the existing Fort Meade Installation Design Guide and Comprehensive Expansion Master Plan to ensure that new development on Ft. Meade integrates economic efficiency with minimal impact to the environment and maximal benefits to those who use the building.

This manual references the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design Green Building Rating System for New Construction and Major Renovations (LEED-NC), version 2.2 (2005) and incorporates U.S. Army and Fort Meade policy. LEED is a voluntary, consensus-based national standard that sets criteria for high-performance buildings in terms of sustainable siting, water efficiency, energy and atmosphere, materials and resources, indoor and environmental quality and innovation and design process. Fort Meade has adopted a policy modeled after the LEED design principles and credit system. All new construction and renovations at Fort Meade, beginning FY08, will be designed to meet a level of Gold or higher LEED rating; however, Ft. Meade will not be certifying all buildings through the USGBC at this time.

1.2 U.S. Army Strategy for the Environment

The U.S. Army strives to create sustainable installations to strengthen the Army today and into the future. The U.S. Army Strategy for the Environment outlines the mission, goals and tools to achieve sustainability, which includes Green Building. A sustainable Army "simultaneously meets current as well as future mission requirements worldwide, safeguards human health, improves quality of life, and enhances the natural environment." (U.S. Army, 2007)

A Memo from the Department of the Army, Office of the Assistant Secretary of the Army (Installations and Environment) (Jan 2006) directed installations to achieve sustainable design and development using the USGBC LEED rating system in lieu of the SPiRiT rating system (see Appendix A). All new construction and major renovations are required to involve the sustainable design of Green Buildings as defined by the U.S. Army and the LEED system. LEED is nationally accepted as the benchmark for the design, construction, and operation of high performance green buildings.

1.3 Sustainability at Fort Meade

Fort Meade realizes that safety, health and environmental protection are essential to the execution of their mission. As the environmental policy of the installation, Fort Meade has made a commitment to:

- Maintain compliance with all applicable requirements to Fort Meade operations.
- Identify potential sources of pollution and meet or exceed the Army's goal for Pollution Prevention.
- Assess the current and future effect of our operations on the natural and human environment, taking into account Life Cycle Planning.
- Set objectives to avoid or minimize the adverse impacts on the environment that result from Fort Meade's operating activities; and promote health and safety.
- Implement and monitor programs to achieve established environmental goals, objectives and targets.
- Actively pursue continual improvement in the Environmental Management System to move towards a sustainable Fort Meade.

Fort Meade has already taken steps towards a sustainable installation through the Environmental Management System (EMS). This Green Building Manual acknowledges the above policy and the goals set forth in the Fort Meade EMS. Fort Meade extends an additional goal to accomplish the requirements necessary to meet a Gold or Platinum LEED rating for all new development and major renovations at the installation. Sustainability at Fort Meade will be achieved through the integration of the installation environmental policy, EMS, IDG, this Green Building Manual and other environmental documentation in consistency with U.S. Army and Department of Defense policy and regulation.

SECTION 2. GREEN BUILDING MANUAL GUIDANCE

2.1 Why this Manual was Developed

This manual was developed using the LEED-NC version 2.2, and DoD, Army and Fort Meade policies to customize a Green Building strategy to meet the needs of Fort Meade. This manual is intended to guide Green Building through all parts of the design process and into the construction, ownership and maintenance phases. In an effort to support Sustainable Design at Fort Meade, this manual identifies and discusses each possible LEED credit and recommends credit requirements that should be easily achieved at Fort Meade (See Table 3.1). Also included are examples of sustainable building features and examples of buildings that have earned a LEED Gold rating. This manual makes the Sustainable Design process progress smoothly and efficiently by incorporating all relevant information into a user-friendly format that is specific to Fort Meade.

2.2 Manual Format

This manual is divided into eight sections. Section 1 introduces the Green Building Manual and policies that have contributed to its conception. Section 2 describes the Manual as it pertains to Fort Meade, including Fort Meade's principles, programs and goals. Section 3 defines Green Building and Sustainable Design with an overview of the LEED system. A matrix of the LEED credits is presented with information about each credit and how they relate to conditions at Fort Meade (Table 3.1). Section 4 lays out how Green Building will be incorporated into the design process with a description of the review and approval process as well as foreseeable new construction and the demolition policy. This section includes a table of examples and resources to help integrate "green" features in building design. Section 5 highlights three Green Buildings. Section 6, 7 and 8 provide references to find further information such as related policies, guidance, websites, and references cited in the Manual.

2.3 How to Use this Manual

The following recommended steps are guidance for approaching and undertaking Green Building in new construction and renovation at Fort Meade:

- Step 1: Review Fort Meade's Installation Design Guide, Comprehensive Expansion Master Plan and the contents of this manual to become familiar with policies and development at Fort Meade. Understand the needs of Fort Meade for the new construction or renovation project.

- Step 2: Consult the matrix (Table 3.1) to determine which LEED credits are required and their designated achievability level (highly recommended, recommended, conditionally recommended, low recommendation). Focus on those credits that are recommended for Fort Meade for each new construction and renovation project. Use resources identified in Table 4.1 for additional guidance and information.

- Step 3: Select a site (if site is not previously designated in the Comprehensive Expansion Master Plan) that will meet the needs and policies of Fort Meade and maximize the amount of LEED credits achieved. Coordinate Anti-Terrorism/Force Protection Standards with LEED credits to ensure maximum security and sustainability (see Table 2.1 and Appendix B).

- Step 4: Design the new construction or renovation project in accordance with Fort Meade needs and policy while incorporating the maximum amount of LEED credits.

- Step 5: Submit all required documentation, as indicated in the matrix (Table 3.1) and in the LEED Documentation Checklist (Appendix C), to the Review and Approval Team for approval and confirmation of achieved LEED credits.

2.4 Fort Meade Principles, Programs and Policies

A sustainable installation simultaneously meets mission requirements, safeguards human health, improves quality of life, and enhances the natural environment. Fort Meade recognizes the interdependence of mission, community and environment and integrates this principle into sustainable design and development. The fundamental sustainable principles, as described in the Fort Meade Comprehensive Expansion Master Plan, that Fort Meade will adopt in Green Building are:

- **Optimize Site Potential.** Creating sustainable buildings starts with proper site selection, including consideration of the reuse of rehabilitation of existing buildings. The location, orientation, and landscaping of a building affects the local ecosystems, transportation methods, and energy use. Siting for physical security has become a critical issue in optimizing site design. The location of access roads, parking, vehicle barriers, and perimeter lighting must be integrated into the design along with sustainable site considerations. Site design for security cannot be an afterthought.

- **Minimize Energy Consumption.** A building should rely on conservation and passive design measures rather than fossil fuels for its operation. It should meet or exceed applicable energy performance standards.

- **Protect and Conserve Water.** In many parts of the country, fresh water is an increasingly scarce resource. A sustainable building should reduce, control, or treat site-runoff, use water efficiently, and reuse or recycle water for on-site use when feasible.

- **Use Environmentally Preferable Products.** A sustainable building should be constructed of materials that minimize life-cycle environmental impacts such as global warming, resource depletion, and human toxicity. In a materials context, life cycle includes raw materials acquisition, product manufacturing, packaging, transportation, installation, use, and reuse/recycling/disposal.

- **Enhance Indoor Environmental Quality.** The indoor environmental quality (IEQ) of a building has a significant impact on occupant health, comfort, productivity, and morale. Among other attributes, a sustainable building should maximize day-lighting; have appropriate ventilation and moisture control; and avoid the use of materials with high-VOC emissions. Additional consideration must now be given to ventilation and filtration to mitigate chemical, biological, and radiological attack.

- **Optimize Operational and Maintenance Practices.** Incorporating operating and maintenance considerations into the design of a facility will greatly contribute to improved working environments, higher productivity, and reduced energy and resource costs. Designers are encouraged to specify materials and systems that simplify and reduce maintenance requirements; require less water, energy, and toxic chemicals and cleaners to maintain; and are cost-effective and reduce life-cycle costs.

- **Low Impact Development.** Low Impact Development is a stormwater management strategy concerned with maintaining or restoring the natural hydrologic functions of a site to achieve natural resource protection objectives and fulfill environmental regulatory requirements. LID employs a variety of natural and built features that reduce the rate of runoff, filter out its pollutants, and facilitate the infiltration of water into the ground. By reducing water pollution and increasing groundwater recharge, LID helps to improve the quality of receiving surface waters and stabilize the flow rates of nearby streams. (U.S. Department of Defense, 2004)

Fort Meade has several programs and policies in place to guide environmental stewardship on the installation. The following Fort Meade programs and policies should be consulted when beginning a development project and are listed in Table 3.1 as they relate to each LEED credit:

- **Installation Design Guide (IDG).** Provides design guidance for standardizing and improving the quality of the total environment of the installation. Includes standards and general guidelines for the design issues of site planning; architectural character, colors and materials; vehicular and pedestrian circulation; and landscape elements, including

plant material, seating, signage, lighting, and utilities. The design guidelines incorporate sustainable design, quality of design, anti-terrorism, low maintenance, historical and cultural considerations, durability, safety, and compatibility.

- **Comprehensive Expansion Master Plan (CEMP).** Provides a total build-out concept plan for the long-term (30+ years) development of the Fort Meade Installation that incorporates regional planning, sustainable design and development, and Anti-Terrorism/Force Protection.

- **Environmental Management System (EMS).** Streamlines the FGGM environmental management program. Current objectives of the FGGM EMS include reducing water and energy usage, reducing solid waste generation through recycling, and increasing purchases of environmentally preferable products.

- **Integrated Natural Resource Management Plan (INRMP).** Provides information on the natural resources on the Installation and outlines management programs to meet the mission of Fort Meade with minimal environmental impact.

- **Forest Conservation Act Policy (FCAP).** Policy complies with Maryland Forest Conservation Act. Asserts that for individual development projects the equivalent of 20 percent of the project area be forested either through tree preservation or planting.

- **FGGM Tree Management Policy (FGGM-TMP).** Complement to the Forest Conservation Act Policy that provides guidance on tree preservation and plantings.

- **Integrated Cultural Resources Management Plan (ICRMP).** Outlines U.S. Department of Army policies, procedures, and responsibilities for meeting cultural resources compliance and management requirements at Fort Meade to ensure that Fort Meade makes informed decisions regarding the cultural resources under its control, is in compliance with public laws, supports the military mission, and operates using sound principles of cultural resources management.

- **Coastal Zone Management (CZM).** FGGM must show consistency with the Maryland Coastal Zone Management Program for all Federal activities and strive to protect Maryland's coastal resources.

These principles, programs and policies serve as a baseline and background from which to begin planning and designing Green Buildings. The Fort Meade Environmental Division website (http://www.fortmeade-ems.org/) has links to the above plans and policies as well as further information regarding environmental management at Fort Meade.

Another important issue to incorporate in the initial phases of planning and design is Anti-Terrorism/Force Protection (AT/FP). While Green Building and AT/FP requirements oppose each other in certain areas of design, there are methods to overcome these challenges to develop a safe and sustainable building. For example, landscaping can provide both physical and visual barriers to control access while improving the quality of the site, provide shade to reduce heat island effect and manage stormwater (e.g., retention pond). Table 2.1 outlines methods to balance security and sustainability as described in detail in the IDG (Chapter 12) and CEMP (Section 4). In the matrix, there is a column that lists the AT/FP standard, if any, that relates to each credit specifically. Appendix B also includes issues and strategies that can be applied to Green Building design.

Table 2.1 Balancing Security and Sustainability

AT/FP STRATEGIES	SUSTAINABLE DESIGN CONSIDERATIONS/OPPORTUNITIES
Access Control	
Secure site perimeter	Integrate with sustainable landscaping scheme
Use barriers to prevent passage of vehicles	Use natural and/or environmentally friendly barriers (e.g., trees, retention ponds, recycled-content planters, etc.)
Minimize public entrances into the building	Integrate with day-lighting scheme
Secure vulnerable openings (e.g. doors, first floor windows)	Integrate with day-lighting scheme
Surveillance	
Place windows and doors to allow for good visibility	Integrate with day-lighting scheme
Avoid spaces that permit concealment	Integrate with day-lighting scheme
Avoid blocking lines of sight with fencing and landscaping	Integrate with landscaping and day-lighting scheme
Blast Protection	
Design structural systems to prevent or delay building collapse	Integrate with passive solar design (Trombe walls). Use sustainable materials
Use building configurations to better resist blast shock waves	Integrate with passive solar design and day-lighting scheme
Maximize distances between parking and buildings	Integrate with alternative transportation plans
Reduce need for utilities	Consider renewable and/or distributed energy resources
Apply external air filtration and overpressurization techniques	Integrate with building automation and control systems
Use internal air filtration technologies	Integrate with building automation and control systems

Source and further information: http://www.wbdg.org/tools/leed_atfp.php?u=8

2.5 Fort Meade's Goals

Fort Meade's goal is to meet the requirements outlined by the USGBC for the number of credits that would result in a Gold or Platinum LEED rating for all new construction and renovations. Fort Meade will not be certifying all buildings through USGBC at this time. Three credit areas that stand out as highly important to Fort Meade: Water Efficiency, Energy and Atmosphere, and Materials and Resources. The following objectives are outlined in the Fort Meade Environmental Management System as future targets in these areas:

Objective #1: Reduce water usage (and associated wastewater discharge).

Target 1a: At least 50 percent of all new construction (excluding housing development privatization projects) will meet a 3-point Leadership in Energy & Environmental Design (LEED) standard requirement for water efficiency from the following available point areas: 2 points in water efficient landscaping; 1 point in innovative wastewater technologies; and 2 points in water use reduction – by the end of Fiscal Year (FY) 2010.

Target 1b: At least 50 percent of all new renovation projects (excluding housing development privatization projects) will meet a 1-point Leadership in Energy & Environmental Design (LEED) standard requirement for water efficiency from among the above-listed available point areas, *for all renovations that include any kind of modifications to landscaping, wastewater system, and/or water delivery systems* – by the end of FY 2010.

Objective #2: Reduce electricity usage.

Target 2a: At least 25 percent of all new construction (excluding housing development privatization projects) will meet a 10-point Leadership in Energy & Environmental Design (LEED) standard requirement for Energy & Atmosphere (EA) – including meeting the LEED EA prerequisites – by the end of FY 2010.

Target 2b: At least 25 percent of all new renovation projects (excluding housing development privatization projects) will meet a 5-point Leadership in Energy & Environmental Design (LEED) standard requirement for Energy & Atmosphere (EA) – including meeting the LEED EA prerequisites – *for all renovations that include any kind of modifications to or additions of electrical systems, HVAC systems, and/or building design (walls/windows/floors)* – by the end of FY 2010.

Objective #3: Reduce solid waste generation through increased recycling.

Target 3a: Improve the Fort Meade Recycling Program by incorporating recyclables from all Fort Meade schools in Fort Meade recycling pickups, by the end of FY 2007.

Target 3b: Increase the number of recycling bins in public places so that all administrative buildings, recreational areas, and barracks have at least one conveniently located

bin available for recyclable drop-offs (for each recycled product type: aluminum, plastic, paper, and cardboard) by the end of FY 2007.

Target 3c: Through outreach/training activities, and using FY 2005 recycling data as a baseline, increase the cumulative amount of aluminum, plastic, paper, and cardboard recyclables collected at Fort Meade by 10 percent by the end of FY 2008.

Objective #4: Increase Recycled-Content, Bio-based, Energy & Water Efficient and Environmentally Preferred Purchases

Target 4a: Ensure all acquisition personnel and Contracting Officer's Representatives for construction, renovation, maintenance, and service contracts receive Green Procurement Awareness Training by the end of FY 2008. By incorporating Green Procurement Awareness Training into established training programs for installation management and staff such as new employee orientation, environmental awareness training, COR and other procurement training, and office staff training.

Target 4b: Promote Green Procurement

i. Send post-wide email outlining the policies and procedures on FGGM Green Procurement Program by the end of FY 2007.

ii. Update the Environmental Division's website to highlight success stories and publicize FGGM Green Procurement Program. Provide links/resources for additional information by the end of FY 2007.

iii. Provide articles on FGGM Green Procurement Program to the Soundoff and Military Housing Newsletter by the end of FY 2007.

iv. Develop an incentive program to organizations that demonstrates commitment to buying green by the end of FY 2007.

Target 4c: Incorporate specific language into construction, renovation, maintenance, and service contracts to include green procurement purchases by the end of FY 2008

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SECTION 3. GREEN BUILDING BACKGROUND

3.1 Green Building and Sustainable Design

Green Building involves the siting, design, construction and maintenance of buildings (including associated lands, hardened and un-hardened, on the parcel) that are water and energy efficient, use materials and resources that have minimal impact on the environment and maximize indoor environmental air quality. These buildings have minimal impact on the environment and human health throughout their complete life cycle, from the siting phase through the design, construction and operational phases and even extending to reuse and removal. Green Building is accomplished through employing the concept of sustainable design.

Sustainable Design is the design of facilities in a manner that meets the needs of today without compromising the ability of future generations to meet their needs. Sustainable Design includes not only efficient use of natural resources, but it can also translate into better performance, desirability, and affordability. (U.S. Army, 2001) Sustainable design requires systematic considerations of environmental impact, energy use, natural resources, economy, and quality of life. Such issues as emissions of greenhouse gases and ozone depleting chemicals; use of limited material resources; management of water resources; reductions in waste; indoor environmental quality and occupant/worker health, productivity and satisfaction are important components of design. Sustainable design maintains economic growth while addressing all of the above issues, though is most effective only when addressed at the inception of a project, and throughout the entire life cycle of a project – from concept to planning, to programming, design, construction and ownership. (U.S. Army, 2007).

3.2 LEED

The LEED Green Building Rating System® is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Members of the U.S. Green Building Council (USGBC), representing all segments of the building industry, developed LEED and continue to contribute to its evolution.

LEED was created to:

- define “green building” by establishing a common standard of measurement
- promote integrated, whole-building design practices
- recognize environmental leadership in the building industry
- stimulate green competition
- raise consumer awareness of green building benefits
- transform the building market

LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state of the art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. LEED recognized achievements and promotes

expertise in green building through a comprehensive system offering project certification, professional accreditation, training and practical resources.

The LEED for New Construction & Major Renovations (LEED-NC version 2.2, October 2005) is utilized in this manual. Under this category of development, there are six criteria areas, each having a set of required items and credit points that can be achieved when employed in new construction and renovation projects.

- Sustainable Sites – 14 possible points
- Water Efficiency – 5 possible points
- Energy and Atmosphere – 17 possible points
- Materials and Resources – 13 possible points
- Indoor Environmental Quality – 15 possible points
- Innovation and Design Process – 5 possible points

The points received for each credit are added to determine the LEED rating for the project. There is a total of 69 points that can potentially be achieved for any one project. The rating system is broken into four categories:

- Certified rating = 26 to 32 points
- Silver rating = 33 to 38 points
- Gold rating = 39 to 51 points
- Platinum rating = 52 to 69 points

As of FY08, all new military construction funded by the U.S. Army must meet the minimum number of credits that would be required to achieve a Silver rating.

3.3 LEED-NC Matrix

The LEED-NC Matrix, presented in Table 3.1, provides a detailed explanation and information on each LEED credit. The Matrix has seven columns:

Intent	Describes the intent of each LEED credit.
Requirement	Breaks down the criteria that must be met to achieve each individual credit.
Points	Shows required for all required credits, and maximum point value for optional credits.
Army Policy	List of Army Policies that are relevant to each credit.
Ft Meade Policy	List of Fort Meade Policies that are relevant to each credit.
Required Documentation	List of documentation required to prove that the credit has been achieved.

Related AT/FP Standards	List of AT/FP Standards by number that are relevant to each credit. Further information in Appendix B.

The LEED-NC Matrix also breaks down each LEED credit to its achievability level and importance. The achievability levels were determined based on site and operational conditions of Fort Meade, significance of the credit and ease of achieving the credit. These levels were designated by a LEED Certified Professional and are as follows:

Green	**Highly Recommended**. Ease of meeting the requirements for these credits is high based on the existing conditions and/or program requirements at Ft Meade. Some of these credits are required per LEED, Army and Fort Meade policy.
Yellow	**Recommended.** The requirements for these credits can be met with relative ease based on the existing conditions and/or program requirements at Ft Meade.
Blue	**Conditionally Recommended.** Existing site conditions and/or Ft Meade policies must be properly evaluated to determine if the requirements for these credits may be met. Some locations at Ft. Meade do not allow for these requirements to be met.
Red	**Low Recommendation.** Existing site conditions and/or Ft Meade policies make it difficult to achieve the requirements for these credits.

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Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SUSTAINABLE SITES						
SS Prerequisite 1: Construction Activity Pollution Prevention						
Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.	Create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities associated with the project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2003 EPA Construction General Permit OR local erosion and sedimentation control standards and codes, whichever is more stringent. The Plan shall describe the measures implemented to accomplish the following objectives: (1) Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse. (2) Prevent sedimentation of storm sewer or receiving streams. (3) Prevent polluting the air with dust and particulate matter. The Construction General Permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the CGP only applies to construction sites greater than 1 acre, the requirements are applied to all projects for the purpose of this prerequisite. Information on the EPA CGP is available at http://cfpub.epa.gov/npdes/stormwater/cgp.cfm.	REQ'D	Executive Memorandum "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds" April 26, 1994.	FGGM-INRMP CZM Program	Provide copies of the project drawings to document the erosion and sedimentation control measures implemented on the site. Provide confirmation regarding the compliance path taken by the project (NPDES Compliance or Local Erosion Control Standards). Provide a narrative to describe the Erosion and Sedimentation control measures implemented on the project. If a local standard has been followed, please provide specific information to demonstrate that the local standard is equal to or more stringent than the referenced NPDES program.	AT Std 1 AT Std 3 AT Rec 2 AT Rec 3 AT Rec 8

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 1: Site Selection						
Avoid development of inappropriate sites and reduce the environmental impact from the locations of a building site.	Do not develop buildings, roads, or parking areas on portions of sites that meet any one of the following criteria: (1) Prime farmland as defined by the United States Department of Agriculture in the United States Code of federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5). (2) Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA). (3) Land which is specifically identified as habitat for any species on Federal or State threatened or endangered lists. (4) Within 100 feet of any water including wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local regulations as defined by local or state rule or law, whichever is more stringent. (5) Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams, and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act. (6) Land which prior to acquisition for the project was public parkland, unless land of equal of greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt).	1	EO 13148 Greening the Government through Leadership in Environmental Management Sec 207 Environmentally and Economically Beneficial Landscaping	CZM Program FGGM-INRMP IDG	Provide confirmation that the project site does not meet any of the prohibited criteria. Special circumstances for individual projects and site compliance should be noted. AND (for projects with special circumstances) Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Std 2 AT Rec2 AT Rec 3 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 2: Development Density and Community Connectivity						
Channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.	OPTION 1- DEVELOPMENT DENSITY Construct or renovate building on a previously developed site AND in a community with a minimum density of 60,000 sq. ft. per acre net. (Note: Density calculation must include the area of the project being built and is based on a typical two-story downtown development.) OR OPTION 2 - COMMUNITY CONNECTIVITY Construct or renovate building on a previously developed site AND within 1/2 mile of a residential zone or neighborhood with an average density of 10 units per acre net AND within 1/2 mile of at least 10 Basic Services AND with pedestrian access between the building and the services. Basic services include, but are not limited to: (1) Bank (2) Place of Worship (3) Convenience Grocery (4) Day Care (5) Cleaners (6)Fire Station (7) Beauty (8) Hardware (9) Laundry (10) Medical/Dental (11) Library (12) Senior Care Facility (13) Park (14) Pharmacy (15) Post Office (16) Restaurant (17) School (18) Supermarket (19) Theatre (20) Community Center (21) Fitness Center (22) Museum. Proximity is determined by drawing a 1/2 mile radius around the main building entrance on a site map and counting the services within that radius.	1		CEMP IDG ICRMP	Option 1- Development Density- Provide a site vicinity plan showing the project site and the surrounding sites and buildings. Sketches, block diagrams, maps, and aerial photos are all acceptable for this purpose. Draw the density boundary on the drawing or note the drawing scale. Provide project site and building area (sq ft). Submit a listing of site and building areas for all surrounding sites within the density radius. Option 2 - -Community Connectivity - Provide a site vicinity drawing showing the project site, the 1/2 mile community radius, and the locations of the community services surrounding the project. Sketches, block diagrams, maps, and aerial photos are all acceptable for this purpose. Either draw the 1/2 mile radius on the drawing or note the drawing scale. Provide Project site and building area (sq ft). Submit a listing (including business name and type) of all community services within the 1/2 mile radius. AND (For projects with special circumstances - either compliance path) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Std 2 AT Rec 2 AT Rec 3 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 3: Brownfield Redevelopment						
Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land.	Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) OR on as site defined as a Brownfield by a local, state, or federal government agency.	1		INRMP FCAP/FGGM-TMP	Provide confirmation whether the project site was determined contaminated by means of an ASTM E 1903-97 Phase II Environmental Site Assessment or the site was defined as a Brownfield by a local, state, or federal government agency. Provide a detailed narrative describing the site contamination and remediation efforts undertaken by the project.	AT Std 1 AT Std 2 AT Rec 2 AT Rec 3 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 4.1: Alternative Transportation: Public Transportation Access						
Reduce pollution and land development impacts from automobile use.	Locate project within 1/2 mile of an existing - or planned and funded - commuter rail, light rail, or subway system. OR Locate project within 1/4 mile of one or more stops for two or more public or campus bus lines useable by building occupants.	1		IDG	Commuter Rail Service: Provide a site vicinity drawing showing the project site and the location of all (existing/proposed) fixed rail stations within 1/2 mile of the site. A listing of each fixed rail station and the distance from the station to the project site (miles). OR Bus Service: Provide a site vicinity drawing showing the project site and the location of all existing bus stops within 1/4 mile of the site. A listing of each bus line that serves the site vicinity and the distance from the bus stop to the project site (miles). AND (For projects with special circumstances - either compliance path) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Rec 1 AT Rec 6 AT Rec 8

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 4.2: Alternative Transportation: Bicycle Storage & Changing Rooms						
Reduce pollution and land development impacts from automobile use.	For commercial or institutional buildings, provide secure bicycle racks and /or storage (within 200 yards of a building entrance) for 5% or more of all building users (measured at peak periods), AND, provide shower and changing facilities in the building or within 200 yards of a building entrance, for 0.5% for Full-Time Equivalent (FTE) occupants. OR For residential buildings, provide covered storage facilities for securing bicycles for 15% or more of building occupants in lieu of changing/shower facilities.	1		IDG	Provide the FTE occupancy and transient occupancy for the project. Provide project drawings to show the location(s) of the secure bicycle storage areas and shower/changing facilities. In addition, please provide the following project data and calculation information based on project type: Non-residential Buildings - Confirm the quantity of shower/changing facilities provided and their distance from the building entry. Residential Buildings - No additional documentation is required. Mixed Non-residential and Residential Buildings - Confirm the number of residential units and residential FTE occupants for the project. Confirm the quantity of shower/changing facilities provided for the non-residential portion of the project and their distance from the building entry. AND (for projects with special circumstances-any compliance path) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Std 2 AT Rec 8 AT Rec 9 AT Rec 12 AT Rec 13 AT Rec 14 AT Rec 15

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 4.3: Alternative Transportation: Low-Emission & Fuel-Efficient Vehicles						
Reduce pollution and land development impacts from automobile use.	OPTION 1 Provide low-emitting and fuel-efficient vehicles for 3% of Full-Time Equivalent (FTE) occupants AND provide preferred parking for these vehicles. OR OPTION 2 Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site. OR OPTION 3 Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors). *For the purposes of this credit, low-emitting and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.* *"Preferred Parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.*	1	EO 13031 Federal Alternative Fueled Vehicle Leadership commits the Federal Government to exercise leadership in the use and buying of energy-efficient alternative fueled vehicles.	IDG	Provide the FTE occupancy for the project. Provide the total parking capacity of the site. OPTION 1-Low-emitting/Fuel Efficient Vehicles Provide project drawings to show the location(s) of the preferred parking spaces for low-emitting/fuel-efficient vehicles. Confirm the quantity of low-emitting/fuel-efficient vehicles provided and their make, model, and manufacturer. Confirm whether each vehicle is a zero-emission vehicle or enter each vehicle's ACEEE vehicle score. OPTION 2-Preferred Parking for Low-emitting/Fuel Efficient Vehicles Provide project drawings to show the location(s) of the preferred parking spaces for low-emitting/fuel-efficient vehicles. Confirm the number of preferred parking spaces provided. OPTION 3-Alternative Fuel Refueling Stations Provide project drawings to show the location(s) of the alternative fuel refueling stations. Confirm the fuel type, number of stations, and fueling capacity for each station for an 8-hour period. AND (For projects with special circumstances-any compliance path) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Std 3 AT Std 4 AT Std 5 AT Std 16 AT Rec 4 AT Rec 8

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 4.4: Alternative Transportation: Parking Capacity						
Reduce pollution and land development impacts from automobile use.	OPTION 1 - NON-RESIDENTIAL Size parking capacity to not exceed minimum local zoning requirements. AND Provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces. OR OPTION 2 - NON-RESIDENTIAL For projects that provide parking for less than 5% of the FTE building occupants: Provide preferred parking for carpools or van pools, marked as such, for 5% of total provided parking spaces. OR OPTION 3 - RESIDENTIAL Size parking capacity to not exceed minimum local zoning requirements, AND, provide infrastructure and support programs to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle services to mass transit. OR OPTION 4 - ALL Provide no new parking. "Preferred Parking" refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.	1		IDG	Provide the FTE occupancy for the project. Provide the total parking capacity of the site. Confirm the appropriate project compliance path. In addition, provide the following project data and calculation information based on the appropriate compliance path: OPTION 1 - NON-RESIDENTIAL Provide the number of parking spaces required for the project per local code or ordinance. Provide the number of carpool/vanpool spaces that are on-site. OPTION 2 - NON-RESIDENTIAL Provide the number of carpool/vanpool spaces that are on-site. OPTION 3 - RESIDENTIAL Provide a description of the infrastructure/programs that are in place to support and promote ridesharing. OPTION 4 - ALL There are no additional items required for this compliance path. AND (For projects with special circumstances - any compliance path) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Std 3 AT Std 4 AT Std 5 AT Rec 4 AT Rec 8

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 5.1: Site Development: Protect or Restore Habitat						
Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.	On greenfield sites, limit all site disturbance to 40 feet beyond the building perimeter; 10 feet beyond surface walkways, patios, surface parking and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area. OR On previously developed or graded sites, restore or protect a minimum of 50% of the site area (excluding the building footprint) with native or adapted vegetation. Native/adapted plants are plants indigenous to a locality or cultivars of native plants that are adapted to the local climate and are not considered invasive species or noxious weeds. Projects earning SS Credit 2 and using vegetated roof surfaces may apply the vegetated roof surface to this calculation if the plants meet the definition of native/adapted. *Greenfield sites are those that are not previously developed or* *graded and remain in a natural state. Previously developed sites* *are those that previously contained buildings, roadways, parking* *lots, or were graded or altered by direct human activities.*	1	EO 13148 Greening the Government through Leadership in Environmental Management Sec 207Environmentally and Economically Beneficial Landscaping	CZM Program FGGM-INRMP FCAP/FGGM-TMP	Provide the project site area. Provide the project building footprint area. Provide a narrative describing the project's approach to this credit. Include information regarding any special circumstances or considerations regarding the project. In addition provide the following project data and calculation information based on the appropriate compliance path: GREENFIELD SITES Provide a copy of the projects site/grading drawings highlighting the designated site disturbance boundaries. PREVIOUSLY DEVELOPED/GRADED SITES Provide the area (sq ft) of the site that has been restored using native and/or adaptive planting. Provide a copy of the project's site/landscape plan that provides information regarding the restored site area and the planting materials.	AT Std 1 AT Std 2 AT Std 4 AT Std 19 AT Rec 1 AT Rec 3 AT Rec 5 AT Rec 7 AT Rec 8 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 5.2: Site Development: Maximize Open Space						
Provide a high ration of open space to development footprint to promote biodiversity,	OPTION 1: Reduce the development footprint (defined as the total area of the building footprint, hardscape, access roads and parking) and/or provide vegetated open space within the project boundary to exceed the local zoning's open space requirement for the site by 25%. OR OPTION 2: For areas with no local zoning requirements (e.g., some university campuses, military bases), provide vegetated open space area adjacent to the building that is equal to the building footprint. OR OPTION 3: Where a zoning ordinance exists, but there is no requirement for open space (zero), provide vegetated open space equal to 20% of the project's site area. ALL OPTIONS: -For projects located in urban areas that earn SS Credit 2, vegetated roof areas can contribute to credit compliance. -For projects located in urban areas that earn SS Credit 2, pedestrian oriented hardscape areas can contribute to credit compliance. For such projects, a minimum of 25% of the open space counted must be vegetated. -Wetlands or naturally designed ponds may count as open space if the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.	1		FCAP/FGGM-TMP	Provide the project site area and project building footprint area. Provide a copy of the project's site/landscape drawings highlighting the dedicated vegetated open space. Provide an optional narrative describing any special circumstances or considerations regarding the project's credit approach. OPTION 1: Provide the area (sq ft) of open space required by local zoning codes/ordinances. Provide the area (sq ft) of the vegetated dedicated open space provided by the project. OPTION 2: Provide the area (sq ft) of the vegetated dedicated open space provided by the project. OPTION 3: Provide the area (sq ft) of the vegetated dedicated open space provided by the project.	AT Std 1 AT Std 2 AT Std 3 AT Std 5 AT Std 8 AT Std 19 AT Rec 4 AT Rec 7 AT Rec 8 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 6.1: Stormwater Design: Quantity Control						
Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff.	OPTION 1-EXISTING IMPERVIOUSNESS IS LESS THAN OR EQUAL TO 50% Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year, 24-hour design storms. OR Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies. OR OPTION 2-EXISTING IMPERVIOUSNESS IS GREATER THAN 50% Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year, 24-hour design storm.	1		FGGM-INRMP CZM Program	OPTION 1: Provide the pre-development site runoff rate (cfs) and the pre-development site runoff quantity (cf). Provide the post-development site runoff rate (cfs), and the post development site runoff quantity (cf). OR Provide a narrative describing the project site conditions, measures taken, and controls implemented to prevent excessive stream velocities and associated erosion. OPTION 2: Provide the pre-development site runoff rate (cfs) and the pre-development site runoff quantity (cf). Provide the post-development site runoff rate (cfs), and the post development site runoff quantity (cf).	AT Std 1 AT Std 2 AT Std 3 AT Std 5 AT Std 8 AT Std 14 AT Rec 1 AT Rec 2 AT Rec 3 AT Rec 4 AT Rec 5 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 6.2: Stormwater Design: Quality Control						
Reduce or eliminate water pollution by reducing impervious cover, increasing onsite infiltration, eliminating sources of contaminants, and removing pollutants from stormwater runoff.	Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs). BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g. Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.	1	Executive Memorandum "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds" April 26, 1994.	FGGM-INRMP CZM Program	NON-STRUCTURAL CONTROLS Provide list of Best Management Practices (BMPs), including a description of the function of each BMP and the percent annual rainfall treated. STRUCTURAL CONTROLS Provide list of structural controls including a description of the pollutant removal of each control and the percent annual rainfall treated. AND Provide an optional narrative describing any special circumstances or considerations regarding the approach to the credit.	AT Std 1 AT Rec 1 AT Rec 2 AT Rec 3 AT Rec 7 AT Rec 8 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 7.1: Heat Island Effect: Non-Roof						
Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.	OPTION 1: Provide any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards, and parking lots): -Shade (within 5 years of occupancy) -Paving materials with a Solar Reflectance Index (SRI) of at least 29 -Open grid pavement system OR OPTION 2: Place a minimum of 50% of parking spaces under cover (defined as underground, under deck, under roof, or under a building). Any roof used to shade or cover parking must have an SRI of at least 29.	1			Provide project site drawings, highlighting the location of specific paving materials, landscape shading, and/or underground or covered parking. AND OPTION 1: Provide the following data in the submittal template: The measured reflectance and emittance of each paving material installed on-site (to Calculate the SRI -OR- the actual SRI for each paving material installed on site. Total area of site hardscape, total area of hardscape to be shaded within 5 years, total area of installed SRI compliant hardscape materials, and total area of open grid pavement. OR OPTION 2: Total number of parking spaces provided on-sits, and total number of covered parking spaces on-site. AND (for either compliance option) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 1 AT Std 2 AT Std 3 AT Std 4 AT Std 5 AT Rec 1 AT Rec 2 AT Rec 3 AT Rec 4 AT Rec 8 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 7.2: Heat Island Effect: Roof						
Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate and human and wildlife habitat.	OPTION 1: Use roofing materials having a Solar Reflectance Index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface. OR OPTION 2: Install a vegetated roof for at least 50% of the roof area. OR OPTION 3: Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria: (area of SRI roof / 0.75) + (area of vegetated roof / 0.5) >=Total Roof Area Low-sloped Roof < 2:12 SRI=78 Steep Sloped Roof> 2:12 SRI=29	1			Provide copies of the project's roof drawings to highlight the location of specific roof materials and/or green roof systems. AND OPTION 1: Total area of installed SRI compliant roofing materials. Provide a listing of installed roofing materials and their SRI values. OR OPTION 2: Total area of installed green roof systems. OR OPTION 3: Total area of installed green roof systems, total area of installed SRI compliant roofing materials, and provide a listing of installed roofing materials and their SRI values. AND Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 5 AT Std 14

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 8: Light Pollution Reduction						
Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments.	FOR INTERIOR LIGHTING The angle of maximum candela from each interior luminary as located in the building shall intersect opaque building interior surfaces and not exit out through the windows. OR All non-emergency interior lighting shall be automatically controlled to turn off during non-business hours. Provide manual override capability for after hours use. AND FOR EXTERIOR LIGHTING Only light areas as required for safety and comfort. Do not exceed 80% of the lighting power densities for exterior areas and 50% for building façades and landscape features as defined in ASHRAE.IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments. All Projects shall be classified under one of the following zones, as defined in IESNA RP-33, and shall follow all of the requirements for that specific zone: Z1-DARK (Park and Rural Settings) Design exterior lighting so that all site and building mounted luminaries produce maximum initial luminance value no greater that 0.01 horizontal and vertical foot-candles at the site boundary and beyond. Document that 0% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down.) LZ2-LOW (Residential Areas) Design exterior lighting so that all site and building mounted luminaries produce a maximum initial luminance value no greater than 0.10 horizontal and vertical footcandles at the site boundary. Document that no more than 2% of the total initial designed fixture lumens are emitted at an angle of 90 degrees of higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.	1			Provide copies of the project lighting drawings (interior and site) to document the location and type of fixtures installed. Interior drawings should clearly show exterior building surfaces to confirm that the maximum candela from interior fixtures does not intersect transparent or translucent building surfaces. Provide confirmation that the interior lighting design has been evaluated to ensure that the maximum candela from each interior luminary intersects opaque interior surfaces and does not exit through windows, OR, that automatic controls have been installed to turn off interior lighting during non-occupied hours. AND	AT Std 1 AT Std 3 AT Std 5 AT Std 15 AT Rec 4 AT Rec 8 AT Rec 9 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
SS Credit 8: Light Pollution Reduction (cont'd)						
	LZ3-MEDIUM (Commercial/Industrial, High-Density Residential)Design exterior lighting so that all site and building mounted luminaries produce a maximum initial illluminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary. LZ4-HIGH (Major City Centers, Entertainment Districts) design exterior lighting so that all site and building mounted luminaries produce a maximum initial illuminance value no greater than 0.60 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 10% of the total initial designed site lumens are emitted at an angle of 90 degrees or higher from nadir (straight down). For site boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the site boundary.				For Projects With No Exterior Lighting Confirm that no exterior lighting has been installed. For Projects with Exterior Lighting Complete the Lighting Power Density tables on the Submittal Template for both exterior site lighting and façade/landscape lighting. The following data will be requires to complete the template: location and ID of each installed exterior luminaries; site area (sq ft) to be illuminated by the luminaries(s); installed LPD; and ASHRAE-allowable LPD. Confirm the site zone classification for the project. Complete the Site Lumen Calculation on the submittal template. The following data will be required to complete the template: luminaries type/ID; quantity installed; initial lamp lumens per luminaries; initial lamp lumens above 90 degrees from nadir. AND Provide a narrative that includes specific information regarding the light trespass analysis conducted to determine compliance. Please provide any additional comments or notes regarding special circumstances or considerations regarding the project's credit approach.	

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
WATER EFFICIENCY						
WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%						
Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.	Reduce potable water consumption for irrigation by 50% from a calculated mid-summer baseline case. Reductions shall be attributed to any combination of the following items: -Plant species factor -Irrigation efficiency -Use of captured rainwater -Use of recycled wastewater -Use of water treated and conveyed by a public agency specifically for non-potable uses	1	EO 12902 Energy Efficiency and Water Conservation at Federal Facilities	EMS	Provide the projects calculated baseline Total Water Applied (TWA) (gal). Provide the projects calculated design case Total Water Applied (TWA) (gal). Provide the total non-potable water supply (gal) available for irrigation purposes. Provide a narrative describing the landscaping and irrigation design strategies employed by the project; description of the water use calculation methodology used to determine savings; and for projects using non-potable water, specific information regarding source and available quantity of non-potable supplies.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 8 AT Rec 9 AT Rec 10
WE Credit 1.2: Water Efficient Landscaping: No Potable Water Use or No Irrigation						
Eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.	Achieve WE Credit 1.1 AND: Use only captured rainwater, recycled wastewater, recycled graywater, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation. OR Install landscaping that does not require permanent irrigation systems. Temporary irrigations systems used for plant establishment are allowed only if removed within one year of installation.	1 point in addition to WE Credit 1.1	Executive Memorandum "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds" April 26, 1994.	EMS	Provide the projects calculated baseline Total Water Applied (TWA) (gal). Provide the projects calculated design case Total Water Applied (TWA) (gal). Provide the total non-potable water supply (gal) available for irrigation purposes. Provide a narrative describing the landscaping and irrigation design strategies employed by the project; description of the water use calculation methodology used to determine savings; and for projects using non-potable water, specific information regarding source and available quantity of non-potable supplies.	AT Std 1 AT Std 2 AT Rec 8 AT Rec 9 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
WE Credit 2: Innovative Wastewater Technologies						
Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge.	OPTION 1: Reduce potable water use for building sewage conveyance by 50% through the use of water-conserving fixtures (water closets, urinals) or non-potable water (captured rainwater, recycled graywater, and on-site or municipally treated wastewater). OR OPTION 2: Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.	1	EO 12902 Energy Efficiency and Water Conservation at Federal Facilities ECB 2006-7 Army Standard for Urinals	EMS	Provide the applicable plumbing drawings from the construction documents that provide data regarding any on-site wastewater treatment facilities. Provide the project's calculated occupants; use a default one-to-one men to women ratio. Projects with special occupancy situations that result in an unbalanced ratio may enter project specific data for this credit. Provide the project's calculated baseline water usage for sewer conveyance. This data is calculated using typical fixture types and the project's mix of occupants. Provide the project's calculated design case water usage for sewage conveyance. This data is calculated using typical fixture types and the project's mix of occupants. Note: project teams must provide the following fixture information for each typical installed flush fixture type: fixture manufacturer, fixture model, flush rate in gallons per flush. For projects using non-potable water for sewage conveyance, provide the total non-potable water supply (gal) available for sewage conveyance purposes. For projects treating wastewater onsite, provide the annual quantity of water treated, the annual quantity (gal) of treated water that is infiltrated, and the annual quantity (gal) of treated water that is re-used on-site. Provide a narrative describing the potable water reduction strategies employed by the project. For projects using non-potable water, include specific information regarding any reclaimed water usage (graywater re-use/rainwater reuse/on-site or municipally treated wastewater). If the project is treating wastewater on-site to tertiary standards, include specific information regarding the use of the treated water.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 8 AT Rec 9 AT Rec 10

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
WE Credit 3.1: Water Use Reduction: 20% Reduction						
Maximize water efficiency within building to reduce the burden on municipal water supply and wastewater systems.	Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers and kitchen sinks.	1	EO 12902 Energy Efficiency and Water Conservation at Federal Facilities	EMS	Provide the following documentation: The project's calculated occupant(s). Use a default one-to-one men to women ratio. Projects with special occupancy situations that result in an unbalanced ratio may enter project specific data for this credit. The project's calculated design case water usage (flush and flow fixtures) This data is calculated using project specified fixture types and the project's mix on occupants. Note: project teams must provide the following fixture information for each typical installed flush fixture type: fixture manufacturer, fixture model, flush rate in gallons per flush, or flow rate in gallons per minute. The project's calculated baseline water usage (flush and flow fixtures) this data is calculated using typical fixture types and project's mix of occupants. For projects using non-potable water for sewage conveyance, provide the total non-potable water supply available for sewage conveyance purposes. Narrative describing the potable water reduction strategies employed by the project. For projects using non-potable water, include specific information regarding reclaimed water usage (graywater reuse/rainwater reuse/on-site treated wastewater).	AT Std 19 AT Rec 15 AT Rec 16 AT Rec 17
WE Credit 3.2: Water Use Reduction: 30% Reduction						
Maximize water efficiency within building to reduce burden on municipal water supply and wastewater systems.	Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupancy usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers, and kitchen sinks.	1 point in addition to WE Credit 3,1	EO 12902 Energy Efficiency and Water Conservation at Federal Facilities	EMS	Same as WE Credit 3.1	AT Std 19 AT Rec 15 AT Rec 16 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
ENERGY AND ATMOSPHERE						
EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems						
Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents.	The following commissioning process activities shall be completed by the commissioning team. 1) Designate an individual as the Commissioning Authority (CxA) to lead, review, and oversee the completion of the commissioning process activities. a) The CxA shall have documented commissioning authority experience in at least two building projects. b) The individual serving as the CxA shall be independent of the project's design and construction management, though they may be employees of the firms providing those services. The CxA may be a qualified employee or consultant of the Owner. c) The CxA shall report results, findings and recommendations directly to the Owner. d) For projects smaller than 50,000 sq ft, the CxA may include qualified persons on the design or construction teams who have the required experience. 2) The owner shall document the Owner's Project Requirements (OPR). The design team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness. The Owner and design team shall be responsible for updates to their respective documents. 3) Develop and incorporated commissioning requirements into the construction documents. 4) Develop and implement a commissioning plan. 5) Verify the installation and performance of the systems to be commissioned. 6) Complete a summary commissioning report. COMMISSIONED SYSTEMS Commissioning process activities shall be completed for the following energy-related systems at a minimum: -Heating, ventilating, air conditioning and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls. -Lighting and daylighting controls. -Domestic hot water systems. -Renewable energy systems (wind, solar, etc.)	REQ'D		EMS IDG	Provide the name and company information for the CxA. Confirm that the 6 required tasks have been completed. Provide a narrative description of the systems that were commissioned and the results of the commissioning process.	AT Std 1-22 AT Rec 1-17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EA Prerequisite 2: Minimum Energy Performance						
Establish the minimum level of energy efficiency for the proposed building and systems.	Design the building project to comply with both- -the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) of ASHRAE/IESNA Standard 90.1-2004 (without amendments); and -the prescriptive requirements (Sections 5.5, 6.5, 7.5, and 9.5) or performance requirements (Section 11) of ASHRAE/IESNA Standard 90.-2004 (without amendments).	REQ'D		EMS	Confirm that the project meets the requirements of ASHRAE Std 90.1-2004. Provide an optional narrative regarding special circumstances or considerations regarding the project's prerequisite approach.	AT Std 9 AT Std 10 AT Std 11 AT Std 12 AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Std 19 AT Std 22 AT Rec 10 AT Rec 15 AT Rec 16 AT Rec 17
EA Prerequisite 3: Fundamental Refrigerant Management						
Reduce ozone depletion.	Zero use of CFC-based refrigerants in new base building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion prior to project completion. Phase-out plans extending beyond the project completion date will be considered on their merits.	REQ'D	EO 12843 Procurement Requirements and Policies for Federal Agencies for Ozone Depleting Substances		Confirm that the project does not use CFC refrigerants. OR Confirm that the project has a phase-out plan for any existing CFC-based equipment. Provide a narrative description of the phase-out plan, including dates and refrigerant quantities as a percentage of the overall project equipment.	AT Std 17

Table 3.1: LEED Credit Matrix

INTENT	REQUIREMENT	POINTS	ARMY POLICY	FT MEADE POLICY	REQUIRED DOCUMENTATION	RELATED AT/FP STANDARDS
EA Credit 1: Optimize Energy Performance						
Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.	Select one of the three compliance path options described below. Project teams documenting achievement using any of the three options are assumed to be in compliance with EA Prerequisite 2. OPTION 1-WHOLE BUILDING ENERGY SIMULATION (1-10 Points) Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 (without amendments) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard. the minimum energy cost savings percentage for each point threshold is as follows: New Buildings / Existing Building Renovations / Points 10.5% / 3.5% / 1 14% / 7% / 2 17.5% / 10.5% / 3 21% / 14% / 4 24.5% / 17.5% / 5 28% / 21% / 6 31.5% / 24.5% / 7 35% / 28% / 8 38.5% / 31.5% / 9 42% / 35% / 10 Appendix G of Standard 90.1-2004 requires that the energy analysis done for the Building Performance rating Method include ALL of the energy costs within and associated with the building project. To achieve points using this credit, the proposed design-- --must comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) in standard 90.1-2004 (without amendments); --must include all the energy costs within and associated with the building project; and --must be compared against a baseline building that complies with Appendix G to Standard 90.1-2004 (without amendments). The default process energy cost is 25% of the total energy cost for the baseline building. For buildings where the process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include supporting documentation substantiating that process energy inputs are appropriate. Continued on next page.	1-10 Points	On June 3, 1999 the President issued EO13123, Greening the Government Through Efficient Energy Management. In EO 13123, the Federal Government has set a goal to reduce greenhouse gas emissions attributed to Federal energy consumption by 30% by 2010 and to reduce energy consumption in Federal facilities by 30% by 2005.	EMS (GPP)	Use and submit the EA Credit 1 Submittal Template provided by the US Green Building Council for LEED-NC Version 2.2 (www.usgbc.org)	AT Std 9 AT Std 10 AT Std 11 AT Std 12 AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Std 19 AT Std 22 AT Rec 10 AT Rec 15 AT Rec 16 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EA Credit 1: Optimize Energy Performance (cont'd)						
	For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators, and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g. lighting integral to medical equipment) and other (e.g. waterfall pumps). Regulated (non-process) energy includes lighting (such as for the interior, parking garage, surface parking, facade, or building grounds, except as noted above), HVAC (such as for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc), and service water heating for domestic or space heating purposes. For EA Credit 1, process loads shall be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the Exception Calculation Method (ASHRAE 90.1-2004 G2.5) to document measures that reduce process loads. Documentation of process load energy savings shall include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions. OR OPTION 2- PRESCRIPTIVE COMPLIANCE PATH (4 Points) Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004. The following restrictions apply: --Buildings must be under 20,000 square feet --Buildings must be office occupancy --Project teams must fully comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located OR OPTION 3- PRESCRIPTIVE COMPLIANCE PATH (1 Point) Comply with the Basic Criteria and Prescriptive Measures of the Advanced Buildings Benchmark Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control. The following restrictions apply: --Project teams must fully comply with all applicable criteria as established in Advanced Buildings Benchmark for the climate zone in which the building is located.					

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EA Credit 2: On-Site Renewable Energy						
Encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use.	Use on-site renewable energy systems to offset building energy cost. Calculate project performance expressing the energy produced by the renewable systems as a percentage of the building annual energy cost and using the table below to determine the number of points achieved. Use the building annual energy cost calculated in EA Credit 1 or use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use. % Renewable Energy — Points 2.5% — 1 7.5% — 2 12.5% — 3	1-3 Points		EMS	Provide the On-Site Renewable Energy Source (s) used, the annual energy generated from each source, and the backup fuel for each source (i.e., the fuel that is used when the renewable energy source is unavailable). Describe the source of the annual energy cost information (energy model or industry database), and provide the appropriate energy values and costs.	AT Std 19 AT Rec 9

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EA Credit 3: Enhanced Commissioning						
Begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed.	Implement, or have a contract in place to implement, the following additional commissioning process activities in addition to the requirements of EA Prerequisite 1 and in accordance with this LEED-NC 2.2 Reference Guide: 1. Prior to the start of the construction documents phase, designate an independent Commissioning Authority (CxA to lead, review, and oversee the completion of all commissioning process activities. The CxA shall, at a minimum, perform Tasks 2, 3 and 6. Other team members may perform Tasks 4 and 5. a. The CxA shall have documented commissioning authority experience in at least two building projects. b. The individual serving as the CxA shall be-- i. independent of the work of design and construction ii. not an employee of the design firm, though they may be contracted through them; iii. not an employee of, or contracted through, a contractor or construction manager holding construction contracts; and iv. (can be) a qualified employee or consultant of the Owner c.The CxA shall report results, findings and recommendations directly to the Owner. d. This requirement has no deviation for project size 2.The CxA shall conduct, at a minimum, one commissioning design review of the Owner's Project Requirements (OPR), Basis of Design (BOD), and design documents prior to mid-construction documents phase and back-check the review comments in the subsequent design submission. 3. The CxA shall review contractor submittals applicable to systems being commissioned for compliance with the OPR and BOD. This review shall be concurrent with A/E reviews and submitted to the design team and Owner. 4. Develop a system manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems. 5. Verify that the requirements for training operating personnel and building occupants are completed. 6. Assure the involvement by the CxA in reviewing building operation within 10 months after substantial completion with O&M staff and occupants. Include a plan for resolution of outstanding commissioning-related issues.	1		IDG	Provide the name, firm and experience information for the CxA. Confirm that the 6 required tasks have been completed. Provide a narrative description of the results of the commissioning design review, implementation of the systems manual and training, and the plan for the review of building operation at 8 to 10 months.	AT Std 1-22 AT Rec 1-17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EA Credit 4: Enhanced Refrigerant Management						
Reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming.	OPTION 1: Do not use refrigerants OR OPTION 2: Select refrigerants and HVAC&R that minimize or eliminate the emissions of compounds that contribute to ozone depletion and global warming. The base building HVAC&R equipment shall comply with the following formula, which sets a maximum threshold for the combined contributions to ozone depletion and global warming potential: LCGWP+LCODPx10^5 ≤ 100 Where: LCODP=[ODP_r x (Lr x Life +Mr) x Rc]/Life LCGWP=[GWPr x (Lr x Life + Mr) x Rc]/Life LCODP: Lifecycle Ozone Depletion Potential (lbCFC11/Ton-Year) LCGWP: Lifecycle Direct Global Warming Potential (lbCO_2/Ton-Year) GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lbCO_2/lbr) ODPr:Ozone Depletion Potential of Refrigerant (0 to 0.2 lbCFC11/lbr) Lr: Refrigerant Leakage Rate (0.5% to 2.0%; default of 2% unless otherwise demonstrated) Mr: End-of-life Refrigerant Loss (2% to 10%; default of 10% unless otherwise demonstrated) Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of cooling capacity) Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated) For multiple types of equipment, a weighted average of all base building level HVAC&R equipment shall be applied using the following formula: [S (LCGWP + LCODP x 105) x Qunit]/Qtotal≤100 Where: Qunit=Cooling capacity of an individual HVAC or refrigeration unit (tons) Qtotal=Total cooling capacity of all HVAC or refrigeration Small HVAC units (defined as containing less than 0.5 lbs of refrigerant), and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 lbs of refrigerant, are not considered part of the "base building" system and are not subject to the requirements of this credit. AND Do not install fire suppression systems that contain ozone-depleting substances (CFC's, HCFC's or Halons)	1	EO 12843 Procurement Requirements and Policies for Federal Agencies for Ozone Depleting Substances		Enter into the template the HVAC&R equipment types, including number, size (tons), refrigerant, and refrigerant charge. Provide a narrative describing any special circumstances or calculation explanations.	AT Std 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EA Credit 5: Measurement & Verification						
Provide for the ongoing accountability of building energy consumption over time.	Develop and implement a Measurement & verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2) , or Option B: Energy Conservation Measure Isolation, as specified in the *International Performance Measurement & verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003.* *The M&V period shall cover a period of no less than one year of post-construction occupancy.*	1			Confirm the IPMVP Option pursued by the project. Upload a copy of the M&V Plan. Provide a narrative describing any special circumstances or calculation explanations.	AT Std 13 AT Std 17 AT Std 18 AT Std 22
EA Credit 6: Green Power						
Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.	Provide at least 35% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements. DETERMINE THE BASELINE ELECTRICITY USE Use the annual electricity consumption from the results of EA Credit 1. OR Use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use.	1	EO 13123 Section 403 Greening the Government Through Efficient Energy Management	EMS	OPTION 1: Provide the name of the green power provider and contract term. Enter total annual electricity consumption (kWh) and total annual green power purchase (kWh). OPTION 2: Provide the name of the renewable energy certificate vendor. Enter total annual electricity consumption (kWh). Enter the value of the green tags purchased (kWh).	AT Std 19

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MATERIALS AND RESOURCES						
MR Prerequisite 1: Storage & Collection of Recyclables						
Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills	Provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals.	REQ'D	EO 13101 Greening the Government Sec 705 Recycling Programs	EMS	Confirm that recycling collection areas have been provided, per requirements, to meet the needs of the project. Confirm the types of materials that are being collected for recycling. Provide an optional narrative describing any special circumstances or considerations regarding the project's prerequisite approach.	AT Std 1 AT Rec 9
MR Credit 1.1: Building Reuse : Maintain 75% of Existing Walls, Floors & Roof						
Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.	Maintain at least 75% (based on surface area) of existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing material). Hazardous materials that are remediated as a part of the project scope shall be excluded from the calculation of the percentage maintained. If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than 2 times the square footage of the existing building.	1		EMS	Confirm whether the project is strictly a renovation of an existing building or a renovation with an addition. For projects with additions, confirm the square footage of the new addition(s). Provide a tabulation of the existing and reused areas (sq ft) of each structural/envelope element. Provide an optional narrative describing any special circumstances or considerations regarding the project's approach.	AT Std 1 AT Std 2 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10 AT Rec 11 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 1.2: Building Reuse : Maintain 95% of Existing Walls, Floors & Roof						
Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.	Maintain an additional 20% (95% total, based on surface area) of existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing material). Hazardous materials that are re-mediated as a part of the project scope shall be excluded from the calculation of the percentage maintained. If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than 2 times the square footage of the existing building.	1 Point in addition to MR Credit 1.1		EMS	Confirm whether the project is strictly a renovation of an existing building or a renovation with an addition. For projects with additions, confirm the square footage of the new addition(s). Provide a tabulation of the existing and reused areas (sq ft) of each structural/envelope element. Provide an optional narrative describing any special circumstances or considerations regarding the project's approach.	AT Std 1 AT Std 2 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10 AT Rec 11 AT Rec 17
MR Credit 1.3: Building Reuse : Maintain 50% of Interior Non-Structural Elements						
Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.	Use existing interior non-structural elements (interior walls, doors, floor coverings and ceiling systems) in at least 50% (by area) of the completed building (including additions). If the project includes an addition to an existing building, this credit is not applicable if the square footage of the addition is more than 2 times the square footage of the existing building.	1		EMS	Confirm whether the project is strictly a renovation of an existing building or a renovation of an existing building or a renovation with an addition. For projects with additions, confirm the square footage of the new addition (s). Provide an optional narrative describing any special circumstances or considerations regarding the project's approach.	N/A

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 2.1: Construction Waste Management : Divert 50% from Disposal						
Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.	Recycle and/or salvage at least 50% of non-hazardous construction and demolition. Develop and implement a construction waste management plan that, at a minimum identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or commingled. Excavated soil and land-clearing debris does not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.	1		EMS	Complete the construction waste calculation tables in the Submittal Template. The following information will be required to fill in these tables: general description of each type/category of waste generated; location of receiving agent (recycler/landfill) for waste; quantity of waste diverted (by category) in tons, or cubic yards. Provide a narrative describing the project's construction waste management approach. The narrative should include the project's Construction Waste Management Plan. Please provide any additional comments or notes to describe special circumstances or considerations regarding the project's credit approach.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 7 AT Rec 8 AT Rec 9
MR Credit 2.2: Construction Waste Management : Divert 75% from Disposal						
Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.	Recycle and/or salvage an additional 25% beyond MR Credit 2.1 (75% total) of non-hazardous construction and demolition debris. Excavated soil and land-clearing debris does not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.	1 Point in addition to MR Credit 2.1		EMS	Complete the construction waste calculation tables in the Submittal Template. The following information will be required to fill in these tables: general description of each type/category of waste generated; location of receiving agent (recycler/landfill) for waste; quantity of waste diverted (by category) in tons, or cubic yards. Provide a narrative describing the project's construction waste management approach. The narrative should include the project's Construction Waste Management Plan. Please provide any additional comments or notes to describe special circumstances or considerations regarding the project's credit approach.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 7 AT Rec 8 AT Rec 9

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 3.1: Materials Reuse : 5%						
Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.	Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least 5% based on cost of the total value of materials on the project. Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7.	1		EMS	Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value. Provide a tabulation of each salvaged/reused material used on the project. The tabulation must include a description of the material, the source/vendor for the material and the product cost. Provide a narrative describing the materials reuse strategy implemented by the project. Include specific information about reused/salvaged materials used on the project.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17
MR Credit 3.2: Materials Reuse : 10%						
Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.	Use salvaged, refurbished or reused materials for an additional 5% beyond MR Credit 3.1 (10% total, based on cost). Mechanical, electrical and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7.	1 Point in addition to MR Credit 3.1		EMS	Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value. Provide a tabulation of each salvaged/reused material used on the project. The tabulation must include a description of the material, the source/vendor for the material and the product cost. Provide a narrative describing the materials reuse strategy implemented by the project. Include specific information about reused/salvaged materials used on the project.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 4.1: Recycled Content : 10% (post-consumer + 1/2 pre-consumer)						
Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.	Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project. The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7. Recycled content shall be defined in accordance with the International Organization for Standardization document., *ISO 14021-Environmental labels and declarations--Self-declared environmental claims (Type II environmental labeling)*. Post-consumer material is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. Pre-consumer material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.	1	EO 13101 Greening the Government Sec 401 Acquisition Planning and Sec 402 Affirmative Procurement Programs	EMS (GPP)	Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value. Provide a tabulation of each material used on the project that is being tracked for recycled content. The tabulation must include a description of the material, the manufacturer of the material, the product cost, the pre-consumer and/or post-consumer recycled content percentage, and the source of the recycled content data. Provide an optional narrative describing any special circumstances or considerations regarding the projects credit approach.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 4.2: Recycled Content : 20% (post-consumer + 1/2 pre-consumer)						
Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.	Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes an additional 10% beyond MR Credit 4.1(total of 20%, based on cost) of the total value of the materials in the project. The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. Mechanical, electrical and plumbing components and specialty items such as elevators shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7. Recycled content shall be defined in accordance with the International Organization for Standardization document., *ISO 14021-Environmental labels and declarations--Self-declared environmental claims (Type II environmental labeling)*.	1 Point in addition to MR Credit 4.1	EO 13101 Greening the Government Sec 401 Acquisition Planning and Sec 402 Affirmative Procurement Programs	EMS (GPP)	Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value. Provide a tabulation of each material used on the project that is being tracked for recycled content. The tabulation must include a description of the material, the manufacturer of the material, the product cost, the pre-consumer and/or post-consumer recycled content percentage, and the source of the recycled content data. Provide an optional narrative describing any special circumstances or considerations regarding the projects credit approach.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17
MR Credit 5.1: Regional Materials: 10% extracted, Processed & Manufactured Regionally						
Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation	Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. Mechanical, electrical and plumbing components and specialty items such as elevators and equipments shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7.	1		EMS (GPP)	Provide the project's total project cost (for application of 45% default factor) or total materials cost. Note this reported value must be consistent across all MR credits. Complete a template to include the following information: product name for each tracked material; material manufacturer; total product cost for each tracked material; percentage of product by weight, that meets both the extraction and manufacture criteria; distance between the project site and extraction/harvest/recovery site; distance between the project site and the final manufacturing location. Provide an option narrative describing any special circumstances or considerations regarding the project's credit approach.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 5.2: Regional Materials: 20% extracted, Processed & Manufactured Regionally						
Increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation	Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. Mechanical, electrical and plumbing components and specialty items such as elevators and equipments shall not be included in this calculation. Only include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7.	1 Point in addition to MR Credit 5.1		EMS (GPP)	Provide the project's total project cost (for application of 45% default factor) or total materials cost. Note this reported value must be consistent across all MR credits. Create and complete a template to include the following information: product name for each tracked material; material manufacturer; total product cost for each tracked material; percentage of product by weight, that meets both the extraction and manufacture criteria; distance between the project site and extraction/harvest/recovery site; distance between the project site and the final manufacturing location. Provide an option narrative describing any special circumstances or considerations regarding the project's credit approach.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17
MR Credit 6.0: Rapidly Renewable Materials						
Reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials.	Use rapidly renewable building materials and products (made from plants that are typically harvested within a ten-year cycle or shorter) for 2.5% of the total value of all building materials and products used in the project, based on cost.	1	EO 13101 Greening the Government Sec 401 Acquisition Planning and Sec 402 Affirmative Procurement Programs	EMS (GPP)	Provide the project's total project cost (for application of 45% default factor) or total materials cost. Note this reported value must be consistent across all MR credits. Create and complete a table to include the following information: product name for each tracked material; material manufacturer; total product cost for each tracked material; percentage of product, by weight, for each material that meets the rapidly renewable criteria.	N/A

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
MR Credit 7.0: Certified Wood						
Encourage environmentally responsible forest management.	Use a minimum of 50% of wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include, but are not limited to, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes. Include materials permanently installed in the project. Furniture may be included, providing it is included consistently in MR Credits 3-7. Wood products purchased for temporary use on the project (e.g. formwork, bracing, scaffolding, sidewalk protection, and guard rails) maybe included in the calculation at the project teams discretion. If any such materials are included, all such materials must be included in the calculation. If any such materials are included, all such materials must be included in the calculation. If such materials are purchased for use on multiple projects, the applicant may include these materials for only one project, at its discretion.	1	EO 13101 Greening the Government Sec 401 Acquisition Planning and Sec 402 Affirmative Procurement Programs	EMS (GPP)	Provide a list of items (and/or components of products) claimed as FSC certified, including product type, manufacturer, and the appropriate entity's COC (chain-of custody) certification number. Each product name can then be cross-referenced with the manufacturer or vendor COC number during the LEED certification review.	N/A

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
INDOOR ENVIRONMENTAL QUALITY						
EQ Prerequisite 1: Minimum IAQ Performance						
Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.	Meet the minimum requirement of Sections 4 through 7 of ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality. Mechanical ventilation systems shall be designed using the Ventilation Rate Procedure or the applicable local code, whichever is more stringent. Naturally ventilated buildings shall comply with ASHRAE 62.1-2044, paragraph 5.1.	REQ'D		IDG	Provide a design narrative describing the project's ventilation design. Include specific information regarding fresh air intake volumes and any special conditions that affected the project's ventilation design. AND For mechanically ventilated building: confirmation that the project has been designed to meet the minimum requirements of ASHRAE Standard 62.1-2004, ventilation for acceptable indoor air quality, using the ventilation rate procedure. OR For naturally ventilated buildings: confirmation that the project has been designed to comply with the requirements for location and size of window openings per ASHRAE Standard 62.1-2004, Section 5.1 AND For naturally ventilated buildings: provide applicable project drawings to show the naturally ventilated building zones and the operable window areas.	AT Std 10 AT Std 13 AT Std 16 AT Std 17 AT Std 22 AT Rec 14 AT Rec 15 AT Rec 16 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control						
Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS)	OPTION 1: Prohibit smoking in the building. Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows. OPTION 2: Prohibit smoking in the building except in designated smoking areas. Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows. Locate designated smoking rooms to effectively contain, capture, and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no re-circulation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions. With the doors to the smoking room closed, operate exhaust sufficient to create a negative pressure with respect to the adjacent spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water gauge). OPTION 3: (For residential buildings only) Prohibit smoking in all common areas of the building. Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas. Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units, and by sealing vertical chases adjacent to the units. All doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway. Continued on next page	REQ'D	Executive Order 13058 Protects federal employees and the public from exposure to tobacco smoke in the federal workplace.	IDG	Confirmation that the project has met the requirements for the appropriate project category: Non-Smoking Building; Building with Designated Smoking Rooms; or Residential Project. For buildings with interior smoking rooms or for residential projects, provide appropriate copies of construction drawings to document the location of the smoking rooms, designed area separations, and dedicated ventilation systems. An optional narrative may be provided to further describe the testing protocols/results and compliance methods implemented by the project.	AT Std 10 AT Std 13 AT Std 16 AT Std 17 AT Std 22 AT Rec 14 AT Rec 15 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control (cont'd)						
	If the common hallways are pressurized with respect to the residential units then doors in the residential units leading to the common hallways need not be weather-stripped provided that the positive differential pressure is demonstrated as in Option 2 above, considering the residential unit as the smoking room. Acceptable sealing of residential units shall be demonstrated by a blower door test conducted in accordance with ANSI/ASTM-E770-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization, AND use the progressive sampling methodology defined in Chapter 4(Compliance Through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards www.energy.ca.gov/title24/residential_manual). Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e. sum of all wall, ceiling and floor areas).					

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 1: Outdoor Air Delivery Monitoring						
Provide capacity for ventilation system monitoring to help sustain occupant comfort and well being.	Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain minimum ventilation requirements. Configure all monitoring equipment to generate an alarm when the conditions vary by 10% of more from set point, via either a building automation system alarm to the building operator or via a visual or audible alert to the building occupants. FOR MECHANICALLY VENTILATED SPACES Monitor carbon dioxide concentrations within all densely occupied spaces (those with a design occupant density greater than or equal to 25 people per 1000 sq ft). CO_2 monitoring locations shall be between 3 feet and 6 feet above the floor. For each mechanical ventilation system serving non-densely occupied spaces, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate with an accuracy of plus or minus 15% of the design minimum outdoor air rate, as defined by ASHRAE 62.1-2004. FOR NATURALLY VENTILATED SPACES Monitor CO_2 concentrations within all naturally ventilated spaces. CO2 monitoring shall be located within the room between 3 feet and 6 feet above the floor. One CO2 sensor may be used to represent multiple spaces if the natural ventilation design uses passive stack(s) or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants.	1		IDG	Confirmation of the type of ventilation system and installed controls. Design narrative describing the project's ventilation design and CO2 monitoring system. Include specific information regarding location and quantity of installed monitors, operational parameters and set points. Provide copies of the applicable project drawings to document the location and type of installed sensors. Drawings should also show natural ventilation components (operable windows, air intakes, etc.) as applicable.	AT Std 13 AT Std 17 AT Std 18 AT Rec 14 AT Rec 15

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 2: Increased Ventilation						
Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.	FOR MECHANICALLY VENTILATED SPACES Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates requires by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1. FOR NATURALLY VENTILATED SPACES Design natural ventilation systems for occupied spaces to meet the recommendations set forth in the Carbon Trust Good Practices Guide 237 [1998]. Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 1.18 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10:2005, Natural ventilation in non-domestic buildings. AND Use diagrams and calculations to show that the design of the natural ventilation systems meets the recommendations set forth in the CIBSE Applications Manual 10:2005, Natural ventilation in non-domestic buildings. OR Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-20004 Chapter 6, for at least 90% of occupied spaces.	1		IDG	MECHANICALLY VENTILATED BUILDINGS: Provide confirmation that the breathing zone ventilation rates in all occupied spaces have been designed to exceed the minimum rates required by ASHRAE Standard 62.1-2004 or the applicable local code, whichever is more stringent, by a minimum of 30%. Provide a design narrative describing the project's ventilation system design. Include specific information regarding the fresh air intake volume for each specific occupied zone to demonstrate that the design exceeds the referenced standard or the applicable local code, whichever is more stringent, by at least 30%. NATURALLY VENTILATED BUILDINGS Provide confirmation that the natural ventilation system has been designed to meet the recommendations set forth in the Carbon Trust Good Practice Guide 237 [1998]. Provide a design narrative describing the design method (CIBSE Method/Analytic Model) utilized in determining the natural ventilation design for the project. Provide specific information regarding calculation methodology and/or model results to demonstrate that the ventilation design complies with the referenced standards.	AT Std 10 AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Rec 14 AT Rec 15 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 3.1: Construction IAQ Management Plan: During Construction						
Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.	Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: During construction meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3. Protect stored on-site or installed absorptive materials from moisture damage. In permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-1999. Replace all filtration media immediately prior to occupancy.	1			Provide a copy of the project's Indoor Air Quality (IAQ) Management Plan. Confirm if the permanently installed air handling equipment was used during construction. Provide photos to highlight the implemented construction IAQ practices. List all filtration media (manufacturer, model#, MERV rating, location of installed filter) installed during construction and confirm that each was replaced prior to final occupancy. Provide an optional narrative describing any special circumstances or non-standard approaches taken by the project.	AT Std 13 AT Std 17 AT Std 18 AT Rec 12 AT Rec 13

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 3.2: Construction IAQ Management Plan: Before Occupancy						
Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.	Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows: OPTION 1-FLUSH OUT After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu ft of outdoor air per sq ft of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and relative humidity no higher than 60%. OR If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu ft of outdoor air per sq ft of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq ft of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu ft of outside air has been delivered to the space. OR OPTION 2- AIR QUALITY TESTING Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in this Reference Guide. Demonstrate that the contaminant maximum concentrations listed below are not exceeded. Formaldehyde - 50 parts per billion; Particulates (PM10) - 50 micrograms per cubic meter; Total Volatile Organic Compounds (TVOC) - 500 micrograms per cubic meter; *4-Phenylcyclohexene (4-PCH) - 6.5 micrograms per cubic meter; Carbon Monoxide (CO) - 9 part per million and no greater than 2 parts per million above outdoor levels. Continued on next page.	1			Provide confirmation regarding the approach taken by the project (pre-occupancy flush-out; flush-out with early occupancy; IAQ testing). Provide a copy of the project's Indoor Air Quality testing report (if applicable). Provide a narrative describing the project's specific flush-out procedure and/or IAQ testing process and results.	AT Std 13 AT Std 17 AT Std 18 AT Rec 12 AT Rec 13

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 3.2: Construction IAQ Management Plan: Before Occupancy (cont'd)						
	**This test is only required if carpets and fabrics with styrene butadiene rubber latex backing material are installed as part of the base building systems.* For each sampling point where the maximum concentration limits are exceeded conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test. The air sample testing shall be conducted as follows: 1. All measurements shall be conducted prior to occupancy, but during normal occupied hours, and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing. 2. The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing. 3. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separated ventilation system, the number of sampling points shall not be less than one per 25,000 sq ft or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength. 4. Air samples shall be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.					

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 4.1: Low-Emitting Materials: Adhesives & Sealants						
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following reference standards: Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168. VOC limits shall correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.	1		IDG EMS	Provide a list of each indoor adhesive, sealant and sealant primer product used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L, less water) for each product, and the corresponding allowable VOC from the referenced standard. Provide a list of each indoor aerosol adhesive product used on the project. Include the manufacturer's name, specific VOC data (in/L less water for each product, and the corresponding allowable VOC from the standard. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 13
EQ Credit 4.2: Low-Emitting Materials: Paints & Coatings						
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	Paints and coatings used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the following criteria: Architectural paints, coatings and primers applied to interior walls and ceilings: Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993. Flats: 50g/L Non-Flats: 150g/L Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates: Do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to interior elements: Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004. Clear wood finishes: varnish 350 g/L; lacquer 550 g/L Floor coatings: 100 g/L Shellac: clear 730 g/L; pigmented 550 g/L Sealers: waterproofing sealers 250 g/L; sanding sealers 275 g/L; all other sealers 200g/L Stains: 250 g/L	1		IDG	Provide a listing of each indoor pain and coating used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L) for each product, and the corresponding allowable VOC from the referenced standard. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	N/A

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 4.3: Low-Emitting Materials: Carpet Systems						
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program. All carpet adhesive shall meet the requirements of EQ Credit 4.1: VOC limit of 50 g/L	1		IDG	Provide listing of each carpet product installed in the building interior. Confirm that the product complies with the CRI Green Label Plus testing program. Provide a listing of each carpet cushion product installed in the building interior. Confirm that the product complies with the CRI Green Label testing program. Provide narrative to describe any special circumstances or non-standard compliance paths taken by the project.	N/A
EQ Credit 4.4: Low-Emitting Materials: Composite Wood & Agrifiber Products						
Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Composite wood and agrifiber products are defined as: particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Furniture and equipment are not considered base building elements and are not included.	1		IDG	Provide a listing of each composite wood and agrifiber product installed in the building interior. Confirm that each product does not contain any added urea-formaldehyde. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	N/A

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 5.0: Indoor Chemical & Pollutant Source Control						
Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants.	Design to minimize and control pollutant entry into buildings and later cross-contamination of regularly occupied areas: Employ permanent entryway systems at least six feet long in the primary direction of travel to capture dirt and particulates from entering the building at all entryways that are directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users. Where hazardous gases or chemicals may be present or used (including garages, housekeeping/laundry areas and coping/printing rooms), exhaust each space sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck to deck partitions or a hard lid ceiling. The exhaust rate shall be al least 0.50 cfm/sq ft, with no air re-circulation. The pressure differential with the surrounding spaces shall be at least 5 Pa (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media prior to occupancy that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Filtration should be applied to process both return and outside air that is to be delivered as supply air.	1		IDG	Provide confirmation that required entryway systems have been provided. Provide a listing of each entryway product installed in the building. For roll-up or carpeted systems, confirm that the required contracted maintenance will take place. Provide copies of the project's construction drawings to highlight the location of the installed entryway systems. Confirm that chemical use area have been designed as separate rooms with dedicated exhaust systems and appropriate negative pressurization. Provide copies of the project's mechanical drawings to highlight the location of chemical usage areas, room separations, and the associated exhaust systems. If mechanically ventilated, confirm that the installed filters have a MERV rating of 13 or better. Provide a listing of the installed filters and their associated MERV ratings. Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Rec 14 AT Rec 15 AT Rec 16

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 6.1: Controllability of Systems: Lighting						
Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.	Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. AND Provide lighting system controllability for all shared multi-occupant spaces to enable lighting adjustments that meets group needs and preferences.	1		IDG	For individual workstation controls, provide a listing of the total number of individual workstations and lighting controls. For shared multi-occupant space control, provide a listing of the project's group multi-occupant spaces and a description of the installed lighting controls. Provide a narrative describing the project's lighting control strategy. Include data regarding the type and location of individual controls (general area illumination controls for multi-workstation spaces may not be counted towards this credit) and also the type and location of controls provided for shared multi-occupant spaces.	AT Std 10 AT Std 16 AT Std 18 AT Std 19 AT Rec 14 AT Rec 15 AT Rec 16 AT Rec 17
EQ Credit 6.2: Controllability of Systems: Thermal Comfort						
Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (i.e. classrooms or conference areas) to promote the productivity, comfort and well-being of building occupants.	Provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. Operable windows can be used in lieu of comfort controls for occupants of areas that are 20 feet inside of and 10 feet to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE 62.1-2004, paragraph 5.1, Natural Ventilation AND Provide comfort system controls for all shared multi-occupant spaces to enable adjustments to suit group needs and preferences. Conditions for thermal comfort are described in ASHRAE Standard 55-2004 to include the primary factors of air temperature, radiant temperature, air speed and humidity. Comfort system control, for the purposes of this credit, is defined as the provision of control over at least one of these primary factors in the occupant's local environment.	1		IDG	For individual workstation controls, provide a listing of the total number of individual workstations and thermal controls. For shared multi-occupant space control, provide a listing of the project's group multi-occupant spaces and a description of the installed thermal controls. Provide a narrative describing the project's comfort control strategy. Include data regarding the type and location of individual and shared group-occupancy controls.	AT Std 16 AT Std 18 AT Rec 19 AT Rec 14 AT Rec 15

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 7.1: Thermal Comfort: Design						
Provide a comfortable thermal environment that supports the productivity and well being of building occupants.	Design HVAC systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy. Demonstrate design compliance in accordance with the Section 6.1.1 Documentation.	1		IDG	Provide data regarding seasonal temperature and humidity design criteria. Provide a narrative describing the method used to establish the thermal comfort conditions for the project and how the systems design addresses the design criteria. Include specific information regarding compliance with the referenced standard.	AT Std 10 AT Std 16 AT Std 18 AT Rec 22 AT Rec 15 AT Rec 16 AT Rec 17
EQ Credit 7.2: Thermal Comfort: Verification						
Provide for the assessment of building thermal comfort over time.	Agree to implement a thermal comfort survey of building occupants within a period of six to 18 months after occupancy. This survey should collect anonymous responses about thermal performance and identification of thermal comfort-related problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004.	1		IDG	Provide a narrative describing the survey planned for the validation of the thermal comfort conditions for the project. Include a specific description of the provisions for creating a plan for corrective action.	AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Std 22 AT Rec 14 AT Rec 15

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 8.1: Daylight and Views: Daylight 75% of Spaces						
Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building	OPTION 1- GLAZING FACTOR CALCULATION Achieve a minimum glazing factor of 2% in a minimum of 75% of all regularly occupied areas. The glazing factor is calculated as follows: Glazing Factor={Window Area [SF]/Floor Area [SF]}x Window Geometry Factor x {Actual Tvis/Minimum Tvis} x Window Height Factor OR OPTION 2-DAYLIGHT SIMULATION MODEL Demonstrate, through computer simulation, that a minimum daylight illumination level of 25 footcandles has been achieved in a minimum of 75% of all regularly occupied areas. Modeling must demonstrate 25 horizontal footcandles under clear sky conditions, at noon, on the equinox, at 30" above the floor. OR OPTION 3-DAYLIGHT MEASUREMENT Demonstrate, through records of indoor light measurement, that a minimum daylight illumination level of 25 footcandles has been achieved in at least 75% of all regularly occupied areas. Measurements must be taken on a 10-foot grid for all occupied space and must be recorded on building floor plans. In all cases, only the square footage associated with the portions of rooms or spaces meeting the minimum illumination requirements can be applied towards the 75% of total area calculation required to qualify for this credit. In all cases, provide daylight redirection and /or glare control devices to avoid high-contrast situations that could impede visual tasks. Exceptions for areas where tasks would be hindered by the use of daylight will be considered on their merits.	1		IDG	GLAZING FACTOR CALCULATION METHOD Complete a calculation spreadsheet to demonstrate overall Glazing Factor. The following data is required for input: occupied space area (sq ft); area of each type of glazing (sidelighting and toplighting); visible light transmittance (T_{vis}) for each glazing type. OR COMPUTER SIMULATION METHOD Demonstrate that the project complies with the minimum illumination levels. The following data is required for input: total regularly occupied space area (sq ft), total regularly occupied space area that achieves a simulated minimum of 25 footcandles. Provide copies of the applicable project drawings showing the illumination simulation results. OR DAYLIGHT MEASUREMENT METHOD Complete a calculation spreadsheet to demonstrate that the project complies with the minimum illumination levels. The following data is required for input: total regularly occupied space area (sq ft); total regularly occupied space area that achieves a measured minimum of 25 footcandles. Provide copies of the applicable project drawings showing the illumination simulation results. AND Provide a narrative describing any special occupancy areas that have been excluded from compliance. The narrative should include a detailed description of the space function and an explanation as to why the inclusion of views would hinder the normal tasks/function of each exclusion area. For projects that have used computer simulation or physical measurements, please include detailed information describing the method used to determine the daylighting contributions in the building. Include specific information regarding the actual or simulated time of day and weather conditions, measurement equipment or software used, and the calculation method for determining the final daylighting area.	AT Std 1 AT Std 2 AT Std 3 AT Std 4 AT Std 8 AT Std 10 AT Std 11 AT Std 12 AT Std 14 AT Std 15

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
EQ Credit 8.2: Daylight and Views: Views for 90% of Spaces						
Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building	Achieve direct line of sight to the outdoor environment via vision glazing between 2'6" and7'6" above finish floor for building occupants in 90% of all regularly occupied areas. Determine the area with direct line of sight by totaling the regularly occupied square footage that meets the following criteria: In plan view, the area is within sight lines drawn from perimeter vision glazing. In section view, a direct sight line can be drawn from the area to perimeter vision glazing. Line of sight may be drawn through interior glazing. For private offices, the entire square footage of the office can be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For multi-occupant spaces, the actual square footages with direct line of sight to perimeter vision glazing are counted.	1		IDG	Complete a calculation spreadsheet to demonstrate overall access to views from occupied spaces. The following data is required for input: occupied space identification, occupied space area (sq ft), and area (sq ft) of each occupied space with direct access to views. Provide copies of the applicable project drawings showing the line of sight from interior spaces through exterior windows in both plan and sectional views. Provide a narrative describing any special occupancy areas that have been excluded from compliance. The narrative should include a detailed description of the space function and an explanation as to why the inclusion of views would hinder the normal tasks/function of each excluded area.	AT Std 1 AT Std 2 AT Std 3 AT Std 4 AT Std 8 AT Std 10 AT Std 11 AT Std 15 AT Rec 3 AT Rec 4 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 9 AT Rec 10 AT Rec 14 AT Rec 15 AT Rec 16 AT Rec 17

Table 3.1: LEED Credit Matrix						
INTENT	**REQUIREMENT**	**POINTS**	**ARMY POLICY**	**FT MEADE POLICY**	**REQUIRED DOCUMENTATION**	**RELATED AT/FP STANDARDS**
INNOVATION AND DESIGN PROCESS						
ID Credit 1.1-1.4: Innovation in Design						
To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set by the LEED-NC Green Building Rating System and /or performance in Breen Building categories not specifically addressed by the LEED-NC Green Building Rating System	In writing, identify the intent of the proposed innovation credit, the proposed requirement for compliance, the proposed submittals to demonstrate compliance, and the design approach (strategies) that might be used to meet the requirements.	1 Point per innovative design idea, max of 4			Provide the specific title for the ID credit being pursued. Provide a narrative statement of the Credit Intent. Provide a narrative statement describing the Credit Requirements. Provide a detailed narrative describing the project's approach to achievement of the credit. This narrative should include a description of the quantifiable environmental benefits of the credit proposal. Provide copies of any specific construction drawings or exhibits that will serve to illustrate the project's approach to the credit.	N/A
ID Credit 2: LEED Accredited Professional						
To support and encourage the design integration required by a LEED-NC green building project and to streamline the application and certification process.	At least one principal participant of the project team shall be a LEED Accredited Professional (AP)	1			Provide the name of the LEED AP. Provide the name of the LEED AP's company. Provide a brief description of the LEED AP's project role(s). Provide a copy of the LEED AP's certificate.	N/A

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Green Building Costs and Benefits

A common misconception of Green Building is the escalated costs as opposed to conventional designs. The average premium for Green Buildings is slightly less than 2 percent, or \$3-5/ft^2, though with more and more buildings incorporating sustainable design, the cost is decreasing as we gain experience (Kats, 2003). The higher costs are typically associated with increased architectural and engineering (A&E) design time, modeling costs and incorporating sustainable measures to a conventionally designed building. These costs can be alleviated by incorporating sustainable design at the very beginning of the design process. Robin Suttel (2006) notes "the only effective way to budget for sustainable features in buildings is to identify sustainability goals and build an appropriate cost model for them upfront, at the start of the planning and design process."

While cost of Green Building may be slightly higher upfront than that of conventional buildings, the several benefits will save money during the lifetime of the building. Benefits includes energy and water savings, reduced pollution and wastes, reduced operations and maintenance costs, improved indoor environmental quality, increased employee comfort and productivity and reduced employee health costs and absenteeism.

In terms of energy savings alone, Green Buildings rated Certified or Silver are on average 25-30 percent more energy efficient (USGBC, Capital E Analysis). Energy savings are primarily a result of reduced electricity purchases and secondarily the ability to generate renewable energy on-site or the purchase of green power. Over 20 years, this savings can be over \$5/ft^2 , which is greater than the average premium for building green (Kats, 2003).

Several studies indicate an increase in occupant productivity and improved occupant health associated with Green Buildings. This is correlated with increased daylighting, better ventilation, improved indoor air quality, and occupant control of lighting, heating and air conditioning. Reports show anywhere from a 1 percent to 16 percent increase in productivity, which amounts to substantial savings (Freed, 2006). Kats (2003) indicates that even a 1 percent increase in productivity, the average benefit of a Certified or Silver level building, can be equal to about \$600 to \$700 per employee per year, or \$3/ft^2 / per year.

The following table (Table 3.2) illustrates the potential financial benefits of Green Buildings, which exceeds the average premiums. Costs and benefits must be looked at over the lifetime of the building, with Green strategies being incorporated at the earliest stages of design.

Table 3.2 Financial Benefits of Green Buildings

Summary of Findings (per ft^2)	
Category	**20-year Net Present Value**
Energy Savings	$5.80
Emissions Savings	$1.20
Water Savings	$0.50
Operations and Maintenance Savings	$8.50
Productivity and Health Benefits	$36.90 to $55.30
Subtotal	*$52.90 to $71.30*
Average Extra Cost of Building Green	(-3.00 to -$5.00)
Total 20- year Net Benefit	**$50 to $65**

Source: USGBC Capital E Analysis

SECTION 4. SUSTAINABLE DESIGN AT FORT MEADE

4.1 Integrated Design Process

The Fort Meade IDG outlines an Integrated Design Process in Section 1. An Integrated Design Process calls for a collaborative effort to integrate design strategies among all disciplines and all players in the project delivery process. Integrated design demands a more inclusive team, including architects, engineers, planners, future building users and facility managers to develop the vision and goals for the new facilities.

4.2 Review and Approval Process

All new construction and renovation projects at Fort Meade must comply with the Green Building Manual and the IDG. The review process is as follows:

- Submit Form 4283, the Design Team IDG Checklist to the Fort Meade Department of Public Works.
- Submit the LEED Documentation Checklist (Appendix C) with supporting documentation to the Integrated Design Team for review.
- Upon approval, the LEED Documentation Checklist shall become part of the project record files along with the level of credits achieved and the estimated LEED rating.
- If disapproved, the Integrated Design Team will collaborate with the project team to reach approval.

It is recommended that the LEED Documentation Checklist be used as a pre-design planning tool when initiating projects. This will assist in keeping track of credits and the required documentation.

4.3 New Construction at Fort Meade

Land use patterns at Fort Meade reflect a "Federal Campus" atmosphere. Presently, the installation has distinct uses between the northern half and southern half. The northern half is predominantly Military Family Housing with public schools. The southern half consists primarily of administrative, unaccompanied housing and industrial operations of the base. A golf course and retail center is located in the center of the base. The NSA complex is located on the western edge of the base and is a mix of administrative and industrial facilities.

In the next few years, new construction at Fort Meade, BRAC, and facility rebuilding will range in facility types from administrative buildings and supporting facilities to housing. This manual applies to the following types of new construction projects identified in the CEMP:

- Training Center

- Operations and Headquarters
- Warehouse Facilities
- Administrative Offices
- Motor Pool Maintenance Facility
- Youth Teen Center
- Chapel Center
- Barracks
- Fitness Center
- Conference/Hotel Facility
- PX Main Store
- Car Wash Facility
- Troop Store/Shoppettes
- Car Care Center

4.4 Demolition

The U.S. Army enforces a 1:1 new construction to demolition rule. New construction projects at Fort Meade must be balanced by the demolition of a U.S. Army facility. On-site construction and demolition wastes from non-contracted activities are handled by the DPW while all other construction and demolition wastes are the responsibility of the contractor. Demolition wastes should be reused or recycled to the maximum extent possible. Refer to the FGGM Integrated Solid Waste Management Plan (2002) for further information.

4.5 LEED-NC Credit Examples and Resources

Table 4.1 provides examples of actions that can be done to help meet the requirements of each credit. A list of resources for each credit is supplied for further research and information. It is important to remember that the credits are meant to be considered in conjunction with each other, so one feature of the building can contribute to several credits though there are different requirements of that feature (see Table 3.1 and the LEED Documentation Checklist in Appendix B) for each credit that must be met to earn the credit.

Guidance for the design of office buildings, training facilities, conference facilities, warehouse facilities, parking facilities, place of worship, youth centers and physical fitness centers is provided in Appendix D. This information is from the Whole Building Design Guide website (www.wbdg.org), which is a highly recommended resource.

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
SUSTAINABLE SITES				
SS Prereq 1	Construction Activity Pollution Prevention	Required	- Create an Erosion and Sedimentation Control Plan for all construction activities	CPESC Inc.www.cpesc.net Environment Canada's Freshwater Web Sediment Page www.ec.gc.ca/water/en/nature/sedim/e_sedim.htm EPA Erosion and Sediment Control Model Ordinances www.epa.gov/owow/nps/ordinance/erosion.htm Erosion Control Technology Council www.wctc.org International Erosion Control Association (IECA) www.ieca.org
SS Credit 1	Site Selection	1	- Site building on footprint of existing building - Design building with minimum footprint - Choose sites with minimal/no sensitive elements or restrictive land types	ESRI www.esri.com/hazards/makemap.html Natural Resource Defense Council www.ndrc.org
SS Credit 2	Development Density & Community Connectivity	1	- Choose sites with pedestrian access to a variety of services	International Union for the Scientific Study of Population www.iussp.org Urban Land Institute ULI Washington www.washington.uli.org Congress for New Urbanism www.cnu.org
SS Credit 3	Brownfield Redevelopment	1	- Rehabilitate and remediate brownfield sites	Brownfields Technology Support Center www.brownfieldstsc.org EPA Sustainable Redevelopment of Brownfields Program www.epa.gov/brownfields
SS Credit 4.1	Alternative Transportation, *Public Transportation Access*	1	- Site building near mass transit, identify transportation needs of future building occupants	US Environmental Protection Agency www.epa.gov/otaq/ Best Workplaces for Commuters www.bestworkplacesforcommuters.gov/index.htm/ Advanced Transportation Technology Institute www.atti-info.org
SS Credit 4.2	Alternative Transportation, *Bicycle Storage & Changing Rooms*	1	- Include bicycle racks and storage and showering/changing facilities in design	Advanced Transportation Technology Institute www.atti-info.org
SS Credit 4.3	Alternative Transportation, *Low-Emitting and Fuel-Efficient Vehicles*	1	- Provide alternate fuel refueling stations	Alternative Fuels Data Center www.afdc.doe.gov American Council for an Energy-Efficient Economy (ACEEE) www.greenercars.com CARB Cleaner Car Guide www.driveclean.ca.gov/en/gv/home/index.asp California Certified Vehicle List www.arb.ca.gov/msprog/ccvl/ccvl.htm Clean Cities Vehicle Buyer's Guide For Consumers www.eere.energy.gov/cleancities/vbg Clean Cities Vehicle Buyer's Guide For Fleets www.eere.energy.gov/cleancities/vbg/fleets CREST www.crest.org/hydrogen/index.html Electric Auto Association www.eaaev.org Electric Drive Transportation Association www.electricdrive.org

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
SS Credit 4.4	Alternative Transportation, *Parking Capacity*	1	- Minimize parking lot/garage size - Consider sharing parking facilities with adjacent buildings - Discourage use of single occupancy vehicles	Advanced transportation Technology Institute www.atti-info.org
SS Credit 5.1	Site Development, *Protect or Restore Habitat*	1	- Use native vegetation in landscaping - On-site habitat restoration to increase range of habitats	American Society of Landscape Architects www.asla.org Ecological Restoration ecologicalrestoration.info Lady Bird Johnson Wildlife Center www.wildflower.org North American Native Plant Society www.nanps.org Plant Native www.plantnative.org Society for Ecological Restoration International www.ser.org Soil and Water Conservation Society www.swcs.org
SS Credit 5.2	Site Development, *Maximize Open Space*	1	- Remove extra paved surface by moving parking underground - Minimize building footprint by stacking the building	North American Native Plant Society www.nanps.org Soil and Water Conservation Society www.swcs.org Green Roofs for Healthy Cities www.greenroofs.org
SS Credit 6.1	Stormwater Design, *Quantity Control*	1	- Use planted swales instead of curbs and gutters to reduce runoff - Install gravel paving in a matrix to retain permeability - Use vegetated roofs - Reuse stormwater volumes for non-potable uses in and around building	Stormwater Best Management Practice Design Guide, EPS/600/R-04/121A, September 2004 www.epa.gov/ORD/NRMRI/pubs/600r04121/600r04121a.pdf Maryland Stormwater Design Manual www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp
SS Credit 6.2	Stormwater Design, *Quality Control*	1	- Bioretention filters, constructed wetlands and open channels to treat runoff pollutants - Promote infiltration with vegetated roofs, pervious pavement, grid pavers, rain gardens, vegetated swales, disconnected imperviousness, rainwater recycling	Stormwater Best Management Practice Design Guide, EPS/600/R-04/121A, September 2004 www.epa.gov/ORD/NRMRI/pubs/600r04121/600r04121a.pdf Maryland Stormwater Design Manual www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp Technology Acceptance and Reciprocity Partnership www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp/
SS Credit 7.1	Heat Island Effect, *Non-Roof*	1	- Landscaping reduces heat island and shades cars - Choose exterior materials that have high reflectance or high albedo -Use light colored pavement - Replace constructed surfaces with vegetated surfaces	American Concrete Pavement Association www.pavement.com Heat Island Group Lawrence Berkeley National Laboratory http://eetd.lbl.gov/HeatIsland/ Heat Island Effect US Environmental Protection Agency www.epa.gov/heatisland

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
SS Credit 7.2	Heat Island Effect, *Roof*	1	- Choose exterior materials with high albedo - Vegetated roofs	Cool Roof Rating Council www.coolroofs.org EPA Energy Star Roofing Products www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products Extensive Green Roofs www.greenroofs.php Greenroofs.com www.greenroofs.com Lawrence Berkley National Laboratory Heat Island Group-Cool Roofs http://eetd.lbl.gov/HeatIsland/CoolRoofs/ Penn State Center for Green Roof Research http://hortweb.cas.psu.edu/research/greenroofcenter/
SS Credit 8	Light Pollution Reduction	1	- Use timers on exterior lights - Use low-angle spotlights - Use low reflectance surfaces - Full cutoff luminaries	American Society of Heating Refrigeration and Air-Conditioning Engineers www.ashrae.org Illuminating Engineering Society of North America www.iesna.org California Energy Commission (CEC)-2005 California Energy Efficiency Building Standards-Lighting Zones www.energy.ca.gov/title24/2005standards/outdoor_lighting/2004-09-30_LIGHTING_ZONES.PDF International Dark-Sky Association www.darksky.org/ida/ida_2/index.html New England Light Pollution Advisory Group http://cfa-www.harvard.edu/cfa/ps/nelpag.html Sky and Telescope http://skyandtelescope.com/resources/darksky/default.asp
WATER EFFICIENCY				
WE Credit 1.1	Water Efficient Landscaping, *Reduce by 50%*	1	- Use native vegetation or adapted plants in landscaping to reduce irrigation needs - Use high-efficiency equipment and/or climate based controllers	American Rainwater Catchments Systems Association (ARCSA) www.arcsa-usa.org Greywater Systems, Compost Toilets, & Rain Collections www.rmi.org/sitepages/pid287.php The Irrigation Association www.irrigation.org Texas Evapotranspiration Website http://texaset.tamu.edu
WE Credit 1.2	Water Efficient Landscaping, *No Potable Use or No Irrigation*	1	- Collect stormwater and/or greywater for irrigation - Use native vegetation or adapted plants in landscaping to reduce irrigation needs	Texas Water Development Board Website www.twdb.state.tx.us Water-Efficient Landscaping http://muextension.missouri.edu/xplor/agguides/hort/g06912.htm Water-efficient Landscaping: Preventing Pollution and Using Resources Wisely www.epa.gov/owm/water-efficiency/final_final.pdf Water Wiser: The Water Efficiency Clearinghouse www.awwa.org/waterwiser

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
WE Credit 2	Innovative Wastewater Technologies	1	- Collect and use rainwater or greywater in buildings for non-potable uses - Composting toilets and waterless urinals - On-site wastewater treatment: biological nutrient removal systems, constructed wetlands, high-efficiency filtration systems	American Rainwater Catchment Systems Association www.arcsa-usa.org Constructed Wetlands for Wastewater Treatment and Wildlife Habitat: 17 Case Studies US EPA EPA Publication No 832/B-93-005, 1993 www.epa.gov/owow/wetlands/construc/ How to Conserve Water and Use it Effectively US EPA www.epa.gov/OW/you/chap3_html On-Site Wastewater Treatment Systems Manual US EPA www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf Sustainable Building Technical Manual, Public Technology, Inc., 1996. On-site Wastewater treatment System Manual www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf
WE Credit 3.1	Water Use Reduction, *20% Reduction*	1	- Use water-efficient appliances - Use low-water use fixtures (automatic faucet controls in lavatories) - Use occupant sensors to reduce potable water demand	Choosing a Toilet www.taunton.com/finehomesbuilding/pages/h00042.asp Composting Toilet Reviews www.buildinggreen.com/features/mr/waste.html National Climatic Data Center www.ncdc.noaa.gov/oa/climate/aasc.html Rocky Mountain Institute www.rmi.org/sitepages/pid15.php Smart Communities Network www.sustainable.doe.gov/efficiency/weinfo.shtml Terry Love's Consumer Toilet Reports www.terrylove.com/crtoilet.htm Water Closet Performance Testing www.ebmud.com/conserving_&_recycling/toilet_test_report/default.htm
WE Credit 3.2	Water Use Reduction, *30% Reduction*	1	-Use composting toilets in place of conventional flush toilets	Same as WE Credit 3.1
			- Reuse stormwater and greywater for non-potable uses throughout building (toilet, urinal, custodial uses, mechanical uses)	
ENERGY & ATMOSPHERE				
EA Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required	- Develop a commissioning team to carry out commissioning activities and requirements as listed in the matrix and LEED-NC manual	American Society of Heating, Refrigeration and Air-Conditioning Engineers www.ashrae.org Building Commissioning Association www.bcxa.org California Commissioning Collaborative www.cacx.org Cx Assistant Commissioning Tool www.ctg-net.com/edr2002/cx/ Portland Energy Conservation Inc. www.peci.org Department of Engineering Professional Development University of Wisconsin, Madison www.engr.wisc.edu

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
EA Prereq 2	Minimum Energy Performance	Required	- Design building envelope, HVAC, lighting, and other systems to maximize energy performance - Document compliance using worksheets in ASHRAE 90.1-2004 User's Manual	Advanced Building www.advancedbuildings.org American Council for an Energy Efficient Economy www.aceee.org Buildings Upgrade Manual ENERGY STAR www.energystar.gov/index.cfm?c=business.bus_upgrade_manual New Building Institute, Inc. www.newbuildings.org Building Energy Codes Program US Department of Energy www.energycodes.gov Office of Energy Efficiency and Renewable Energy www.eere.energy.gov
EA Prereq 3	Fundamental Refrigerant Management	Required	- Specify new HVAC equipment that uses no CFC refrigerant - Replace CFC refrigerants in equipment being reused	US Environmental Protection Agency www.epa.gov/ozone The Treatment by LEED of the Environmental Impact of HVAC Refrigerants US Green Building Council www.usgbc.org/DisplayPage.aspx?CMSPageID=154
EA Credit 1	Optimize Energy Performance	1 to 10	- Provide an open floor plan and openings located to catch prevailing winds - Use operable windows - Minimize the number of east and west windows - Use light-colored exterior walls and roofs - Orient the building properly, site building for southern exposure - Shade south windows with exterior louvers, awnings, or trellises - Use large exterior windows for daylighting - Use automatic-dimming electronic fluorescent lamp ballasts in conjunction with daylighting - Use occupancy sensors with light controls - Use total energy management systems that monitor and controls energy use in buildings (alerts occupants to open windows, automatically opens or closes windows, automatically adjusts lighting according to monitored daylight levels - Optimize energy performance with glazing systems for high-performance windows and doors	Advanced Buildings Technologies & Practices Natural Resources Canada www.advancedbuildings.org American Council for an Energy Efficient Economy www.aceee.org American Society of Heating, Refrigeration and Air Conditioning Engineers www.ashrae.org Building Energy Codes Program US Department of Energy www.energycodes.gov Building Energy Use and Cost Analysis Software www.doe2.com ENERGY STAR www.energystar.gov Building Upgrade Manual www.energystar.gov/index.cfm?c=business.bus_upgrade_manual&layout=print Energy-10TM Energy Simulation Software National Renewable Energy Program www.nrel.gov/buildingd/energy10>www.nrel.gov/buildings/energy10 Sustainable Buildings Industry Council www.Energy-10.com New Buildings Institute www.newbuildings.org Office of Energy efficiency and Renewable Energy US Department of Energy www.eere.energy.gov/EE/buildings.html

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
EA Credit 2	On-Site Renewable Energy	1 to 3	- Use a photovoltaic system to generate electricity - Use geothermal wells to heat and cool building - Use solar water heaters - Consider solar, wind, low-impact hydro, biomass and bio-gas energy strategies	American Wind Energy Association www.awea.org Database of State Incentives for Renewable Energy www.dsireusa.org ENERGY Guide www.energyguide.com Green Power Network US Department of Energy www.eere.energy.gov/greenpower National Center for Photovoltaics www.nrel.gov/ncpv National Renewable Energy Laboratory www.nrel.gov Office of Energy Efficiency and Renewable Energy US Department of Energy www.eere.energy.gov US EPA Green Power Partnership www.epa.gov/greenpower/index.htm
EA Credit 3	Enhanced Commissioning	1	- Execute additional activities after systems performance is completed such as commissioning design review, commissioning submittal review, and a systems manual	
EA Credit 4	Enhanced Refrigerant Management	1	- Do not use refrigerants - Use HVAC&R equipment with reduced refrigerant charge and increased equipment life - Maintain equipment to prevent leakage of refrigerant to the atmosphere - Utilize fire suppression systems that do not contain HCFCs or Halons	EPA's Significant New Alternatives Policy (SNAP) www.epa.gov/ozone/snap/index.html Stratospheric Ozone Protection: Moving to Alternative Refrigerants http://es.epa.gov/program/epaorgs/oar/altrefrg.html
EA Credit 5	Measurement & Verification	1	- Take advantage of net metering with the local utility if using solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies - Develop a M&V Plan to evaluate building and/or energy performance	International Performance Measurement and Verification Protocol (IPMVP) www.ipmvp.org
EA Credit 6	Green Power	1	- Engage in green power contract for solar, wind, geothermal, biomass or low-impact hydro sources - Renewable energy certificates, tradable renewable certificates, green tags and other forms or green power documents to verify compliance with this credit	US Department of Energy www.eere.energy.gov/greenpower Green-e Program www.green-e.org Clean Energy Union of Concerned Scientists www.ucsusa.org/clean_energy Green Power Partnership US Environmental Protection Agency (EPA) www.epa.gov/greenpower

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
MATERIALS & RESOURCES				
MR Prereq 1	Storage & Collection of Recyclables	Required	- Provide an easily accessible and appropriately sized recycling area in the building to handle anticipated recyclables - Consider employing cardboard balers, aluminum can crushers and recycling chutes - Consider placing collection bins at individual workstations	California Integrated Waste Management Board www.ciwmb.ca.gov/WasteChar/ California Statewide Solid Waste Characterization Study www.ciwmb.ca.gov.Publications/default.asp?pubid=1097 Earth 911 www.earth911.org/master.asp Recycling at Work www.usmayors.org/USCM/recycle Waste at Work Inform: Strategies for a Better Environment www.informinc.org/wasteatwork.php
MR Credit 1.1	Building Reuse, *Maintain 75% of Existing Walls, Floors & Roof*	1	- Consider reuse of existing, previously occupied buildings, including structure, envelope and elements	How Buildings Learn: What Happens After They're Built by Stewart Brand
MR Credit 1.2	Building Reuse, *Maintain 95% of Existing Walls, Floors & Roof*	1	- Maintain 95% of building use with removal of hazardous elements and upgrades to enhance energy and water efficiency	How Buildings Learn: What Happens After They're Built by Stewart Brand
MR Credit 1.3	Building Reuse, *Maintain 50% of Interior Non-Structural Elements*	1	- Use existing interior non-structural elements (interior walls, doors, floor coverings, and ceiling systems) in at least 50% of the area of the completed building	How Buildings Learn: What Happens After They're Built by Stewart Brand
MR Credit 2.1	Construction Waste Management, *Divert 50% from Disposal*	1	- Adopt a construction waste management plan - Recycle cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation - Donate materials to charitable organizations and salvage materials on-site	Construction and Demolition Debris Recycling Information California Integrated Waste Management Board www.ciwmb.ca.gov/ConDemo Construction Materials Recycling Association www.cdrecycling.org Construction Waste Management Handbook Smart Growth Online www.smartgrowth.org/library/articles.asp?art=15 Contractors' Guide to Preventing Waste and Recycling Resource Venture www.resourceventure.org/rv/issues/building/publications/index.php
MR Credit 2.2	Construction Waste Management, *Divert 75% from Disposal*	1	- Use strategies from Credit 2.1 and increase amount of waste diverted from disposal to 75%	Construction and Demolition Debris Recycling Information California Integrated Waste Management Board www.ciwmb.ca.gov/ConDemo Construction Materials Recycling Association www.cdrecycling.org Construction Waste Management Handbook Smart Growth Online www.smartgrowth.org/library/articles.asp?art=15 Contractors' Guide to Preventing Waste and Recycling Resource Venture www.resourceventure.org/rv/issues/building/publications/index.php

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
MR Credit 3.1	Materials Reuse, *5%*	1	- Incorporate salvaged materials into building design (beams, posts, flooring, paneling, doors, frames, cabinetry, furniture, brick and decorative items)	California Materials Exchange California Integrated Waste management Board www.ciwmb.ca.gov/CalMAX Guide to Resource-Efficient Building Elements www.crbt.org/index.html Industrial Materials Exchange (IMEX) Local Hazardous Waste Management Program in King County, OR www.govlink.org/hazwaste Reuse Development Organization (ReDO) www.redo.org Salvaged Building Materials Exchange Green Building Resource Guide www.greenguide.com/exchange/search.html
MR Credit 3.2	Materials Reuse, *10%*	1	- Use strategy from Credit 3.1 and reuse 10% of materials - Use chips of concrete from existing foundation as a road base	Building Materials Reuse Association www.ubma.org Used Building Materials Exchange www.build.recycle.net Old to New: Design Guide, Salvaged Building Materials in New Construction The Greater Vancouver Regional District (GVRD) www.gvrd.bc.ca/buildsmart/PDFS/oldtonewdesignguidesalvbuildmatinnewc.pdf
MR Credit 4.1	Recycled Content, *10% (Post-consumer + ½ pre-consumer)*	1	- Use materials with recycled content as 10% of total value of the materials in the project - Use material suppliers that can achieve this goal	California Integrated Waste Management Board www.ciwmb.ca.gov/rcp BuildingGreen,Inc. www.buildinggreen.com/menus/index.cfm Guide to Resource-Efficient Building Elements www.crbt.org/index.html Oikos www.oikos.com "Recycled Content: What is it and What is it Worth?" www.buildinggreen.com/auth/article.cfm?filename=140201a.xml US EPA Comprehensive Procurement Guidelines Program www.epaa.gov/cpg/products.htm
MR Credit 4.2	Recycled Content, *20% (Post-consumer + ½ pre-consumer)*	1	- Use materials with recycled content as 20% of total value of the materials in the project - Use material suppliers that can achieve this goal	California Integrated Waste Management Board www.ciwmb.ca.gov/rcp BuildingGreen,Inc. www.buildinggreen.com/menus/index.cfm Guide to Resource-Efficient Building Elements www.crbt.org/index.html Oikos www.oikos.com "Recycled Content: What is it and What is it Worth?" www.buildinggreen.com/auth/article.cfm?filename=140201a.xml US EPA Comprehensive Procurement Guidelines Program www.epaa.gov/cpg/products.htm
MR Credit 5.1	Regional Materials, *10% Extracted, Processed & Manufactured Regionally*	1	- Use building materials that have been extracted, harvested, recovered or manufactured within 500 miles of the project site for a minimum of 10% of the total materials value	

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
MR Credit 5.2	Regional Materials, *20% Extracted, Processed & Manufactured Regionally*	1	- Use building materials that have been extracted, harvested, recovered or manufactured within 500 miles of the project site for a minimum of 20% of the total materials value	
MR Credit 6	Rapidly Renewable Materials	1	- Use rapidly renewable building materials and products made from plants that are typically harvested within a ten-year cycle or shorter - Use materials such as bamboo, wool, cotton insulation, agrifiber, linoleum, wheatboard, strawboard and cork	Environmental Building News BuildingGreen, Inc. www.buildinggreen.com/products/bamboo.html Environmental Design + Construction www.edcmag.com GreenSpec BuildingGreen, Inc. www.buildinggreen.com/menus/index.cfm Oikos www.oikos.com
MR Credit 7	Certified Wood	1	- Use a minimum of 50% of wood-based materials and products that are certified with the Forest Stewardship Council Principles and Criteria for wood building components - Products include structural framing, general dimensional framing, flooring, sub-flooring, wood doors and finishes	Forest Stewardship Council, United States www.fscus.org/green_building
INDOOR ENVIRONMENTAL QUALITY				
EQ Prereq 1	Minimum IAQ Performance	Required	- Use ventilation systems that meet or exceed the minimum outdoor air ventilation rates - Use natural ventilation where possible - Provide occupants with access to operable windows - Use ASHRAE 62 User's Manual and standards	ASHRAE www.ashrae.org US Environmental Protection Agency's Indoor Air Quality Website www.epa.gov/iaq
EQ Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required	- Prohibit smoking buildings or limit smoking to designated areas	ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization www.astm.org Energy Rating Systems (HERS) Required Verification and Diagnostic Testing, California Low Rise Residential Alternative Calculation Method Approval Manual www.energy.ca.gov/title24/residential_manual/res_manual_chapter4.PDF What You Can Do About Secondhand Smoke as Parents, Decision Makers and Building Occupants US Environmental Protection Agency www.epa.gov/smokefree/pubs/etsbro.html Setting the Record Straight: Secondhand Smoke Is a Preventable Health Risk US Environmental Protection Agency www.epa.gov/smokefree/pubs/strsfs.html

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
EQ Credit 1	Outdoor Air Delivery Monitoring	1	- Install carbon dioxide and airflow measurement equipment and feed the information to the HVAC system and/or Building Automation System to trigger corrective action - Use measurement equipment to trigger alarms for building operators or occupants to address possible deficiency in outdoor air delivery	ASHRAE 62.1-2004 Users Manual Appendix A wwww.ashrae.org ASHRAE www.ashrae.org Building Air Quality: A Guide for Building Owners and Facility Managers www.epa.gov/iaq/largebldgs/baqtoc.html
EQ Credit 2	Increased Ventilation	1	- Mechanical ventilation: use heat recovery to minimize additional energy consumption associated with higher ventilation rates -Natural ventilation: follow eight steps of the Carbon Trust Good Practice Guide 237: 1) Develop design requirements; 2) Plan airflow paths; 3) Identify building uses and features that might require special attention; 4) Determine ventilation requirements; 5) Estimate external driving pressures; 6) Select types of ventilation devices; 7) Size ventilation devices; 8) Analyze the design	ASHRAE Standard 62.1-2004: Ventilation For Acceptable Indoor Air Quality www.ashrae.org The Carbon Trust Good Practice Guide 237-Natural ventilation in non-domestic buildings-a guide for designers; developers and owners (1998) www.thecarbontrust.org.uk CIBSE Applications Manual 10: 2005, Natural ventilation in non-domestic buildings www.cibse.org Building Assessment, Survey and Evaluation Study www.epa.gov/iaq/largebldgs/base_page.htm Building Air Quality Action Plan www.epa.gov/iaq/largebldgs/actionpl.html Chartered Institution of Building Services Engineers www.cibse.org
EQ Credit 3.1	Construction IAQ Management Plan, *During Construction*	1	- Adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways - Sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard	Controlling Pollutant and Sources www.epa.gov/iaq/schooldesign/controlling.html The State of Washington (SOW) Program and IAQ Standards www.aerias.org/kview.asp?DocId=85&spaceid=2&subbid=13 SMACNA www.smacna.org
EQ Credit 3.2	Construction IAQ Management Plan, *Before Occupancy*	1	- Prior to occupancy perform a building flush-out or test the air contaminant levels in the building	Indoor Air Pollution Report (July, 2005) California Air Resources Board www.arb.ca.gov/research/indoor/ab1173/finalreport.htm Controlling Pollutants and Sources, IAQ Design for Schools www.epa.gov/iaq/schooldesign/controlling.html State of Washington (SOW) Program and IAQ Standards www.aerias.org/kview.asp?DocId=85&spaceid=2&subbid=13 SMACNA www.smacna.org

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
EQ Credit 4.1	Low-Emitting Materials, *Adhesives & Sealants*	1	- Specify low-VOC materials in construction documents such as general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives, and cove base adhesives - All adhesives and sealants meet the following requirements: South Coast Air Quality Management District Rule #1168 (2005) and Green Seal Standard for Commercial Adhesives GS-36 (2000)	South Coast Rule #1168 by the South Coast Air Quality Management District www.aqmd.gov/rules Green Seal Standard 36 (GS-36) www.greenseal.org/standards/commercialadhesives.htm
EQ Credit 4.2	Low-Emitting Materials, *Paints & Coatings*	1	- Specify low-VOC paints and coatings in construction documents - All paints and coatings meet the following criteria: Green Seal Standard GS-11, Paints (1993); Green Seal Standard GC-03, Anti-Corrosive Paints (1997); South Coast Air Quality Management District Rule 1113, Architectural Coatings (2004)	Green Seal www.greenseal.org South Coast Air Quality Management District www.aqmd.gov
Credit 4.3	Low-Emitting Materials, *Carpet Systems*	1	- Specify requirements for product testing and/or certification in the construction documents. - Select products that are either certified under the Green Label Plus program or for which testing has been done by qualified independent laboratories in accordance with the appropriate requirements	Carpet and Rug Institute www.carpet-rug.org
EQ Credit 4.4	Low-Emitting Materials, *Composite Wood & Agrifiber Products*	1	- Specify wood and agrifiber products and laminating adhesives that contain no added urea-formaldehyde resins - This includes: particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores	An Update on Formaldehyde Consumer Product Safety Commission www.cpsc.gov/CPSCPUB/PUBS/725.html

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
EQ Credit 5	Indoor Chemical & Pollutant Source Control	1	- Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants. - Maintain physical isolation of hazardous chemicals and pollutants from the rest of the regularly occupied areas of the building, design isolated storage closets for cleaning and maintenance projects - Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building - Avoid carpet and other hard-to-clean floor surfaces near entry - Install high-level filtration systems in air handling units processing both return air and outside supply air - Ensure that air handling units can accommodate required filter sizes and pressure drops	Green Seal www.greenseal.org/recommendations.htm Janitorial Products Pollution Prevention Project www.westp2net.org/janitorial/jp4.htm EPA Environmentally Preferable Product Information www.epa.gov/opptintr/epp/
EQ Credit 6.1	Controllability of Systems, *Lighting*	1	- Install occupant control for ambient and task lighting - Integrate lighting systems controllability into the overall lighting design, providing ambient and task lighting while managing the overall energy use of the building	A Field Study of PEM (Personal Environmental Module) Performance in Bank of America's San Francisco Office Buildings www.cbe.berkeley.edu/research/pdf_files/bauman1998_bofa.pdf "Do Green Buildings Enhance the Well-being of Workers? Yes" www.edcmag.com/CDA/ArticleInformation/coverstory/BNPCoverStoryItem/0,4118,19794,00.html
EQ Credit 6.2	Controllability of Systems, *Thermal Comfort*	1	- Design the building and system with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. - Use operable windows, hybrid systems integrating operable windows and mechanical systems or mechanical systems alone. - For individual adjustments use individual thermostat controls, local diffusers at floor, desk, or overhead levels, or control of individual radiant panels, or other means integrated into the overall building, thermal comfort systems, and energy system design	Center for the Built Environment www.cbe.berkeley.edu "Do Green Buildings Enhance the Well-being of Workers? Yes" www.edcmag.com/CDA/ArticleInformation/coverstory/BNPCoverStoryItem/0,4118,19794,00.html

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
EQ Credit 7.1	Thermal Comfort, *Design*	1	- Meet comfort criteria per ASHRAE Standard 55-2004, to support the desired quality and occupant satisfaction with building performance - Evaluate air temperature, radiant temperature, air speed, and relative humidity in an integrated fashion and coordinate these criteria with EQ Prereq 1, EQ Credit 1, EQ Credit 2	Enhance Indoor Environmental Quality (IEQ) The Whole Building Design Guide www.wbdg.org/design/ieq.php
EQ Credit 7.2	Thermal Comfort, *Verification*	1	- Use ASHRAE Standard 55-2004 guidance to establish thermal comfort criteria - Design a monitoring system with corrective actions for thermal comfort in the building	Center for the Built Environment www.cbesurvey.org The Usable Buildings Trust www.usablebuildings.co.uk
EQ Credit 8.1	Daylight & Views, *Daylight 75% of Spaces*	1	- Design building to maximize interior daylighting using building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high performance glazing and automatic photocell-based controls - Predict daylight factors via manual calculations or model daylighting strategies with a physical or computer model to assess footcandle levels and daylight factors achieved - Provide views for employees to maximize visual comfort	Analysis of the Performance of Students in Daylight Schools www.innovativedesign.net/studentperformance.htm The Art of Daylighting www.edcmag.com/CDA/ArticleInformation/features/BNP_Features_Item/0,4120,18800,00.html New Buildings Institute's Productivity and Building Science Program www.newbuildings.org/downloads/FinalAttachments/PIER_Final_Report(P500-03-082).pdf Radiance Software http://radsite.lbl.gov/radiance The Whole Building Design Guide, Daylighting www.wbdg.org/design/daylighting.php?r=ieq Lighting Controls www.wbdg.org/design/elecrticlighting.?php?r=ieq
EQ Credit 8.2	Daylight & Views, *Views for 90% of Spaces*	1	- Use same methods as described in Credit 8.1, maximize daylight to 90% of spaces in building	Analysis of the Performance of Students in Daylight Schools www.innovativedesign.net/studentperformance.htm The Art of Daylighting www.edcmag.com/CDA/ArticleInformation/features/BNP_Features_Item/0,4120,18800,00.html New Buildings Institute's Productivity and Building Science Program www.newbuildings.org/downloads/FinalAttachments/PIER_Final_Report(P500-03-082).pdf

Table 4.1: LEED Credit Examples and Resources				
Credit	**Description**	**Points**	**Examples**	**Resources**
INNOVATION & DESIGN PROCESS				
ID Credit 1.1	Innovation in Design, *Provide Specific Title*	1	- Substantially exceed a LEED-NC credit - Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environment and/or health benefits.	Visit the USGBC Certified Project List and Case Studies website for further information: http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx?CMSPageID=244
ID Credit 1.2	Innovation in Design, *Provide Specific Title*	1	- Same as Credit 1.1	
ID Credit 1.3	Innovation in Design	1	- Same as Credit 1.1	
ID Credit 1.4	Innovation in Design	1	- Same as Credit 1.1	
ID Credit 2	LEED Accredited Professional	1	- At least one principal participant on the project team is a LEED Accredited Professional who will educate the project team members about green building design & construction	

Table Source: USGBC LEED-NC version. 2.2

SECTION 5. EXAMPLE GREEN BUILDING FACILITIES

The information contained in this section is from the USGBC Certified Project List (http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx?CMSPageID=244)

5.1 The Chesapeake Bay Foundation's Philip Merrill Environmental Center

5.1.1 Overview

- Location: Annapolis, MD
- Building Type: Commercial office, Interpretive Center
- New Construction
- 32,000 sq. feet (2,970 sq. meters)
- Project Scope: 2-story building
- Suburban setting
- Completed December 2000
- Rating: U.S. Green Building Council LEED-NC, v1.0 – Level: Platinum
    - Rating: Green Building Challenge – Level: 2.7 in GB Tool 1.76

5.1.2 Background

The Chesapeake Bay Foundation Headquarters building is recognized as one of the "greenest" buildings ever constructed. Sustainability issues ranging from energy use to material selection were given serious consideration throughout design and construction of this facility. It was the first building to receive a Platinum rating through the U.S. Green Building Council's LEED Rating System, version 1.0.

5.1.3 Design Team

Owner/Developer
LEED Coordinator
Environmental Building Consultant
Architect
Landscape Architect
Interior Designer
Commissioning Agent
Structural Engineer
Civil Engineer
Mechanical Engineer
Electrical Engineer
Plumbing Engineer
Energy Monitoring and Evaluation

5.1.4 Finance and Cost

Cost data in U.S. dollars as of date of completion:

- Total project cost (land excluded): $7,500,000
- Some of the hard costs:
    - Construction: $199 per sq foot ($2,140 per sq meter)
    - Of the $199 per sq foot cost, roughly $46 per sq foot is directly attributable to premiums spent for green measures. This initial investment will pay for itself within 7-8 years through reduced operation costs.

5.1.5 Green Strategies

5.1.5.1 Sustainable Sites

- Sited on the footprint of an existing building
- Removed extra pavement by moving parking underground
- Native landscaping and on-site habitat restoration projects to increase ranges of habitats
- Use planted swales instead of curbs and gutters to reduce runoff
- Install gravel paving in a matrix to retain permeability
- Oil and other runoff pollutants from the parking lot are treated by a bioretention filter
- Landscaping and exterior material choices minimize the heat island effect and provide shade for parked vehicles
- Light pollution minimized by use of timers on exterior lights

5.1.5.2 Water Efficiency

- Composting toilets in place of conventional flush toilets
- Water-efficient appliances
- Native landscaping reduces irrigation needs
- Captured rainwater used in building
- Use low-water-use fixtures, such as automatic faucets controls for lavatories

5.1.5.3 Energy and Atmosphere

- Wall Insulation
    - Achieve a whole-wall R-value of 15 or greater
    - Use advanced framing techniques
- Ground-Coupled Systems
    - Use ground-source heat pumps as a source for heating and cooling
- Solar Cooling Loads
    - Use light-colored exterior walls and roofs
    - Orient the building properly
    - Minimize the number of east and west windows
    - Shade south windows with exterior louvers, awnings, or trellises
- Daylighting for Energy Efficiency
    - Use large exterior windows and high ceilings to increase daylighting
    - Use north/south roof monitors and/or clerestories for daylighting
- Non-Solar Cooling Loads
    - Provide an open floor plan and openings located to catch prevailing breezes
    - Use operable windows
- Water Heaters
    - Use solar water heaters
- Cooling System
    - Commission the HVAC system
- Photovoltaics

    - Use a photovoltaic (PV) system to generate electricity on-site
- Heating Loads
    - Site the building for southern exposure
- Lamp Ballasts
    - Use automatic-dimming electronic fluorescent lamp ballasts in conjunction with daylighting
- High-Performance Windows and Doors
    - Optimize energy performance of glazing systems
- Lighting Controls
    - Use occupancy sensors
- HVAC Controls and Zoning
    - Provide separate HVAC systems for spaces with distinct heating and cooling loads
- Roof Insulation
    - Achieve a whole-roof R-value of 25 or greater
- Geothermal wells are used for heating in winter and cooling in summer
- Total energy management system monitors and controls energy use in building
    - System alerts employees when windows should be open, other windows are opened and closed automatically, and electric lighting is adjusted according to monitored daylight levels

5.1.5.4 Materials and Resources

- "Cradle-to-Cradle" philosophy
    - Materials selected by what they can be made into at the end of their useful lives
- Existing structures on the site were recycled into the new construction
    - Require a waste management plan from the contractor
- Use recycled materials and renewable and regenerable resources
    - Use salvaged wood for finish carpentry
    - Prefer roofing materials with high levels of recycled content
    - Use plastic toilet partitions made from recycled plastic
- Use wood treated with less-toxic preservatives than the standard CCA or ACZA
- Roof and wall enclosures use Structurally Insulated Panels (SIPs)
- Prefer materials that are sources and manufactured within the local area
- Green Products Used:
    - Bamboo flooring
    - Composting toilets
    - Cork flooring
    - Granulated Linoleum-Cork Composite Sheets
    - High-Performance Fiberglass Windows
    - Natural Linoleum Flooring
    - Occupancy Sensors and Controls
    - Photovoltaic Collectors
    - Recycled-Wood Fiberboard and Particleboard

5.1.5.5 Indoor Environmental Quality

- Entry of Pollutants
  - Design entry to facilitate removal of dirt before entering building
  - Avoid carpet and other hard-to-clean floor surfaces near entry
- Visual Comfort and Interior Design
  - Design open floor plans to allow exterior daylight to penetrate to the interior
  - Provide views for employees to maximize visual comfort (i.e., view of the Chesapeake Bay)
- Ventilation and Filtration Systems
  - Provide occupants with access to operable windows
  - Use natural ventilation when possible
- Below Grade Rainwater and Groundwater
  - Raise the building up on piers
- Reduction of Indoor Pollutants
  - Use only very low or no-VOC paints
  - Specify prefinished wood or bamboo flooring
  - Avoid wood products made with urea-formaldehyde binder
  - Use a carbon monoxide monitor
- Building Commissioning for IEQ
  - Use a comprehensive commissioning process to ensure that design intent is realized
- Maintenance for IEQ
  - Design isolated storage closet for cleaning and maintenance products

5.2 The Bremerton Bachelor Enlisted Quarters Building 1044

5.2.1 Overview

- Location: Bremerton, WA
- Building type(s): Multi-unit residential
- New construction
- 99,800 sq. feet (9,270 sq. meters)
- Project scope: 8-story building
- Suburban setting
- Completed December 2004
- Rating: U.S. Green Building Council LEED-NC, v2--Level: Certified (29 points)

The Bremerton Bachelor Enlisted Quarters (BEQ) Building 1044, was constructed as part of a navy base housing complex that will eventually contain seven BEQ buildings divided into several projects extending through 2015. The building provides 132 living units along with common areas and support spaces. The living units are occupied only when the sailors are on-shore.

Green features in the design and construction of Building 1044 were guided by the LEED(r) Rating System. Site restoration, porous pavement, and removal of hardscapes reduce stormwater

flows by 25 percent compared to predevelopment conditions. Asphalt from the structures formerly on the site was recycled during demolition into aggregate for future paving on the site. Wood, asphalt, gypsum, steel, cardboard, and other construction debris recycling resulted in a greater than 90 percent diversion of construction waste from the landfill. Integrated energy efficiency strategies reduce the base building energy use by approximately 35 percent compared to the ASHRAE 90.1-1999 standard. Dual-sensor direct digital controls (DDC) further contribute to energy savings by allowing power to each apartment unit to be turned off when the unit is unoccupied. The architects accounted for the future use of the building in their plans. Apartment units are designed to house four occupants with the ability to convert to two-occupant housing. Highly durable building materials with minimum maintenance requirements act as finishes throughout the building. A green housekeeping plan for maintenance staff and occupants lowers the building's maintenance impact.

5.2.2 Design Team

Owner/Developer	Structural Engineer
Project Managers	Civil Engineer
Project Superintendent	Mechanical Engineer
Architect	Electrical Engineer
Landscape Architect	Quality Control
Interior Designer	Code Analyst
Commissioning Agent	LEED Implementation Manager
Sustainability Consultant	Geo/hazard Tester

5.2.3 Finance and Cost

Financing Mechanisms

- Equity: Government appropriation
- Procurement process: Design-build

Cost Data

Cost data in U.S. dollars as of date of completion.

- Total project cost (land excluded): $21,000,000

The original contract award amount was $24.3 million. The contract included upgrading sewer and electrical systems, which were underground and undocumented. Additionally, the contract amount provided for furniture. The building itself came in below budget.

Overall, costs associated with meeting LEED requirements were less than 1.5 percent of total construction costs.

5.2.4 Green Strategies

5.2.4.1 Sustainable Sites

- Replaced an existing small building with a large building
- Replaced surface parking adjacent to the building with green space for occupants and visitors
- Provide safe access for bicyclers and pedestrians
- Covered bike storage for 15 percent of the building occupants
- Increase open spaces to encourage a pedestrian community
- Access to two bus stops within 650 ft of building
- Site restoration including removal of hardscapes and installation of porous pavement reduced stormwater flows by 25 percent
- Runoff from parking lot is treated with a propriety system

5.2.4.2 Water Efficiency

- Water efficient landscaping eliminates need for permanent irrigation system
- Artificial turf in high-use recreation areas eliminates need for maintenance and water use
- Reduce runoff by reduction in driveway pavement
- Use porous turf-paving systems on low-traffic parking and driveway areas
- Incorporate a pollutant separation/filtering system in parking lot drains

5.2.4.3 Energy and Atmosphere

- Use high-efficiency motors for all fans and pumps that provide at least 3.0 horsepower and variable-speed drives on the secondary chilled water pumps
- Domestic hot water is provided with semi-instantaneous water heaters, which use steam to heat water in small storage tanks located near the points of end use
- A four-pipe fan-coil system provides mechanical heating, cooling, and ventilation
    - Steam from a central plant heats the water
    - Chilled water comes from the building's own air-cooled chiller
- Each living unit has its own fan coil and thermostat
- Dual-sensor direct digital controls (DDC) allow power to apartment units to be turned off when unoccupied
- Lighting values are 0.8 watts per square foot (half the suggested value)
- High-efficiency fluorescent lighting is used throughout the interior, supplemented with incandescent task lighting and accent lighting
- Commission the HVAC system

5.2.4.4 Materials and Resources

- Recycling chutes on each floor lead to a central recycling area in the basement
- HVAC systems are CFC-, HCFC-, and Halon-free

- Diversion of 93 percent of material from landfill – most materials recycled, steel doors, frames, equipment, lights, and poles reused
- Combination of concrete walls and a regular, symmetrical building reduced concrete formwork since forms could be flipped and mirrored instead of being reconstructed for each floor
- Four-person living units designed to facilitate possible conversion into smaller one- or two- person units
- Minimize ozone-depletion potential of refrigerants in cooling systems
- Cluster buildings to minimize infrastructure requirements
- Use materials and systems with low maintenance requirements
- Use reusable forms
- Require waste management plan from the contractor
- Physical in-house recycling system
- Use recycled materials as aggregate in the concrete
- Use wood products from independently certified, well-managed forests for finished carpentry
- Prefer materials that are sourced and manufactured within the local area

5.2.4.5 Indoor Environmental Quality

- Design entry to facilitate removal of dirt before entering building
- Use low or no- VOC interior adhesives, sealants, interior paints and coating
- Use interior composite wood materials containing no added urea-formaldehyde resins
- Permanent entryway walk-off mats, appropriate drains, and separate ventilation for housekeeping areas minimize pollutant cross-contamination of regularly occupied areas
- Provide local exhaust ventilation for rooms with high-emitting sources
- Establish protocols for controlling the spread of pollutants during work on occupied buildings
- Provide temporary filters on any permanent air-handling devices used during construction
- Use a comprehensive commission process

5.3 The Genzyme Center

5.3.1 Overview

Location: Cambridge, MA
Building type(s): Commercial office
New construction
344,000 sq. feet (32,000 sq. meters)
Project scope: 12-story building
Urban setting
Completed November 2003
Rating: U.S. Green Building Council LEED-NC, v2--Level: Platinum (52 points)

5.3.2 Background

Genzyme Center is the corporate headquarters for a biotechnology company, with offices, an employee cafeteria, a library, gardens, training rooms, a conference center, cafes, and public retail space. Genzyme Center was created as a symbol of progress to represent a point of identification for the company, its employees, and visitors. The goal of the design was to develop a building from the inside out, from the individual working environment to the overall complex structure of the building. Largely due to the collaboration of the design team, developer, client, and construction team, this led to an environmentally friendly, highly communicative, and innovative signature building.

The project team and the client balanced aesthetics, cost, constructability, and reliability to create an environmentally responsible corporate headquarters. A number of environmental design strategies contribute to the LEED Platinum rating the building is expected to achieve and establish an open spatial atmosphere for the building occupants.

The building envelope is a high-performance curtainwall glazing system with operable windows on all 12 floors. More than 32 percent of the exterior envelope is a ventilated double-facade that blocks solar gains in summer and captures solar gains in the winter. Steam from a nearby power plant is used for central heating and cooling.

The building's central atrium acts as a huge return air duct and light shaft. Fresh air moves into the atrium and up and out exhaust fans near the skylight. Natural light from the fully glazed facade and from the atrium (brought in by solar-tracking mirrors above the skylight) is reflected deep into the building.

The building uses 32 percent less water than a comparable office building by using waterless urinals, dual-flush toilets, automatic faucets, and low-flow fixtures. Stormwater supplement the evaporative cooling towers and irrigates the landscaped roof.

Building materials were chosen for their low emissions, recycled content, or local manufacturing. Nearly 90 percent of the wood was FSC certified.

5.3.3 Design Team

Owner/Developer	Structural Engineer
Architect	Master Environmental Planner
Executive Architect – base building	Environmental Consultant
Executive Architect – tenant improvement	Lighting Consultant
Landscape Architect	Interior Gardens Consultant

5.3.4 Finance and Cost

A 20-kW photovoltaic system was partially funded by a grant from the Massachusetts Renewable Energy Trust.

The greening process in our design makes good sense all around. First, it offers direct operating savings. There is also a growing body of evidence that supports the theory that high-performance buildings are beneficial to employee health and productivity. While these costs and benefits are still in development, the potential for savings is significant. One report indicates that annual personnel costs vary from $300 to $500 per square foot. Therefore, a 1 percent increase in efficiency could be worth $3 to $5 per square foot. For Genzyme, this could average $1,040,000 per year in personnel efficiency alone.

It has been recorded that companies who provide a good working environment report a considerable drop in absenteeism, which enhances the productivity figure above. People value a direct connection to the outdoors. This is supported by European blue-green laws coming, whereby all employees are entitled to a view of the sky and vegetation. The role of daylight is a key factor in the design, as it has a positive effect on the productivity of the workforce. A number of studies also point out that the problem stated above is often also a consequence of uncomfortable surroundings, which include furniture ergonomics. This was evaluated and brought into the design of the furniture as a means for the employees to create and modify their own work environment.

There are many aspects to the greening process, and the success of the Genzyme building will be recorded in its LEED rating and its future "real life" use.

5.3.5 Green Strategies

5.3.5.1 Sustainable Sites

- Integrate building with local mixed-use community and regional transportation corridors
- Use a remediated brownfield site
- Reuse existing infrastructure
- Provide subsidies for public transit passes
- Implement a guaranteed-ride-home program
- Carpool database services
- Indoor bike storage with lockers and showers, additional bike storage in garage
- Preferred carpool spaces
- Alternative fuel recharging stations for electric vehicles
- Reduce heat-island effect by using below grade parking and vegetated roofs
- On-site open space is planted with native or adaptive plants and trees
- Vegetated roof and skylight rainwater collection system reduces stormwater runoff by 25 percent
- Filters were placed in the piping systems to reduce pollutant levels and stop soil erosion during construction
- Light pollution is controlled by reflective lighting, controlling indoor lights, and shading with an automated blind system after dark

5.3.5.2 Water Efficiency

- Rainwater collected from vegetated roof supplements the water demand for the evaporative cooling towers
- Overflow from vegetated roof and from surface drains is filtered to remove solids before it is discharged from the site
- Use efficient irrigation systems with moisture sensors for outdoor and indoor garden irrigation
- Use automated and low-flow faucets
- Use waterless urinals and dual-flush toilets
- Use landscape plantings to stabilize soils and control erosion

5.3.5.3 Energy and Atmosphere

- The central heating and cooling systems are powered with steam from an adjacent power plant – the steam drives absorption chillers for cooling during summer and is exchanged directly into heat for heating during winter
- Fan coil units are used for local heating or cooling loads in each space and will automatically shut off when windows or doors are opened for natural ventilation
- Photo sensors and occupancy sensors detect conditions and dim overhead lights as needed
- Natural light enhancement system uses roof-mounted heliostats, prismatic louvers, hanging prismatic mobiles, series of reflective panels, and a reflective light wall, with horizontal, reflective, motorized blinds that reflect light up to a reflective ceiling panel
- One-third of the building's façade is constructed as a double façade with a four-foot externally ventilate void with operable blinds to control solar gains and ventilation
- Use two photovoltaic arrays on the roof
- Use efficient fans, motors and equipment
- Develop an extensive building management system
- Use third-party commissioning firm for extensive building commissioning
- Integrate climatic conditions, including wind, rainfall, sunshine and average cloud cover into building design

5.3.5.4 Materials and Resources

- Require a waste management plan from the contractor
- Specify recycling receptacles that are accessible to the occupants – 500 square foot area devoted to building recycling program
- Design a physical in-house recycling system
- Use wood products from independently certified, well-managed forests for finish carpentry
- Prefer materials that are sourced and manufactured within the local area
- 93 percent of construction waste recycled or reused

- Use filigree slab concrete, which reduces need for reinforcing steel and increases the thermal efficiency of the finished building, also reduces release of VOCs into the environment
- Use foam fillers in panels to reduce foundation elements
- Use recycled aggregate material

5.3.5.5 Indoor Environmental Quality

- Design entry to facilitate removal of dirt before entering building
- Provide occupants with the means to control temperature in their area
- Use skylights and/or clerestories for daylighting
- Design open floor plans to allow exterior daylighting to penetrate to the interior
- Provide occupants with control of light in their area
- Provide illumination sensors
- Provide occupants with access to operable windows
- Provide views for occupants
- Provide indoor gardens and access to outdoor patios to enhance occupants' connection with outdoor environment
- Provide local exhaust ventilation for rooms with high-emitting sources
- Avoid wood products made with urea-formaldehyde binder
- Use only very-low-VOC carpet adhesives

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SECTION 6. POLICY AND RELATED GUIDANCE

6.1 E.O. 13423 – Strengthening Federal Environmental, Energy, and Transportation Management

On January 24, 2007, Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management" was signed. This order consolidates and strengthens E.O.'s 13101, 13123, 13134, 13148 and 13149 and establishes new and updated environmental goals. E.O. 13423 requires all Federal agencies to advance their energy efficiency and environmental performance in the following areas:

- Improve energy efficiency through reduction of energy intensity
- Reduce greenhouse gas emissions
- Increase use of renewable sources of energy
- Reduce water consumption intensity
- Acquisition of biobased, environmentally preferable, energy-efficient, water-efficient and recycled content goods
- Reduce acquisition, use and disposal of toxic and hazardous chemicals
- Increase diversion of solid waste and maintain cost-effective waste prevention and recycling programs
- New construction and major renovations must comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings
- Reduce consumption of petroleum products and increase consumption of non-petroleum products, use hybrid vehicles
- Acquire electronic products that meet Energy Star standards or Electronic Product Environmental Assessment Tool standards

These goals must be implemented within the agency environmental management system with appropriate training, compliance review and audit, and leadership awards within the agency.

6.2 DASA (I&E) Memo – Sustainable Design and Development Policy Update – SpiRiT to LEED Transition

The Deputy Assistant Secretary of the Army released a memorandum in January 2006 to update the Army Strategy for integrating sustainability across all army installations by transitioning from the Sustainable Project Rating Tool (SPiRiT) to the USGBC LEED rating system. All FY08 military vertical building construction projects will achieve the SILVER level of LEED NC (New Constructon).

6.3 E.0. 12873 – Federal Acquisition, Recycling, and Waste Prevention

On August 6, 1993 Executive Order (EO) 12873, "Federal Acquisition, Recycling, and Waste Prevention," was signed. Section 401 of this E.O. states that "In developing plans, drawings, work statements, specifications, or other product descriptions, agencies shall consider the following factors: elimination of virgin material requirements; use of recovered materials; reuse of product; life cycle cost; recyclability; use of environmentally preferable products; waste

prevention (including toxicity reduction or elimination); and ultimate disposal, as appropriate." The EO also directed the Environmental Protection Agency (EPA) develop guidance to help federal agencies incorporate environmental preferability into their purchasing procedures.

6.4 EPA Comprehensive Procurement Guidelines (CPG I and II)

In response to EO 12873, EPA developed Comprehensive Procurement Guidelines (CPG I and II). These are the first formal regulations implementing sustainability requirements. The companion Recovered Materials Advisory Notices (RMAN I and II) contain EPA's recommendations for purchasing all items designated in the final CPGs. Currently, EPA has designated 36 items that are, or can be, manufactured using recycled and recovered materials. Construction, landscape, park and recreation products are among the designated items. Federal Agencies are required to purchase EPA-designated items meeting minimum recycled-content standards unless they are not available within a reasonable period of time; fail to meet reasonable specification standards; are not available from two or more sources (to maintain competition); or are unreasonably priced (5 percent higher than comparable nonrecycled products). Recycled-content purchase requirements are discussed in EPA's "Federal Recycling Guide for Waste Prevention, Recycling and Buying Recycled."

SECTION 7. RESOURCES

7.1 Websites

U.S. Green Building Council

USGBC – LEED-NC
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220

LEED Certified Project List and Case Studies
http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx?CMSPageID=244

Whole Building Design Guide

Whole Building Design Guide (WBDG)
http://www.wbdg.org/index.php

WBDG LEED DoD Antiterrorism
http://www.wbdg.org/tools/leed_atfp.php?u=8

WBDG Building and Space Examples
http://www.wbdg.org/design/buildingtypes.php and
http://www.wbdg.org/design/spacetypes.php

Additional Websites

Building Green.com
http://www.buildinggreen.com

Green Building Resource Guide
http://www.greenguide.com

Green Home Building – Sustainable Architecture
http://www.greenhomebuilding.com/sustainable_architecture.htm

7.2 Agency Resources

U.S. Army

U.S. Army Sustainability
http://www.sustainability.army.mil/

Fort Meade Environmental Division
http://www.fortmeade-ems.org/

EKO – Sustainable Design and Development (requires U.S. Army password)

https://eko.usace.army.mil/fa/sdd

Facilities and Housing Directorate – Information on Sustainable Design and Development
http://www.hqda.army.mil/ascimweb/fd/linksSDD.htm#sustainable

Fort Bragg Installation Design Guide
http://www.bragg.army.mil/dpw/idg/html/ex_fr1.htm

U.S. Department of Energy

Dept. of Energy: Office of Energy Efficiency and Renewable Energy – High Performance Federal Buildings
http://www.eere.energy.gov/buildings/highperformance/

U.S. Environmental Protection Agency

EPA Green Building Website
http://www.epa.gov/greenbuilding/

U.S. Air Force

Air Force Sustainability
http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/index.html

SECTION 8. REFERENCES

Capital E. 2003. *The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force*. Website: http://www.usgbc.org/Docs/News/News477.pdf, last accessed January 2007.

Fort George G. Meade. 2005. *Comprehensive Expansion Master Plan*. Prepared by R&K Engineering, Inc.

Fort George G. Meade. 2005. *Environmental Management System*. Website: http://www.fortmeade-ems.org/, last accessed January 2007.

Fort George G. Meade. 2005. *Installation Design Guide*. Prepared by R&K Engineering, Inc.

Freed, Eric. 2006. *Ask the Green Architect: How 'Green' Saves Money*, Greener Buildings. Website: http://www.greenerbuildings.com/news_detail.cfm?Page=1&NewsID=33554#Q2, last accessed January 2007.

Kats, Gregory. 2003. *Green Building Costs and Financial Benefits*. USA for Massachusetts Technology Collaborative.

Office of the Federal Environmental Executive. 2005. *Federal Government-wide Green Building Policies*. Website: http://www.ofee.gov/sb/policies.html, last accessed January 2007.

Suttel, Robin. 2006. The True Cost of Green Buildings, Buildings. Website: http://www.buildings.com/Articles/detailBuildings.asp?ArticleID=3029, last accessed January 2007.

U.S. Green Building Council. 2005. *LEED-NC: Green Building Rating System for New Construction & Major Renovations, version 2.2*. Website: https://www.usgbc.org/ShowFile.aspx?DocumentID=1095, last accessed January 2007.

U.S. Army. 2001. *Engineering and Design – Sustainable Design for Military Facilities* (ETL 110-3-491).

U.S. Army. 2007. U.S. Army Sustainability Website: http://www.sustainability.army.mil/, last accessed March 2007.

U.S. Department of Defense. 2003. *DoD Minimum Antiterrorism Standards for Buildings* (UFC 4-010-01).

U.S. Department of Defense. 2004. *Low Impact Development* (UFC 3-210-10).

U.S. Green Building Council. 2007. *Certified Project List*. Website: http://www.usgbc.org/LEED/PROJECT/CERTIFIEDPROJECTLIST.ASPX?CMSPAGEID=244, last accessed January 2007.

Whole Building Design Guide. 2007. *LEED ® - DoD Antiterrorism Standards Tool*. Website: http://www.wbdg.org/tools/leed_atfp.php, last accessed January 2007.

SECTION 9. ACRONYMS

4-PCH	4-Phenycyclohexene
A&E	Architectural and Engineering
ACEE	American Council for an Energy Efficient Economy
ACZA	Ammoniacal Copper Zinc Arsenate
ANSI	American National Standards Institute
AP	Accredited Professional
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASTM	American Society for Testing and Materials
AT/FP	Anti-Terrorism/ Force Protection
BMPs	Best Management Practices
BOD	Basis of Design
BRAC	Base Realignment and Closure
CBECS	Commercial Buildings Energy Consumption Survey
CEMP	Comprehensive Expansion Master Plan
CFC	Chlorofluorocarbon
CIBSE	Chartered Institution of Building Services Engineers
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPG	Comprehensive Procurement Guidelines
CPG Permit	Construction General Permit
CRI	Carpet and Rug Institute
CRS	Center for Resource Solutions
CxA	Commissioning Authority
CZM	Coastal Zone Management
DASA	Department of the Army, Office of the Assistant Secretary of the Army
DDC	Direct Digital Controls
DOE	Department of Energy
DPW	Department of Public Works
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
ESC	Erosion and Sedimentation Control
ESRI	Environmental Systems Research Institute
ETS	Environmental Tobacco Smoke
FCAP	Forest Conservation Act Policy
FGGM	Fort George G. Meade
FGGM-TMP	Fort George G. Meade Tree Management Policy
FSC	Forest Stewardship Council
FTE	Full-time Equivalent
GPP	Green Procurement Plan
HCFC	Hydrochlorofluorocarbon
HVAC&R	Heating, Ventilating, Air Condition and Refrigeration

IAQ	Indoor Air Quality
ICRMP	Integrated Cultural Resource Management Plan
IDG	Installation Design Guide
IEQ	Indoor Environmental Quality
IESNA	Illuminating Engineering Society of North America
INRMP	Integrated Natural Resource Management Plan
IPMVP	International Performance Measurement and Verification Protocol
LCODP	Lifecycle Ozone Depletion Potential (lbCFC11/Ton-Year)
LCGWP	Lifecycle Direct Global Warming Potential ($lbCO_2$/Ton-Year)
GWPr	Global Warming Potential of Refrigerant (0 to 12,000 $lbCO_2$/lbr)
ODPr	Ozone Depletion Potential of Refrigerant (0 to 0.2 lbCFC11/lbr)
Lr	Refrigerant Leakage Rate (0.5% to 2.0%; default of 2%)
Mr	End-of-life Refrigerant Loss (2% to 10%; default of 10%)
Rc	Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton cooling capacity)
LEED-NC	Leadership in Energy and Environmental Design – New Construction
LID	Low Impact Development
LPD	Lighting Power Density
M&V	Measurement and Verification
MDF	Medium Density Fiberboard
MERV	Minimum Efficiency Reporting Value
NPDES	National Pollutant Discharge Elimination System
OPR	Owner's Project Requirements
PM	Particulate Matter
PV	Photovoltaic
RMAN	Recovered Materials Advisory Notices
SCAQMD	South Coast Air Quality Management District
SIPs	Structurally Insulated Panels
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPiRiT	Sustainable Project Rating Tool
SRI	Solar Reflectance Index
TSS	Total Suspended Solids
TVOC	Total Volatile Organic Compounds
TWA	Total Water Applied
USGBC	U.S. Green Building Council
VOC	Volatile Organic Compounds

APPENDIX A. SPIRIT TO LEED MEMO, JANUARY 2006

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY
INSTALLATIONS AND ENVIRONMENT
110 ARMY PENTAGON
WASHINGTON DC 20310-0110

05 JAN 2006

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Sustainable Design and Development Policy Update – SPiRiT to LEED Transition

1. The purpose of this memorandum is to update the Army Strategy for integrating the principles and practices of sustainability on our installations as we minimize the impacts and total ownership costs of Army systems, material, facilities, and operations. Accordingly, the Army will transition from the Sustainable Project Rating Tool (SPiRiT) to the US Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED®) rating system effective with the FY 08 Military Construction program.

2. All military vertical building construction projects starting with the FY 08 military construction program will achieve the SILVER level of LEED NC (New Construction). This policy includes all new construction projects, regardless of fund source. Horizontal construction, such as ranges, roads and airfields, will continue to incorporate Sustainable Design and Development features to the maximum extent possible. The installation Director of Public Works or the Reserve Component equivalent, supporting Engineer District, designer and constructor will jointly certify the final LEED score and rating.

3. Projects prior to the FY 08 program will continue to use SPiRiT and achieve the GOLD level. Such projects may be scored using LEED NC if the LEED SILVER rating level can be achieved within the program amount. Projects using the design/ build procurement method will include the SPiRiT or LEED assessment in the RFP requirements and achieve the appropriate sustainable rating level in the project.

4. The Army will adopt LEED Homes for scoring residential housing when released by the USGBC. In the meantime, SPiRiT will continue to be used to rate all Army Family Housing new construction projects and homes built under the Residential Communities Initiative. These projects will continue to attain SPiRiT GOLD.

5. It is important that we all continue to emphasize sustainability and incorporate sustainable design and development practices into all facilities built on our installations. This is just one way we are reducing our energy consumption and optimizing life cycle economic performance.

Joseph W. Whitaker
Deputy Assistant Secretary of the Army
(Installations and Housing)
OASA(I&E)

SUBJECT: Sustainable Design and Development Policy Update – SPiRiT to LEED Transition

DISTRIBUTION:
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COMMANDER AND CHIEF OF ENGINEERS, USACE
CHIEF, ARMY RESERVE
DIRECTOR, ARMY NATIONAL GUARD

APPENDIX B. LEED AND ANTI-TERRORISM/FORCE PROTECTION STANDARDS

APPENDIX B. ANTI-TERRORISM/ FORCE PROTECTION STANDARDS

SITE PLANNING

Standard 1. Minimum Standoff Distances
Standard 2. Unobstructed Space
Standard 3. Drive-Up/ Drop-Off Areas
Standard 4. Access Roads
Standard 5. Parking Beneath Buildings or on Rooftops

STRUCTURAL DESIGN

Standard 6. Progressive Collapse Avoidance
Standard 7. Structural Isolation
Standard 8. Building Overhangs
Standard 9. Exterior Masonry Walls.

ARCHITECTURAL DESIGN

Standard 10. Windows, Skylights, and Glazed Doors
Standard 11. Building Entrance Layout
Standard 12. Exterior Doors
Standard 13. Mailrooms
Standard 14. Roof Access
Standard 15. Overhead Mounted Architectural Features

ELECTRICAL AND MECHANICAL DESIGN

Standard 16. Air Intakes
Standard 17. Mailroom Ventilation
Standard 18. Emergency Air Distribution Shutoff
Standard 19. Utility Distribution and Installation
Standard 20. Equipment Bracing
Standard 21. Under Building Access
Standard 22. Mass Notification

The following table presents the issues and strategies to coordinate both AT/FP Standards and LEED credits in building projects. The information is from the Whole Building Design Guide website (2007): http://www.wbdg.org/tools/leed_atfp.php?u=8

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
Sustainable Sites			
SS Prereq 1	Construction Activity Pollution Prevention	Several strategies can be implemented to protect the installation or facility perimeter (controlling vehicular access) as well as to control erosion. These include: earth dikes, sediment traps, and sediment basins. However, sediment traps and basins, depending on their size, may become concealment opportunities for terrorists. Other erosion control measures, like seeding and mulching, and installing pervious paving, can be implemented to stabilize the soil and to mitigate potential damage to a building's foundation and structural system due to floods, mudslides, torrential rainstorms, and other natural hazards. Where parking, roadways, and drive-up/drop-off areas are required, including within the standoff distance, consider pervious paving, which will minimize erosion due to water runoff.	AT Std 1 AT Std 3 AT Rec 2 AT Rec 3 AT Rec 8
SS Credit 1	Site Selection	The most suitable areas on a site for a building in terms of security and anti-terrorism force protection (ATFP) may have negative environmental impacts. While it is unlikely that buildings are sited on areas deemed inappropriate by this LEED SS Credit 1 (i.e., prime farmland, in a floodplain, on endangered species habitat, in wetlands, or on parklands) for security reasons, there are cases where this may occur. As such, conduct a threat/vulnerability assessment and risk analysis to determine the overriding priority for the site and building. Where possible, choose sites that allow for adequate protection and meet the LEED SS Credit 1 criteria. For DoD buildings that cannot meet required standoff distances because land is not available, DoD standards allow the application of building hardening and other mitigating strategies as a means of last resort to achieve the required level of protection. New buildings must still comply with the required "effective standoff distance" as well as the 33' unobstructed space requirement. The cost of mitigating strategies must be considered in the risk analysis. Incorporate standoff distances and designated greenfield areas into the master plans for facilities, installations, and campuses. This will help ensure that standoff distances and undeveloped spaces are not encroached upon by future expansions and developments.	AT Std 1 AT Std 2 AT Rec 2 AT Rec 3 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 2	Development Density & Community Connectivity	Minimum standoff distances, building separation recommendations, and unobstructed spaces are established within UFC 4-010-01 to keep terrorists as far away from inhabited buildings as possible and to minimize the possibility that an attack on one building would cause injuries in adjacent buildings. Because of these standards, DoD buildings are rarely sited in dense urban areas, as required by this LEED SS Credit 2. However, conduct a threat/vulnerability assessment and risk analysis to determine if utilizing a site that is located within an existing minimum development density of 60,000 square feet per acre is acceptable for the particular facility. For DoD buildings that cannot meet required standoff distances because land is not available, DoD standards allow the application of building hardening and other mitigating strategies as a means of last resort to achieve the required level of protection. New buildings must still comply with the required "effective standoff distance" as well as the 33' unobstructed space requirement. The cost of mitigating strategies must be considered in the risk analysis.	AT Std 1 AT Std 2 AT Rec 2 AT Rec 3 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
SS Credit 3	Brownfield Redevelopment	Ensure that the brownfield site allows for compliance with DoD minimum standoff distances and building separation requirements. For DoD buildings that cannot meet required standoff distances because land is not available, DoD standards allow the application of building hardening and other mitigating strategies as a means of last resort to achieve the required level of protection. New buildings must still comply with the required "effective standoff distance" as well as the 33' unobstructed space requirement. The cost of mitigating strategies must be considered in the risk analysis.	AT Std 1 AT Std 2 AT Rec 2 AT Rec 3 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 4.1	Alternative Transportation, Public Transportation Access	DoD recommends avoiding sites that are close to railroads (UFC 4-010-01, Recommendation 6: Railroad Location). However, it is possible to locate a building near public transportation access while meeting minimum standoff distances for security and protection. Keep perimeter access points to a minimum, but where possible, locate them near rail stations and/or bus stops to accommodate public transportation users.	AT Std 1 AT Rec 1 AT Rec 6 AT Rec 8
SS Credit 4.2	Alternative Transportation, Bicycle Storage and Changing Rooms	If this credit is pursued, in certain cases DoD recommends that exposed barriers and site furnishings, which include bicycle racks, be protected to prevent fragmentation hazards. Refer to UFC 4-010-01, Recommendation 9: Minimize Secondary Debris for more information. Within a DoD building, visitor-accessible bike storage facilities and changing/shower facilities should be controlled and located away from "sensitive or critical areas, areas where high-risk or mission-critical personnel are located, or other areas with large population densities of DoD personnel" (UFC 4-010-01, Recommendation 13. Visitor Control). Covered bicycle storage facilities, when located outside the building, should comply with unobstructed space requirements.	AT Std 1 AT Std 2 AT Rec 8 AT Rec 9 AT Rec 12 AT Rec 13 AT Rec 14 AT Rec 15
SS Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles	For DoD buildings, locate liquid or gaseous fueling facilities outdoors and beyond the minimum standoff distance for the building per UFC 3-460-01 and NFPA 30A. Parking, including parking for alternative fuel vehicles such as hybrid vehicles, should be located to comply with the required standoff distances from inhabited buildings. Per UFC 4-010-01, Standard 5, avoid locating parking beneath buildings or on rooftops of inhabited buildings. When unavoidable, follow measures identified in Standard 5 to achieve the required level of protection for new and existing buildings.	AT Std 1 AT Std 3 AT Std 4 AT Std 5 AT Std 16 AT Rec 4 AT Rec 8

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
SS Credit 4.4	Alternative Transportation, Parking Capacity	Parking and carpool/vanpool parking areas should be located beyond the minimum standoff distance for the building. Per UFC 4-010-01, Standard 5, avoid locating parking beneath buildings or on rooftops of inhabited buildings. When these conditions are unavoidable, follow measures identified in Standard 5 to achieve the required level of protection for new and existing buildings.	AT Std 1 AT Std 3 AT Std 4 AT Std 5 AT Rec 4 AT Rec 8
SS Credit 5.1	Site Development, Protect or Restore Habitat	DoD requirements for unobstructed space and standoff distances from inhabited buildings, and recommended building separation distances, when left undeveloped, support strategies for achieving this credit. For previously developed sites, choose native and adapted vegetation that will not create concealment opportunities, especially within the unobstructed space. Vegetation can also be used to shield people or assets from potential aggressors in vantage points. Controlled perimeters are not conducive to protecting or restoring open spaces, as they often require man-made physical boundaries. Work with the Project Manager, Base Security Office, and Facility Manager to locate staging areas where they would not create concealment opportunities, compromise security nor disturb open spaces.	AT Std 1 AT Std 2 AT Std 4 AT Std 19 AT Rec 1 AT Rec 3 AT Rec 5 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 5.2	Site Development, Maximize Open Space	In most cases, DoD requirements require eliminating under building parking and locating emergency backup systems away from the systems for which they provide backup. These measures do not support reducing the development's footprint per this credit. However, in areas with no local zoning requirements, the required standoff distance may support designation of an open area adjacent to the building that is equal to the developed footprint. In addition, DoD requirements for unobstructed space and recommended building separation distances, when left undeveloped, support strategies for achieving this credit. The installation of onsite power generation and fuel supply for emergency backup power and/or increased power reliability may increase development of open space as well as habitat disturbance. Incorporate standoff distances and designated greenfield areas into the master plans for facilities, installations, and campuses. This will help ensure that standoff distances and undeveloped spaces are not encroached upon by future expansions and developments.	AT Std 1 AT Std 2 AT Std 3 AT Std 5 AT Std 8 AT Std 19 AT Rec 4 AT Rec 7 AT Rec 8 AT Rec 10

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
SS Credit 6.1	Stormwater Design, Quantity Control	Standoff distances can provide areas for stormwater management features or pervious areas to reduce runoff. Limit impervious surfaces within the controlled perimeter, standoff distance, and/or unobstructed space. Use pervious paving for low-vehicle traffic areas, including parking and maintenance roads, which should be located according to minimum standoff distances. Bioswales and bioretention ponds (two of many low impact development technologies) can be used to reduce the rate of stormwater runoff and provide a physical barrier between occupied buildings and potential aggressors. One strategy to minimize the amount of paving and hard surfaces within an installation or campus (read: less stormwater runoff) is to concentrate development. Be sure to comply with DoD required standoff distances and unobstructed space requirements. Consider installing extensive vegetated—or "green"—roofs to reduce stormwater runoff. Intensive vegetated roofs offer the use of the roof space, however, DoD Standard 14 requires limiting roof access to minimize potential threats.	AT Std 1 AT Std 2 AT Std 3 AT Std 5 AT Std 8 AT Std 14 AT Rec 1 AT Rec 2 AT Rec 3 AT Rec 4 AT Rec 5 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 6.2	Stormwater Design, Quality Control	Standoff distances can provide areas for stormwater management features or pervious areas to reduce runoff. Mechanical or natural stormwater treatment systems, such as constructed wetlands, bioretention ponds, and vegetated filter strips, could serve as part of the perimeter protection scheme. Large bioretention ponds located next to a building can be designed to break-up potential bomb-loaded, high velocity vehicle approaches and absorb the bomb blast if it detonates in the water.	AT Std 1 AT Rec 1 AT Rec 2 AT Rec 3 AT Rec 7 AT Rec 8 AT Rec 10
SS Credit 7.1	Heat Island Effect, Non-Roof	Stand alone structured parking is preferable because parking under inhabited DoD buildings should be eliminated in most cases. The top floor of a covered parking area can provide an ideal location for photovoltaic panels, if the project is to utilize renewable energy sources (see LEED EA Credits 2.1 - 2.3: Renewable Energy). Use native and adapted trees and vegetation to create shade for parking areas, roadways, and drive-up/drop-off areas; and to screen vulnerable buildings and occupants from potential aggressors in vantage points. However, also ensure that the vegetation as well as any light-colored/high-albedo covered structures do not provide concealment opportunities, especially in unobstructed spaces.	AT Std 1 AT Std 2 AT Std 3 AT Std 4 AT Std 5 AT Rec 1 AT Rec 2 AT Rec 3 AT Rec 4 AT Rec 8 AT Rec 10

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
SS Credit 7.2	Heat Island Effect, Roof	Elimination of rooftop parking, as required by DoD standards, opens the door for the use of roofing materials that will meet the criteria for this LEED SS Credit 7.2, including some roofing membranes, metal roofing, and extensive vegetated—or "green"—roofs. Intensive vegetated roofs offer the use of the roof space; however, DoD Standard 14 requires limiting roof access to minimize potential threats.	AT Std 5 AT Std 14
SS Credit 8	Light Pollution Reduction	For DoD buildings, exterior security lighting must be provided in accordance with Military Handbook 1013/1A, Design Guidelines for Physical Security of Facilities. In some cases, this requirement may prohibit achievement of this LEED credit. Note that the Military Handbook will be replaced by UFC 4-011-02, Design: Security Engineering (draft due in late 2004). Where possible, use downlighting techniques instead of uplighting techniques to minimize light pollution. Horizontal or "out-lighting" techniques from the building for security should be avoided in favor of downlighting. Reflective glazing is appropriate for shielding people and assets inside buildings from potential aggressors. However, consider minimizing its use where reflected glare may cause occupant visual discomfort and/or increased energy load in adjacent buildings.	AT Std 1 AT Std 3 AT Std 5 AT Std 15 AT Rec 4 AT Rec 8 AT Rec 9 AT Rec 17
Water Efficiency			
WE Credit 1.1	Water-Efficient Landscaping, Reduce by 50%	Use native and adapted vegetation to decrease the need for irrigation as well as to screen occupants in or around the building from potential aggressors and to break-up potential high velocity vehicle approaches. Ensure that the vegetation does not create concealment opportunities. Consider integrating rainwater collection and storage systems into the architecture of the facility, such as the building facade. If this is not feasible, ensure that stand alone, exterior rain collection systems do not provide concealment opportunities and are located beyond the required unobstructed space and/or minimum standoff distance.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 8 AT Rec 9 AT Rec 10
WE Credit 1.2	Water-Efficient Landscaping, No Potable Use or No Irrigation	See WE Credit 1.1: Water Efficient Landscaping, Reduce by 50%	AT Std 1 AT Std 2 AT Rec 8 AT Rec 9 AT Rec 10

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
WE Credit 2	Innovative Wastewater Technologies	Ensure that stand alone, exterior rainwater collection systems or wastewater treatment systems do not provide concealment opportunities and are located beyond the required unobstructed space and/or minimum standoff distance. Constructed wetlands, used for wastewater treatment, can be incorporated into perimeter protection strategies to control vehicular and pedestrian access.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 8 AT Rec 9 AT Rec 10
WE Credits 3.1 - 3.2	Water Use Reduction, [20%] [30%] Reduction	In conjunction with a water use reduction program, consider on-site potable and non-potable water storage for buildings where the occupants may be required to man their positions for extended durations following an incident when off-site water sources may be damaged or otherwise unavailable.	AT Std 19 AT Rec 15 AT Rec 16 AT Rec 17
Energy & Atmosphere			
EA Prereq 1	Fundamental Commissioning of the Building Energy Systems	Use building commissioning to verify that building systems and features function optimally and that the project's goals, including security, safety, and sustainability, have been achieved. The more complex the building type and the more integrated the building systems, the more likely that a formal building commissioning process will prove valuable. According to the U.S. Green Building Council (USGBC), commissioning can improve new building energy performance by 8% to 30%. Consider procuring commissioning services through the construction manager contract.	AT Std 1-22 AT Rec 1-17
EA Prereq 2	Minimum Energy Performance	Decrease infiltration through tight building construction, proper air sealing, and mechanically controlled ventilation. This will improve comfort, save energy, control moisture, reduce indoor pollution, and promote ventilation. Also, tight building construction in combination with building pressurization can effectively prevent infiltration of exterior chemical, biological and radiological (CBR) agents released at some distance from a building, such as a large-scale attack. Consider a dedicated heating and cooling system for the mailroom. This will help to limit damage to the rest of the building should an incident occur within the mailroom. It is recognized that a common heating and cooling system serving the mailroom and other areas of the building may save money over the cost of providing separate steam, hot water, chilled water, and refrigerant systems. However, per Standard 13 the mail room may be located far enough away from the building's heating and cooling source that the cost of running piping to the mailroom may offset the cost saving of having a single unit serving the mailroom and other areas of the building. Additionally, the need for separate, dedicated air ventilation systems for mailrooms may complicate running piping from a remote heating and cooling source. Consider co-locating the mailroom with other areas that require special design considerations such as loading docks and receiving areas to efficiently maximize the investment of protective design funds while simultaneously meeting LEED goals.	AT Std 9 AT Std 10 AT Std 11 AT Std 12 AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Std 19 AT Std 22 AT Rec 10 AT Rec 15 AT Rec 16 AT Rec 17

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EA Prereq 3	Fundamental Refrigerant Management	Do not use CFC-based refrigerant systems—including for the mailroom—whether it is served by common heating and cooling systems or by separate dedicated mailroom heating and cooling systems.	AT Std 17
EA Credit 1	Optimize Energy Performance	If possible, minimize additional equipment and systems needed to defend against terrorist attacks, protect against fires, and mitigate natural hazards because they will increase the building's energy load and may affect its energy performance. Windows, glazed doors, and building entrances containing extensive glazing can have a significant impact on the building's energy performance, particularly HVAC systems. Choose glazing that minimizes solar gain, allows optimum daylight penetration, and meets DoD ATFP objectives, including Standard 10 for glazing thickness and type, and frame material and strength. See also LEED EQ Credit 8.1: Daylight and Views: Daylight 75% of Spaces. Standard 10 provisions require the use of laminated windows for new construction and all planned window replacements. As such, while certain window films are designed to hold shattered glass together as well as to improve building energy efficiency, they are not DoD's preferred design solution for blast effect mitigation except as a temporary solution for existing windows that are not planned to be replaced. Locate building entrances, especially those with glazed doors, per Standard 11 and Recommendation 4: Drive-Up/Drop-Off to mitigate vulnerable vantage points and the potential for hazardous flying glass fragments in the event of an explosion. Where feasible, use thermal mass walls, or Trombe walls, to passively heat a space. A typical Trombe wall consists of an 8- to 16-inch thick masonry, stone, adobe, or concrete wall coated with a dark, heat-absorbing material and faced with a single or double layer of glass. The glass is placed from about 3/4" to 6" away from the wall to create a small airspace. Heat from sunlight passing through the glass is absorbed by the dark surface and stored in the wall. As it cools gradually during the night, it slowly releases its stored heat indirectly into the space. Trombe walls can serve double duty to reduce energy consumption and provide blast protection if they are integrated into the structural system and are made of reinforced concrete— unreinforced masonry walls break up readily and become secondary fragments during blasts. Consider distributed energy resources (DER), such as fuel cells and microturbines, for primary and/or emergency back-up power. DER can provide greater reliability, strengthen energy security, and provide low-cost energy. The efficiency of on-site power generation can be increased by using the waste heat for existing thermal processes (i.e., in combined heat and power, or cogeneration, applications). To the maximum extent feasible, specify and install Energy Star® and Federal Energy Management Program (FEMP) recommended products, equipment, and fixtures.	AT Std 9 AT Std 10 AT Std 11 AT Std 12 AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Std 19 AT Std 22 AT Rec 10 AT Rec 15 AT Rec 16 AT Rec 17

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EA Credit 2	On-Site Renewable Energy	Consider on-site renewable energy systems for primary power, emergency back-up systems, or as a redundant utility source. These systems offer the potential for lower cost, higher service reliability, high power quality, increased energy efficiency, and energy security. Where applicable, use standalone solar-powered (photovoltaic [PV]) lighting systems as part of the site security scheme to reduce energy consumption. Standalone PV lighting systems can be counted for this credit, using a special calculation method as defined within a LEED credit interpretation by the USGBC on 23 Jul 2003: "After the energy modeling is completed, add the unregulated site lighting's electricity requirements to the design case's Regulated Subtotal (DEC') and add the solar-powered pole lights' contribution to the Renewable Subtotal (REC') and complete the calculations for the renewable percentage."	AT Std 19 AT Rec 9
EA Credit 3	Enhanced Commissioning	See EA Prerequisite 1: Fundamental Building Systems Commissioning.	AT Std 1-22 AT Rec 1-17
EA Credit 4	Enhanced Refrigerant Management	Do not use HVAC and refrigeration equipment and fire suppression systems containing HCFCs or Halons for the building, including the mailroom.	AT Std 17
EA Credit 5	Measurement & Verification	Consider installing an integrated Building Automation and Control System (BAS), which enables electronic monitoring and control of air flow, space temperature, system performance, energy conservation, fire alarms, security functions, etc. from a single, centralized location. This will facilitate optimized building operations, energy efficiency, indoor comfort, safety, and security. A BAS can be programmed such that a duct sensor can monitor the efficiency of the air flow, but can also detect a contaminant in the ductwork and alarm the facility manager, who can then reconfigure the HVAC system in that part of the building, notify the proper officials, and evacuate occupants safely. Do not locate metering equipment in mailrooms because they are primary targets. Locate monitoring devices for mailroom ventilation isolation controls outside of the mailroom so they may effectively perform their function during or after an incident.	AT Std 13 AT Std 17 AT Std 18 AT Std 22
EA Credit 6	Green Power	Investigate the availability of green power as a source of redundant utilities. The Western Area Power Administration green power program is available to all Federal agencies in the western region. Consider alternatives, including on-site storage of fuel and water, if redundant sources of natural gas and potable water are not available.	AT Std 19
Materials & Resources			
MR Prereq 1	Storage & Collection of Recyclables	Follow DoD Standard 1 for securing and locating recycling containers and other recycling-related devices (e.g., cardboard balers, aluminum can crushers) outside a building.	AT Std 1 AT Rec 9

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
MR Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors, and Roof	Reuse of an existing building depends on many factors. Conduct a comprehensive analysis of the existing building and its site to determine if it meets programmatic, performance, structural, code, security, and other requirements. If the building/site meets all/most of the requirements but not the DoD security criteria, determine if incorporating mitigating measures are life-cycle cost-competitive to constructing new. Security issues that may affect the feasibility of reusing an existing building or portions thereof include: standoff distance, unobstructed space, building layout, progressive collapse, structural isolation, architectural components (e.g., building overhangs), and material integrity. Note that existing unreinforced masonry walls must be upgraded to provide the level of protection defined in Standard 9 for exterior masonry walls. This mitigation effort may negate the percentage of the building that is reused.	AT Std 1 AT Std 2 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10 AT Rec 11 AT Rec 17
MR Credit 1.2	Building Reuse, Maintain 95% of Existing Walls, Floors, and Roof	ATFP standards may require significant alterations to the existing building structure and shell. See MR Credit 1.1: Building Reuse, Maintain 75% of Existing Shell.	AT Std 1 AT Std 2 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 10 AT Rec 11 AT Rec 17
MR Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	See MR Credit 1.1: Building Reuse, Maintain 75% of Existing Shell.	N/A

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
MR Credits 2.1 - 2.2	Construction Waste Management, Divert [50%] [75%] from Disposal	Consult the Project Manager, Base Security Office, and Facilities Manager for the most appropriate location for temporary construction waste and recycling containers and other construction waste management-related devices (e.g., concrete crushers, cardboard balers). Location of these containers and devices should not create concealment opportunities nor compromise other security strategies. Especially for buildings occupied during construction, ensure that security procedures and access control measures are in place to process construction workers, delivery trucks, recycling haulers, etc.	AT Std 1 AT Std 2 AT Rec 3 AT Rec 7 AT Rec 8 AT Rec 9
MR Credits 3.1 - 3.2	Materials Reuse, [5%] [10%]	To prevent unneeded security upgrades, hence use of more resources and materials, a comprehensive threat assessment, vulnerability assessment, and risk analysis should be conducted to identify the appropriate level of security for the building. Analyze each salvaged, refurbished or reused materials, products and furnishings to ensure that it meets DoD security criteria and will not adversely affect the desired level of security.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17
MR Credits 4.1 - 4.2	Recycled Content, [10%] [20%] (post consumer + 1/2 post industrial)	Some security and safety products are made of materials with recycled content or other environmentally preferable characteristics. Examples include concrete planters made with fly ash (a by-product of coal burning plants), recycled content metal fencing, and site furnishings made of slag (a by-product of steel production) and plastic lumber—all of which can be used for perimeter access control. Concrete made with fly ash or slag has increased strength, which can be beneficial in buildings that require structural concrete.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
MR Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	Some security products needed to meet DoD security criteria may not be manufactured within a 500 miles radius of the project site. This may adversely affect the regionally manufactured materials percentage calculation for this LEED credit.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17
MR Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	While some security products needed to meet DoD security criteria may be manufactured regionally, they may not be extracted, harvested or recovered within a 500 miles radius of the project site. This may adversely affect the regionally extracted materials percentage calculation for this LEED credit.	AT Std 2 AT Std 5 AT Std 6 AT Std 7 AT Std 8 AT Std 9 AT Std 10 AT Std 12 AT Std 20 AT Rec 11 AT Rec 17
MR Credit 6	Rapidly Renewable Materials	Evaluate choices of renewable building materials to ensure they pose no additional threat of splintering, fragmenting, or shattering compared to standard building materials.	N/A
MR Credit 7	Certified Wood	Many applications requiring ATFP protection will require construction with materials other than wood products. Where wood products are used, specify certified wood to the maximum extent feasible.	N/A

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
Indoor Environmental Quality			
EQ Prereq 1	Minimum IAQ Performance	To help maintain superior indoor air quality and limit exposure of building occupants to potentially hazardous chemical, biological and radiological (CBR) agents, dedicated ventilation systems (aka. dedicated outdoor air systems [DOAS]) and dedicated exhaust systems can be installed. DOAS use separate air handlers to condition and deliver the minimum required constant volume of outdoor air. Be sure to protect all outdoor air intakes and locate discharge points away from them. To maintain acceptable indoor air quality in the mailrooms, ensure the low leakage isolation dampers in the mailroom ventilation system are open and operating properly during normal working conditions. Provide controls that will: monitor the negative air pressure in the mailroom with respect to the rest of the building; sound an alarm if the air pressure changes; and allow the flow of air from the mailroom to the rest of the building. In temperate climates (e.g., San Francisco), consider operable windows for natural ventilation. Be sure to coordinate this strategy with other ventilation, energy efficiency, and security strategies, including blast resistant glazing (see LEED EA Credit 1: Minimum Energy Performance). Operable blast resistant window systems including thermally efficient systems are available but are expensive. See also LEED EQ Credit 6.1: Controllability of Systems: Perimeter.	AT Std 10 AT Std 13 AT Std 16 AT Std 17 AT Std 22 AT Rec 14 AT Rec 15 AT Rec 16 AT Rec 17
EQ Prereq 2	Environmental Tobacco Smoke (ETS) Control	See LEED EA Prerequisite 1: Fundamental Building Systems Commissioning for commissioning the dedicated smoking room. Do not make smoking rooms the refuge area for an incident. Locate the smoking room on the building's perimeter to keep the smoke exhaust system duct run short and to avoid conflicting paths with main building air supply and return ducts.	AT Std 10 AT Std 13 AT Std 16 AT Std 17 AT Std 22 AT Rec 14 AT Rec 15 AT Rec 17
EQ Credit 1	Outdoor Air Delivery Monitoring	Consider automating the building's emergency air distribution shutoff system to integrate carbon dioxide monitoring. Include carbon dioxide detection in mailroom isolation controls for detecting chemical, biological, or radiological agents.	AT Std 13 AT Std 17 AT Std 18 AT Rec 14 AT Rec 15

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EQ Credit 2	Increased Ventilation	Use motorized dampers to close air intakes when not operational. To prevent compromising the ventilation effectiveness of the building's ventilation system, do not locate the building's air intakes close to the air intake for the mailroom or other high-risk areas.Follow the recommendations for outdoor air intakes found in Department of Health and Human Services, National Institute for Occupational Safety and Health, Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks. Raised floors should not be used in laboratories or other spaces containing hazardous materials that could spill onto the floor and contaminate the underfloor space/air.	AT Std 10 AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Rec 14 AT Rec 15 AT Rec 17
EQ Credit 3.1	Construction IAQ Management Plan, During Construction	Should it be necessary for a building section to become occupied while another section is still under construction, do not store construction materials adjacent to occupied section and take precautions to prevent occupants' exposure to dust, chemicals, and moisture. Replace HVAC system filters frequently during the construction phase. Ensure air intakes are located according to the provisions of Standard 16. Provide access control to restrict construction workers' access to occupied sections. Provide the capability to immediately shut down the air distribution system throughout the building in order to limit airborne contaminants ranging from construction dust to chemical/biological agents.	AT Std 13 AT Std 17 AT Std 18 AT Rec 12 AT Rec 13
EQ Credit 3.2	Construction IAQ Management Plan, Before Occupancy	Should it be necessary for a building section to become occupied while another section is still under construction, do not store construction materials adjacent to occupied section and take precautions to prevent occupants' exposure to dust, chemicals, and moisture. Replace HVAC system filters frequently during the construction phase. Ensure air intakes are located according to the provisions of Standard 16. Provide access control to restrict construction workers' access to occupied sections. Provide the capability to immediately shut down the air distribution system throughout the building in order to limit airborne contaminants ranging from construction dust to chemical/biological agents.	AT Std 13 AT Std 17 AT Std 18 AT Rec 12 AT Rec 13
EQ Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	Ensure all cracks, and wall, floor and ceiling/roof penetrations are sealed with long-life, non-shrinking sealants meeting the requirements of EQ Credit 4.1.	AT Std 13
EQ Credit 4.2	Low-Emitting Materials, Paints and Coatings	Ensure low-emitting materials, paints and coatings are no less fire retardant/resistant than standard products of the same type.	N/A

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EQ Credit 4.3	Low-Emitting Materials, Carpet Systems	Ensure carpet systems meeting the requirements of EQ Credit 4.3 are no less fire retardant/resistant than standard products of the same type.	N/A
EQ Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	Ensure composite wood and agrifiber products meeting the requirements of EQ Credit 4.4 are no less fire retardant/resistant than standard products of the same type.	N/A
EQ Credit 5	Indoor Chemical & Pollutant Source Control	To the maximum extent possible, locate rooms where chemicals are being used on the building's perimeter to keep the dedicated exhaust system duct runs short and to avoid conflicting paths with main building air supply and return ducts. Exposure of building occupants to potentially hazardous chemical, biological and radiological (CBR) agents negatively impacts the indoor environment and can pose serious health threats. To help maintain superior indoor air quality and protect people's health, dedicated ventilation systems (aka. dedicated outdoor air systems [DOAS]) and dedicated exhaust systems can be installed. DOAS use separate air handlers to condition and deliver the minimum required constant volume of outdoor air. Be sure to protect all outdoor air intakes and locate discharge points away from them.	AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Rec 14 AT Rec 15 AT Rec 16

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EQ Credit 6.1 - 6.2	Controllability of Systems	Perimeter Spaces: Where appropriate, install operable windows to allow for natural ventilation. Natural ventilation has become an increasingly energy-efficient and attractive method for providing acceptable indoor air quality and maintaining a healthy, comfortable, and productive indoor climate rather than the more prevailing approach of using energy-intensive mechanical ventilation. Power sources are not needed to operate natural ventilation systems, so building occupants can maintain their level of comfort in the event of power shortages or blackouts. On the other hand, natural ventilation systems could bring outside contaminants inside. For critical and high-risk buildings, mechanical ventilation with special filters is recommended to protect against possible chemical, biological and radiological (CBR) agents from entering interior spaces. Although more energy will be used, mechanical ventilation does allow for precise control of humidity, preventing the growth of mold and mildew. Operable windows on the perimeter walls are not recommended for buildings that do not meet the required minimum standoff distance. Operable blast resistant window systems are available and can be designed. However, these are generally not as effective as fixed windows and they can cost 2 to 5 times that of a comparable fixed window system. Coordinate natural ventilation strategies with other ventilation, energy efficiency, and security strategies, including blast resistant glazing (see LEED EA Credit 1: Optimize Energy Performance). Ensure that operable windows have appropriate locks and security gates to prevent intruders and falls from heights. Locate low occupancy support areas on the side of the building most vulnerable to blast events. Keep in mind that the installation and distribution of utility systems should comply with the provisions of Standard 19.	AT Std 10 AT Std 16 AT Std 18 AT Std 19 AT Rec 14 AT Rec 15 AT Rec 16 AT Rec 17
		Non-Perimeter Spaces: Ensure individual controls for airflow, temperature, and lighting do not affect the facility manager's capability to control the systems and the systems' ability to safely allow occupants to exit the building during an incident. Raised floors should not be used in laboratories or other spaces containing hazardous materials that could spill onto the floor and contaminate the underfloor space/air.	AT Std 16 AT Std 18 AT Rec 19 AT Rec 14 AT Rec 15

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EQ Credit 7.1	Thermal Comfort, Design	Decrease infiltration—through tight building construction, proper air sealing, and mechanically controlled ventilation—to improve comfort, save energy, control moisture, reduce indoor pollution and promote ventilation. Also, tight building construction in combination with building pressurization can effectively prevent infiltration of exterior chemical, biological and radiological (CBR) agents released at some distance from a building, such as a large-scale attack. Consider installing an integrated Building Automation and Control System (BAS), which enables electronic monitoring and control of air flow, space temperature, system performance, energy conservation, fire alarms, security functions, etc. from a single, centralized location. This will facilitate optimized building operations, energy efficiency, indoor comfort, and safety and security. A BAS can be programmed such that a duct sensor can monitor the efficiency of the air flow, but can also detect a contaminant in the ductwork and alarm the facility manager, who can then reconfigure the HVAC system in that part of the building, notify the proper officials, and evacuate occupants safely. Where appropriate, consider natural ventilation and operable windows. Note that operable windows on the perimeter walls are not recommended for buildings that do not meet the required minimum standoff distance. Ensure that operable windows have appropriate locks and security gates to prevent intruders and falls from heights.	AT Std 10 AT Std 16 AT Std 18 AT Rec 22 AT Rec 15 AT Rec 16 AT Rec 17
EQ Credit 7.2	Thermal Comfort, Verification	Consider installing an integrated Building Automation and Control System (BAS), which enables electronic monitoring and control of air flow, space temperature, system performance, energy conservation, fire alarms, security functions, etc. from a single, centralized location. This will facilitate optimized building operations, energy efficiency, indoor comfort, and safety and security. A BAS can be programmed such that a duct sensor can monitor the efficiency of the air flow, but can also detect a contaminant in the ductwork and alarm the facility manager, who can then reconfigure the HVAC system in that part of the building, notify the proper officials, and evacuate occupants safely. Do not locate metering equipment in mailrooms, as they are primary targets. Locate monitoring devices for mailroom ventilation isolation controls outside of the mailroom so they may effectively perform their function during an incident.	AT Std 13 AT Std 16 AT Std 17 AT Std 18 AT Std 22 AT Rec 14 AT Rec 15

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EQ Credit 8.1	Daylight & Views, Daylight 75% of Spaces	Implement daylighting strategies to the maximum extent possible while meeting all ATFP requirements. Daylighting—the controlled admission of natural light through glazing—reduces the need for electric lighting, enhances the indoor environment, and contributes to the security of a building by shedding light on otherwise dark corners. Provide glazing that admits daylight to spaces, prevents heat transfer and glare, and minimizes the potential for hazard to building occupants from glass breaking due to natural hazards, accidents or explosions. Provisions for unobstructed space may result in open areas around the building, which could foster admittance of daylight into a building. Be sure to specify energy-efficient windows and glazing to control heat gain. To reduce the potential for glazing hazards, size and locate windows, glazed doors, and building entrances with extensive glazing with detonation points in mind. Minimize glazing on the side(s) of the building exposed to threat delivery locations such as those sides that are close to parking areas, streets, access roads, loading docks, etc. Where minimum standoff distances cannot be met, consider the use of skylights and clerestories to minimize glazing along perimeter walls while still achieving daylighting goals. If glazing is to be installed along the perimeter, use blast resistant glazing (see bullet point on window films below) as needed. Coordinate daylighting scheme with shading strategies and site security strategies. Avoid exterior ornamentation, including certain sun control and shading devices, that can break away easily. Do not use external sun control and shading devices on buildings susceptible to explosive threats. Note that the placement of windows and doors to allow for good visibility and surveillance may interfere with the daylighting scheme. Standard 10 provisions require the use of laminated windows for new construction and all planned window replacements. As such, while certain window films are designed to hold shattered glass together as well as to improve building energy efficiency, they are not DoD's preferred design solution for blast effect mitigation except as a temporary solution for existing windows that are not planned to be replaced.	AT Std 1 AT Std 2 AT Std 3 AT Std 4 AT Std 8 AT Std 10 AT Std 11 AT Std 12 AT Std 14 AT Std 15

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
EQ Credit 8.2	Daylight & Views, Views for 90% of Spaces	Direct line of sight may increase the risks to occupant due to external surveillance by potential aggressors and/or bombing or ballistic attacks and may conflict with DoD security criteria.	AT Std 1 AT Std 2 AT Std 3 AT Std 4 AT Std 8 AT Std 10 AT Std 11 AT Std 15 AT Rec 3 AT Rec 4 AT Rec 5 AT Rec 6 AT Rec 7 AT Rec 8 AT Rec 9 AT Rec 10 AT Rec 14 AT Rec 15 AT Rec 16 AT Rec 17
Innovation & Design Process			
ID Credit 1.1	Innovation in Design	There are many ways to achieve an innovation credit. Designers applying for future innovation credits are encouraged to come up with new and creative ideas, and not just duplicate what has been done before. Some of the strategies may have security implications (positive or negative) and careful evaluation is necessary. For example, if an Education Display Element is being pursued as an innovation credit, displays should be located away from critical areas and personnel. On the other hand, building hardening for blast protection, which typically involves using a lot of concrete, may result in exceeding the recycled content requirements of LEED MR Credit 4.2: Recycled Content: 10% if concrete with slag or fly ash was used. Refer to the US Green Building Council's Credit Ruling Interpretations and *Reference Guide* for further guidance on potential innovation credits.	N/A
ID Credit 1.2	Innovation in Design	Same as ID-1.1	N/A
ID Credit 1.3	Innovation in Design	Same as ID-1.1	N/A

LEED® Credit	Credit Description	Issues & Strategies	Related AT/FP Standards
ID Credit 1.4	Innovation in Design	Same as ID-1.1	N/A
ID Credit 2	LEED Accedited Professional	A competent security design professional should work in conjunction with the LEED® Accredited Professional to ensure issues of security and sustainability are discussed and evaluated early in the concept design phase of the project.	N/A

APPENDIX C. LEED CHECKLIST

APPENDIX C. LEED DOCUMENTATION CHECKLIST

The following checklist lists all of the required documentation necessary to earn a credit. The prerequisite credits **must** be earned and all required documentation must be complete and submitted. If all the documentation is complete for a credit, check it off in the points earned column and mark the credit point in the points earned column. Add the earned points to determine the rating for the building project:

- Certified 26 – 32 points
- Silver 33 – 38 points
- Gold 39 – 51 points
- Platinum 52 – 69 points

This checklist should be used from the beginning of the project design to help determine what is involved in each credit and see how the credits may work together.

Submit this checklist with the required documentation to the Integrated Design Team for review.

Possible Points	Credit	Description	Points Earned
14 points		**SUSTAINABLE SITES**	
REQ	SS Prereq 1	**Construction Activity Pollution Prevention**	REQ
		Project drawings that document the erosion and sedimentation control measures implemented on the site	
		Confirmation of the compliance path taken by the project (NPDES Compliance or Local Erosion Control Standards).	
		Narrative to describe the Erosion and Sedimentation control measures implemented on the project.	
		If a local standard has been followed, demonstrate that the local standard is equal to or more stringent than the referenced NPDES program.	
1	SS Credit 1	**Site Selection**	
		Confirm that the project site does not meet any of the prohibited criteria.	
		Narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	SS Credit 2	**Development Density & Community Connectivity**	
		Option 1 Development Density: Site vicinity plan showing the project site and the surrounding sites and buildings. Sketches, block diagrams, maps, and aerial photos are all acceptable for this purpose. Draw the density boundary on the drawing or note the drawing scale. Provide project site and building area (sq ft). Submit a listing of site and building areas for all surrounding sites within the density radius.	
		Option 2 Community Connectivity: Site vicinity drawing showing the project site, the 1/2 mile community radius, and the locations of the community services surrounding the project. Sketches, block diagrams, maps, and aerial photos are all acceptable for this purpose. Either draw the 1/2 mile radius on the drawing or note the drawing scale. Provide Project site and building area (sq ft). Submit a listing (including business name and type) of all community services within the 1/2 mile radius.	
		For projects with special circumstances - either compliance path - provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	SS Credit 3	**Brownfield Redevelopment**	
		Confirm whether the project site was determined contaminated by means of an ASTM E 1903-97 Phase II Environmental Site Assessment or if the site was defined as a Brownfield by a local, state, or federal government agency.	
		Provide a detailed narrative describing the site contamination and remediation efforts undertaken by the project.	
1	SS Credit 4.1	**Alternative Transportation: Public Transportation Access**	
		Commuter Rail Service: Provide a site vicinity drawing showing the project site and the location of all (existing/proposed) fixed rail stations within 1/2 mile of the site. A listing of each fixed rail station and the distance from the station to the project site (miles).	

Possible Points	Credit	Description	Points Earned
		Bus Service: Provide a site vicinity drawing showing the project site and the location of all existing bus stops within 1/4 mile of the site. A listing of each bus line that serves the site vicinity and the distance from the bus stop to the project site (miles).	
		For projects with special circumstances, provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**SS Credit 4.2**	**Alternative Transportation, Bicycle Storage & Changing Rooms**	
		Provide the FTE occupancy and transient occupancy for the project.	
		Provide project drawings to show the location(s) of the secure bicycle storage areas and shower/changing facilities. In addition, please provide the following project data and calculation information based on project type: *Non-residential Buildings* - Confirm the quantity of shower/changing facilities provided and their distance from the building entry. *Residential Buildings* - No additional documentation is required. *Mixed Non-residential and Residential Buildings* - Confirm the number of residential units and residential FTE occupants for the project. Confirm the quantity of shower/changing facilities provided for the non-residential portion of the project and their distance from the building entry.	
		For projects with special circumstances, provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**SS Credit 4.3**	**Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles**	
		Provide the FTE occupancy for the project. Provide the total parking capacity of the site.	
		OPTION 1-Low-emitting/Fuel Efficient Vehicles Provide project drawings to show the location(s) of the preferred parking spaces for low-emitting/fuel-efficient vehicles. Confirm the quantity of low-emitting/fuel-efficient vehicles provided and their make, model, and manufacturer. Confirm whether each vehicle is a zero-emission vehicle or enter each vehicle's ACEEE vehicle score.	
		OPTION 2-Preferred Parking for Low-emitting/Fuel Efficient Vehicles Provide project drawings to show the location(s) of the preferred parking spaces for low-emitting/fuel-efficient vehicles. Confirm the number of preferred parking spaces provided.	
		OPTION 3-Alternative Fuel Refueling Stations Provide project drawings to show the location(s) of the alternative fuel refueling stations. Confirm the fuel type, number of stations, and fueling capacity for each station for an 8-hour period.	
		AND (For projects with special circumstances-any compliance path) Provide an optional narrative to describe any special circumstances or non-standard compliance paths taken by the project.	

Possible Points	Credit	Description	Points Earned
1	**SS Credit 4.4**	**Alternative Transportation, Parking Capacity**	
		Provide the FTE occupancy for the project. Provide the total parking capacity of the site.	
		Confirm the appropriate project compliance path. In addition, provide the following project data and calculation information based on the appropriate compliance path:	
		OPTION 1 - NON-RESIDENTIAL Provide the number of parking spaces required for the project per local code or ordinance. Provide the number of carpool/vanpool spaces that are on-site.	
		OPTION 2 - NON-RESIDENTIAL Provide the number of carpool/vanpool spaces that are on-site.	
		OPTION 3 - RESIDENTIAL Provide a description of the infrastructure/programs that are in place to support and promote ridesharing.	
		OPTION 4 - ALL There are no additional items required for this compliance path.	
		For projects with special circumstances, provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**SS Credit 5.1**	**Site Development, Protect or Restore Habitat**	
		Provide the project site area. Provide the project building footprint area. Provide a narrative describing the project's approach to this credit.	
		In addition provide the following project data and calculation information based on the appropriate compliance path:	
		GREENFIELD SITES - Provide a copy of the project's site/grading drawings highlighting the designated site disturbance boundaries.	
		PREVIOUSLY DEVELOPED/GRADED SITES - Provide the area (sqft) of the site that has been restored using native and/or adaptive planting. Provide a copy of the project's site/landscape plan that provides information regarding the restored site area and the planting materials.	
		Include information regarding any special circumstances or considerations regarding the project.	
1	**SS Credit 5.2**	**Site Development, Maximize Open Space**	
		Provide the project site area and project building footprint area. Provide a copy of the project's site/landscape drawings highlighting the dedicated vegetated open space.	
		OPTION 1: Provide the area(sq ft) of open space required by local zoning codes/ordinances. Provide the area (sq ft) of the vegetated dedicated open space provided by the project.	
		OPTION 2: Provide the area (sq ft) of the vegetated dedicated open space provided by the project.	
		OPTION 3: Provide the area (sq ft) of the vegetated dedicated open space provided by the project.	

Possible Points	Credit	Description	Points Earned
		Provide a narrative describing any special circumstances or considerations regarding the project's credit approach.	
1	**SS Credit 6.1**	**Stormwater Design, Quantity Control**	
		OPTION 1: Provide the pre-development site runoff rate (cfs) and the pre-development site runoff quantity (cf). Provide the post-development site runoff rate (cfs), and the post development site runoff quantity(cf).	
		Provide a narrative describing the project site conditions, measures taken, and controls implemented to prevent excessive stream velocities and associated erosion.	
		OPTION 2: Provide the pre-development site runoff rate (cfs) and the pre-development site runoff quantity (cf). Provide the post-development site runoff rate (cfs), and the post development site runoff quantity(cf).	
1	**SS Credit 6.2**	**Stormwater Design, Quality Control**	
		NON-STRUCTURAL CONTROLS Provide list of Best Management Practices (BMP's), including a description of the function of each BMP and the percent annual rainfall treated.	
		STRUCTURAL CONTROLS Provide list of structural controls including a description of the pollutant removal of each control and the percent annual rainfall treated.	
		Provide a narrative describing any special circumstances or considerations regarding the approach to the credit.	
1	**SS Credit 7.1**	**Heat Island Effect, Non-Roof**	
		Provide project site drawings, highlighting the location of specific paving materials, landscape shading, and/or underground or covered parking.	
		OPTION 1: Provide the following data in the submittal template: The measured reflectance and emittance of each paving material installed on-site (to Calculate the SRI -OR- the actual SRI for each paving material installed on site. Total area of site hardscape, total area of hardscape to be shaded within 5 years, total area of installed SRI compliant hardscape materials, and total area of open grid pavement.	
		OPTION 2: Total number of parking spaces provided on-sits, and total number of covered parking spaces on-site.	
		Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**SS Credit 7.2**	**Heat Island Effect, Roof**	
		Provide copies of the project's roof drawings to highlight the location of specific roof materials and/or green roof systems.	
		OPTION 1: Total area of installed SRI compliant roofing materials. Provide a listing of installed roofing materials and their SRI values.	

Possible Points	Credit	Description	Points Earned
		OPTION 2: Total area of installed green roof systems.	
		OPTION 3: Total area of installed green roof systems, total area of installed SRI compliant roofing materials, and provide a listing of installed roofing materials and their SRI values.	
		Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**SS Credit 8**	**Light Pollution Reduction**	
		Provide copies of the project lighting drawings (interior and site) to document the location and type of fixtures installed. Interior drawings should clearly show exterior building surfaces to confirm that the maximum candela from interior fixtures does not intersect transparent or translucent building surfaces.	
		Provide confirmation that the interior lighting design has been evaluated to ensure that the maximum candela from each interior luminaries intersects opaque interior surfaces and does not exit through windows, OR, that automatic controls have been installed to turn off interior lighting during non-occupied hours.	
		FOR PROJECTS WITH NO EXTERIOR LIGHTING Confirm that no exterior lighting has been installed.	
		FOR PROJECTS WITH EXTERIOR LIGHTING Complete Lighting Power Density tables for both exterior site lighting and façade/landscape lighting. The following data will be required to complete the template: - location and ID of each installed exterior luminaries; - site area (sq ft) to be illuminated by the luminaire(s); - installed LPD; - and ASHRAE-allowable LPD.	
		Confirm the site zone classification for the project. Complete the Site Lumen Calculation on the submittal template (visit the USGBC website for credit templates: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447). The following data will be required to complete the template: - luminaries type/ID; - quantity installed; - initial lamp lumens per luminaries; - initial lamp lumens above 90 degrees from nadir.	
		Provide a narrative that includes specific information regarding the light trespass analysis conducted to determine compliance.	
		Please provide any additional comments or notes regarding special circumstances or considerations regarding the project's credit approach.	
5 points	**WATER EFFICIENCY**		
1	**WE Credit 1.1**	**Water Efficient Landscaping, *Reduce by 50%***	
		Provide the project's calculated baseline Total Water Applied (TWA) (gal).	

Possible Points	Credit	Description	Points Earned
		Provide the project's calculated design case Total Water Applied (TWA) (gal).	
		Provide the total non-potable water supply (gal) available for irrigation purposes.	
		Provide a narrative describing: - the landscaping and irrigation design strategies employed by the project; - description of the water use calculation methodology used to determine savings; - and for projects using non-potable water, specific information regarding source and available quantity of non-potable supplies.	
1	**WE Credit 1.2**	**Water Efficient Landscaping, No Potable Use or No Irrigation**	
		Provide the project's calculated baseline Total Water Applied (TWA) (gal).	
		Provide the project's calculated design case Total Water Applied (TWA) (gal).	
		Provide the total non-potable water supply (gal) available for irrigation purposes.	
		Provide a narrative describing - the landscaping and irrigation design strategies employed by the project; - description of the water use calculation methodology used to determine savings; - and for projects using non-potable water, specific information regarding source and available quantity of non-potable supplies.	
1	**WE Credit 2**	**Innovative Wastewater Technologies**	
		Provide the applicable plumbing drawings from the construction documents that provide data regarding any on-site wastewater treatment facilities.	
		Provide the project's calculated occupants, use a default one-to-one men to women ratio. Projects with special occupancy situations that result in an unbalanced ratio may enter project specific data for this credit.	
		Provide the project's calculated baseline water usage for sewer conveyance. This data is calculated using typical fixture types and the project's mix of occupants.	
		Provide the project's calculated design case water usage for sewage conveyance. This data is calculated using typical fixture types and the project's mix of occupants. Note: project teams must provide the following fixture information for each typical installed flush fixture type: fixture manufacturer, fixture model, flush rate in gallons per flush.	
		For projects using non-potable water for sewage conveyance, provide the total non-potable water supply (gal) available for sewage conveyance purposes.	

Possible Points	Credit	Description	Points Earned
		For projects treating wastewater onsite, provide the annual quantity of water treated, the annual quantity (gal) of treated water that is infiltrated, and the annual quantity (gal) of treated water that is re-used on-site.	
		Provide a narrative describing the potable water reduction strategies employed by the project. For projects using non-potable water, include specific information regarding any reclaimed water usage (graywater re-use/rainwater reuse/on-site or municipally treated wastewater).	
		If the project is treating wastewater on-site to tertiary standards, include specific information regarding the use of the treated water.	
1	**WE Credit 3.1**	**Water Use Reduction, 20% Reduction**	
		The project's calculated occupant(s). Use a default one-to-one men to women ratio. Projects with special occupancy situations that result in an unbalanced ratio may enter project specific data for this credit.	
		The project's calculated design case water usage (flush and flow fixtures) This data is calculated using project specified fixture types and the project's mix on occupants. Note: project teams must provide the following fixture information for each typical installed flush fixture type: fixture manufacturer, fixture model, flush rate in gallons per flush, or flow rate in gallons per minute.	
		The project's calculated baseline water usage (flush and flow fixtures). This data is calculated using typical fixture types and project's mix of occupants.	
		For projects using non-potable water for sewage conveyance, provide the total non-potable water supply available for sewage conveyance purposes.	
		Narrative describing the potable water reduction strategies employed by the project. For projects using non-potable water, include specific information regarding any reclaimed water usage (graywater re-use/rainwater reuse/on-site treated wastewater).	
1	**WE Credit 3.2**	**Water Use Reduction, 30% Reduction**	
		Same as WE Credit 3.1	
17 points	**ENERGY AND ATMOSPHERE**		
REQ	**EA Prereq 1**	**Fundamental Commissioning of the Building Energy Systems**	**REQ**
		Provide the name and company information for the CxA.	
		Confirm that the 6 required tasks have been completed.	
		Provide a narrative description of the systems that were commissioned and the results of the commissioning process.	
REQ	**EA Prereq 2**	**Minimum Energy Performance**	**REQ**
		Confirm that the project meets the requirements of ASHRAE Std 90.1-2004.	
		Provide a narrative regarding special circumstances or considerations regarding the project's prerequisite approach.	

Possible Points	Credit	Description	Points Earned
REQ	**EA Prereq 3**	**Fundamental Refrigerant Management**	**REQ**
		Confirm that the project does not use CFC refrigerants. OR Confirm that the project has a phase-out plan for any existing CFC-based equipment.	
		Provide a narrative description of the phase-out plan, including dates and refrigerant quantities as a percentage of the overall project equipment.	
1 to 10	**EA Credit 1**	**Optimize Energy Performance**	
		Refer to the USGBC Credit Template for this credit at this website: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447	
		Option 1 (up to 10 points): Confirm use of energy simulation software that has all capabilities described in either 'G2 Simulation Requirements' in Appendix G of ASHRAE 90.1-2004 or the analogous section of the alternative qualifying energy code.	
		Confirm the baseline building and proposed building in the project's energy simulation runs use the assumptions and modeling methodology described in either Appendix G of ASHRAE 90.1-2004 or the analogous section of the alternative qualifying energy code used.	
		General Information: Identify the simulation program, quantity of stories, principal heating source, weather file, Energy Code used (ASHRAE 90.1-2004 Appendix G), climate zone, new construction percent, existing renovation percent, target finder score (use Energy Star website: http://www.energystar.gov/index.cfm?fuseaction=target_finder.&CFID=154897)	
		Space Summary: Provide table that includes columns: building use (occupancy type), conditioned area (sf), unconditioned area (sf), total area (sf)	
		Advisory Messages from the simulation output files: Provide the following for both the proposed building and the baseling building (0 deg. Rotation): number of hours heating loads not met, number of hours cooling loads not met, number of warning messages, number of error messages, number of defaults overridden. Calculate the difference between the proposed and baseline buildings for each number.	

Possible Points	Credit	Description	Points Earned
		Comparison of Proposed Design Versus Baseline Design Energy Model Inputs: For the following model input parameters, provide a description for both the proposed design input and the baseline design input: exterior wall construction, underground wall, roof, floor, and slab assemblies including framing type, assembly R-values, assembly U-factors, and roof reflectivity when modeling cool roofs fenestration types, assebly U-factors (including the impact of the frame on the assembly), SHGCs, and visual light transmittances, overall window-to-gross wall ratio, fixed shading devices, and automated movable shading devices interior lighting power densities, exterior lighting power, process lighting power, and lighting controls modeled for credit receptacle equipment, elevators or escalators, refrigeration equipment, and otehr process loads HVAC system information including types and efficiencies, fan control, fan supply air volume, fan power, economizer control, demand control ventilation, exhaust heat recovery, pump power and controls, and any other pertinent system information (include the ASHRAE 90.1-2004 Table G.3.1.1 Domestic hot water system type, efficiency and storage tank volume General schedule information	
		Energy Type Summary: List the energy types used for your project (i.e. electricity, natural gas, purchased chilled water or steam, etc.) for either the baseline or proposed design. Also describe the utility rate used for each energy type, as well as the units of energy used, and the units of demand used.	
		On-Site Renewable Energy (skip if project does not include on-site renewable energy): Show calculations for the cost of on-site renewable energy using either an energy model or purchased USGBC calculation tools. Indicate the renewable source, backup energy type, annual energy generated and the rated capacity for the source.	
		Exceptional Calculation Measure Summary: Show calculations for calculating exceptional calculation measure cost savings using either an energy model based on local utility rate structures or the purchased USGBC forms.	

Possible Points	Credit	Description	Points Earned
		Performance Rating Method Compliance Report: List each energy end use for the project (including all end uses reflected in the baseline and proposed designs). Check whether the end-use is a process load, indicate the energy type, and list the energy consumption and peak demand for each end-use for the four baseline design orientations (0 degrees rotation, 90 degrees rotation, 180 degrees rotation and 270 degrees rotation). Indicate the total baseline energy cost for each energy type based on the four baseline design orientations. If either the bseline or proposed design uses more than one energy type for a single end use (i.e. electric resistance reheat, and central natural gas heating), list each energy type as a separate end use (i.e. Heating-Electric, and Heating, NG) Indicate the energy consumption and peak demand for each end use of the proposed design energy consumption. Indicate the total proposed energy cost for each energy type.	
		Provide the input and output summaries of the simulated energy consumption models for the baseline and proposed buildings.	
		OR Option 2 (4 points): Confirm that the building complies with all the prescriptive measures of the ASHRAE Advance Energy Design Guide Buildings 2004: the project is less than 20,000 square feet, the project is office occupancy, the project has fully complied with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located (also indicate the climate zone)	
		OR Option 3 (1 point): Confirm that the project fully complies with the Basic Criteria and Prescriptive Measures of the Advanced Buildings Benchmark^TM Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control. Also indicate the climate zone.	
1 to 3	**EA Credit 2**	**On-Site Renewable Energy**	
		Provide the On-Site Renewable Energy Source (s) used, the annual energy generated from each source, and the backup fuel for each source (ie, the fuel that is used when the renewable energy source is unavailable).	
		Describe the source of the annual energy cost information (energy model or industry database), and provide the appropriate energy values and costs.	
1	**EA Credit 3**	**Enhanced Commissioning**	
		Provide the name, firm and experience information for the CxA.	
		Confirm that the 6 required tasks have been completed.	
		Provide a narrative description of the results of the commissioning design review, implementation of the systems manual and training, and the plan for the review of building operation at 8 to 10 months.	

Possible Points	Credit	Description	Points Earned
1	**EA Credit 4**	**Enhanced Refrigerant Management**	
		Enter into the template the HVAC&R equipment types, including number, size (tons), refrigerant, and refrigerant charge.	
		Provide a narrative describing any special circumstances or calculation explanations.	
1	**EA Credit 5**	**Measurement & Verification**	
		Confirm the IPMVP Option pursued by the project.	
		Submit a copy of the M&V Plan.	
		Provide a narrative describing any special circumstances or calculation explanations.	
1	**EA Credit 6**	**Green Power**	
		OPTION 1: Provide the name of the green power provider and contract term. Enter total annual electricity consumption (kWh) and total annual green power purchase (kWh).	
		OPTION 2: Provide the name of the renewable energy certificate vendor. Enter total annual electricity consumption (kWh). Enter the value of the green tags purchased (kWh).	
13 points	**MATERIALS AND RESOURCES**		
REQ	**MR Prereq 1**	**Storage & Collection of Recyclables**	**REQ**
		Confirm that recycling collection areas have been provided, per requirements, to meet the needs of the project.	
		Confirm the types of materials that are being collected for recycling.	
		Provide a narrative describing any special circumstances or considerations regarding the project's prerequsite approach.	
1	**MR Credit 1.1**	**Building Reuse, Maintain 75% of Existing Walls, Floors & Roof**	
		Confirm whether the project is strictly a renovation of an existing building or a renovation with an addition. For projects with additions, confirm the square footage of the new addition(s).	
		Provide a tabulation of the existing and reused areas (sq ft) of each structural/envelope element.	
		Provide a narrative describing any special circumstances or considerations regarding the project's approach.	
1	**MR Credit 1.2**	**Building Reuse, Maintain 95% of Existing Walls, Floors & Roof**	
		Confirm whether the project is strictly a renovation of an existing building or a renovation with an addition. For projects with additions, confirm the square footage of the new addition(s).	
		Provide a tabulation of the existing and reused areas (sq ft) of each structural/envelope element.	
		Provide a narrative describing any special circumstances or considerations regarding the project's approach.	

Possible Points	Credit	Description	Points Earned
1	**MR Credit 1.3**	**Building Reuse, Maintain 50% of Interior Non-Structural Elements**	
		Confirm whether the project is strictly a renovation of an existing building or a renovation of an existing building or a renovation with an addition. For projects with additions, confirm the square footage of the new addition (s).	
		Provide a tabulation of the existing and reused areas (sq ft) of each structural/envelope element.	
		Provide an optional narrative describing any special circumstances or considerations regarding the project's approach.	
1	**MR Credit 2.1**	**Construction Waste Management, Divert 50% from Disposal**	
		Complete the construction waste calculation tables in the Submittal Template (visit the USGBC website for credit templates: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447). The following information will be required to fill in these tables: - general description of each type/category of waste generated; - location of receiving agent (recycler/landfill) for waste; - quantity of waste diverted (by category) in tons, or cubic yards.	
		Provide a narrative describing the project's construction waste management approach. the narrative should include the project's Construction Waste Management Plan.	
		Please provide any additional comments or notes to describe special circumstances or considerations regarding the project's credit approach.	
1	**MR Credit 2.2**	**Construction Waste Management, Divert 75% from Disposal**	
		Complete the construction waste calculation tables in the Submittal Template (visit the USGBC website for credit templates: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447). The following information will be required to fill in these tables: - general description of each type/category of waste generated; - location of receiving agent (recycler/landfill) for waste; - quantity of waste diverted (by category) in tons, or cubic yards.	
		Provide a narrative describing the project's construction waste management approach. the narrative should include the project's Construction Waste Management Plan.	
		Please provide any additional comments or notes to describe special circumstances or considerations regarding the project's credit approach.	
1	**MR Credit 3.1**	**Materials Reuse, 5%**	
		Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value.	
		Provide a tabulation of each salvaged/reused material used on the project. The tabulation must include a description of the material, the source/vendor for the material and the product cost.	

Possible Points	Credit	Description	Points Earned
		Provide a narrative describing the materials reuse strategy implemented by the project. Include specific information about reused/salvaged materials used on the project.	
1	**MR Credit 3.2**	**Materials Reuse, 10%**	
		Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value.	
		Provide a tabulation of each salvaged/reused material used on the project. The tabulation must include a description of the material, the source/vendor for the material and the product cost.	
		Provide a narrative describing the materials reuse strategy implemented by the project. Include specific information about reused/salvaged materials used on the project.	
1	**MR Credit 4.1**	**Recycled Content, 10% (Post-consumer + ½ pre-consumer)**	
		Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value.	
		Provide a tabulation of each material used on the project that is being tracked for recycled content. The tabulation must include - a description of the material, - the manufacturer of the material, - the product cost, - the pre-consumer and/or post-consumer recycled content percentage, - and the source of the recycled content data.	
		Provide a narrative describing any special circumstances or considerations regarding the project's credit approach.	
1	**MR Credit 4.2**	**Recycled Content, 20% (Post-consumer + ½ pre-consumer)**	
		Provide the total project materials cost (Divisions 2-10) or provide the total project cost for Divisions 2-10 to apply the 45% default materials value.	
		Provide a tabulation of each material used on the project that is being tracked for recycled contet. The tabulation must include - a description of the material, - the manufacturer of the material, - the product cost, - the pre-consumer and/or post-consumer recycled content percentage, - and the source of the recycled content data.	
		Provide a narrative describing any special circumstances or considerations regarding the project's credit approach.	

Possible Points	Credit	Description	Points Earned
1	**MR Credit 5.1**	**Regional Materials, 10% Extracted, Processed & Manufactured Regionally**	
		Provide the project's total project cost (for application of 45% default factor) or total materials cost. Note: this reported value must be consistent across all MR credits.	
		Complete a template to include the following information: - product name for each tracked material; - material manufacturer; - total product cost for each tracked material; - percentage of product by weight, that meets both the extraction and manufacture criteria; - distance between the project site and extraction/harvest/recovery site; - distance between the project site and the final manufacturing location.	
		Provide a narrative decsribing any special circumstances or considerations regarding the project's credit approach.	
1	**MR Credit 5.2**	**Regional Materials, 20% Extracted, Processed & Manufactured Regionally**	
		Provide the project's total project cost (for application of 45% default factor) or total materials cost. Note: this reported value must be consistent across all MR credits.	
		Create and complete a template to include the following information: - product name for each tracked material; - material manufacturer; - total product cost for each tracked material; - percentage of product by weight, that meets both the extraction and manufacture criteria; - distance between the project site and extraction/harvest/recovery site; - distance between the project site and the final manufacturing location.	
		Provide a narrative decsribing any special circumstances or considerations regarding the project's credit approach.	
1	**MR Credit 6**	**Rapidly Renewable Materials**	
		Provide the project's total project cost (for application of 45% default factor) or total materials cost. Note this reported value must be consistent across all MR credits.	
		Create and complete a table to include the following information: - product name for each tracked material; - material manufacturer; - total product cost for each tracked material; - percentage of product, by weight, for each material that meets the rapidly renewable crtieria.	

Possible Points	Credit	Description	Points Earned
1	**MR Credit 7**	**Certified Wood**	
		Provide a list of items (and/or components of products) claimed as FSC certified, including product type, manufacturer, and the appropriate entity's COC (chain-of custody) certification number. Each product name can then be cross-referenced with the manufacturer or vendor COC number during the LEED certification review.	
15 points	**Indoor Environmental Quality**		
REQ	**EQ Prereq 1**	**Minimum IAQ Performance**	**REQ**
		Provide a design narrative describing the project's ventilation design. Include specific information regarding fresh air intake volumes and any special conditions that affected the project's ventilation design.	
		For mechanically ventilated building: confirmation that the project has been designed to meet the minimum requirements of ASHRAE Standard 62.1-2004, ventilation for acceptable indoor air quality, using the ventilation rate procedure. OR For naturally ventilated buildings: confirmation that the project has been designed to comply with the requirements for location and size of window openings per ASHRAE Standard 62.1-2004, Section 5.1	
		For naturally ventilated buildings: provide applicable project drawings to show the naturally ventilated building zones and the operable window areas.	
REQ	**EQ Prereq 2**	**Environmental Tobacco Smoke (ETS) Control**	**REQ**
		Confirmation that the project has met the requirements for the appropriate project category: Non-Smoking Building; Building with Designated Smoking Rooms; or Residential Project.	
		For buildings with interior smoking rooms or for residential projects, provide appropriate copies of construction drawings to document the location of the smoking rooms, designed area separations, and dedicated ventilation systems.	
		A narrative may be submitted to further describe the testing protocols/results and compliance methods implemented by the project.	
1	**EQ Credit 1**	**Outdoor Air Delivery Monitoring**	
		Confirmation of the type of ventilation system and installed controls.	
		Design narrative describing the project's ventilation design and CO2 monitoring system. Include specific information regarding location and quantity of installed monitors, operational parameters and setpoints.	
		Provide copies of the applicable project drawings to document the location and type of installed sensors. Drawings should also show natural ventilation components (operable windows, air intakes, etc.) as applicable.	

Possible Points	Credit	Description	Points Earned
1	**EQ Credit 2**	**Increased Ventilation**	
		MECHANICALLY VENTILATED BUILDINGS: -Provide confirmation that the breathing zone ventilation rates in all occupied spaces have been designed to exceed the minimum rates required by ASHRAE Standard 62.1-2004 or the applicable local code, whichever is more stringent, by a minimum of 30%. - Provide a design narrative describing the project's ventilation system design. Include specific information regarding the fresh air intake volume for each specific occupied zone to demonstrate that the design exceeds the referenced standard or the applicable local code, whichever is more stringent, by at least 30%.	
		NATURALLY VENTILATED BUILDINGS - Provide confirmation that the natural ventilation system has been designed to meet the recommendations set forth in the Carbon Trust Good Practice Guide 237 [1998]. - Provide a design narrative describing the design method (CIBSE Method/Analytic Model) utilized in determining the natural ventilation design for the project. - Provide specific information regarding calculation methodology and/or model results to demonstrate that the ventilation design complies with the referenced standards.	
1	**EQ Credit 3.1**	**Construction IAQ Management Plan, During Construction**	
		Provide a copy of the project's Indoor Air Quality (IAQ) Management Plan. Confirm if the permanently installed air handling equipment was used during construction.	
		Provide photos to highlight the implemented construction IAQ practices.	
		List all filtration media (manufacturer, model#, MERV rating, location of installed filter) installed during construction and confirm that each was replaced prior to final occupancy.	
		Provide a narrative describing any special circumstances or non-standard approaches taken by the project.	
1	**EQ Credit 3.2**	**Construction IAQ Management Plan, Before Occupancy**	
		Provide confirmation regarding the approach taken by the project (pre-occupancy flush-out; flush-out with early occupancy; IAQ testing).	
		Provide a copy of the project's Indoor Air Quality testing report (if applicable).	
		Provide a narrative describing the project's specific flush-out procedure and/or IAQ testing process and results.	
1	**EQ Credit 4.1**	**Low-Emitting Materials, Adhesives & Sealants**	
		Provide a listing of each indoor adhesive, sealant and sealant primer product used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L, less water) for each product, and the corresponding allowable VOC from the referenced standard.	

Possible Points	Credit	Description	Points Earned
		Provide a listing of each indoor aerosol adhesive product used on the project. Include the manufacturer's name, specific VOC data (in/L less water for each product, and the corresponding allowable VOC from the standard.	
		Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**EQ Credit 4.2**	**Low-Emitting Materials, Paints & Coatings**	
		Provide a listing of each indoor pain and coating used on the project. Include the manufacturer's name, product name, specific VOC data (in g/L) for each product, and the corresponding allowable VOC from the referenced standard.	
		Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**EQ Credit 4.3**	**Low-Emitting Materials, Carpet Systems**	
		Provide listing of each carpet product installed in the building interior. Confirm that the product complies with the CRI Green Label Plus testing program.	
		Provide a listing of each carpet cushion product installed in the building interior. Confirm that the product complies with the CRI Green Label testing program.	
		Provide narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**EQ Credit 4.4**	**Low-Emitting Materials, Composite Wood & Agrifiber Products**	
		Provide a listing of each composite wood and agrifiber product installed in the building interior. Confirm that each product does not contain any added urea-formaldehyde.	
		Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**EQ Credit 5**	**Indoor Chemical & Pollutant Source Control**	
		Provide confirmation that required entryway systems have been provided.	
		Provide a listing of each entryway product installed in the building. For roll-up or carpeted systems, confirm that the required contracted maintenance will take place.	
		Provide copies of the project's construction drawings to highlight the location of the installed entryway systems.	
		Confirm that chemical use area have been designed as separate rooms with dedicated exhaust systems and appropriate negative pressurization. Provide copies of the project's mechanical drawings to highlight the location of chemical usage areas, room separations, and the associated exhaust systems. If mechanically ventilated, confirm that the installed filters have a MERV rating of 13 or better. Provide a listing of the installed filters and their associated MERV ratings.	

Possible Points	Credit	Description	Points Earned
		Provide a narrative to describe any special circumstances or non-standard compliance paths taken by the project.	
1	**EQ Credit 6.1**	**Controllability of Systems, Lighting**	
		For individual workstation controls, provide a listing of the total number of individual workstations and lighting controls.	
		For shared multi-occupant space control, provide a listing of the project's group multi-occupant spaces and a description of the installed lighting controls.	
		Provide a narrative describing the project's lighting control strategy. Include data regarding the type and location of individual controls (general area illumination controls for multi-workstation spaces may not be counted towards this credit) and also the type and location of controls provided for shared multi-occupant spaces.	
1	**EQ Credit 6.2**	**Controllability of Systems, Thermal Comfort**	
		For individual workstation controls, provide a listing of the total number of individual workstations and thermal controls.	
		For shared multi-occupant space control, provide a listing of the project's group multi-occupant spaces and a description of the installed thermal controls.	
		Provide a narrative describing the project's comfort control strategy. Include data regarding the type and location of individual and shared group-occupancy controls.	
1	**EQ Credit 7.1**	**Thermal Comfort, Design**	
		Provide data regarding seasonal temperature and humidity design criteria.	
		Provide a narrative describing the method used to establish the thermal comfort conditions for the project and how the systems design addresses the design criteria. Include specific information regarding compliance with the referenced standard.	
1	**EQ Credit 7.2**	**Thermal Comfort, Verification**	
		Provide a narrative describing the survey planned for the validation of the thermal comfort conditions for the project. Include a specific description of the provisions for creating a plan for corrective action.	
1	**EQ Credit 8.1**	**Daylight & Views, Daylight 75% of Spaces**	
		GLAZING FACTOR CALCULATION METHOD Complete a calculation spreadsheet to demonstrate overall Glazing Factor. The following data is required for input: occupied space area (sq ft); area of each type of glazing (sidelighting and toplighting); visible light transmittance (T_{vis}) for each glazing type.	

Possible Points	Credit	Description	Points Earned
		OR COMPUTER SIMULATION METHOD Demonstrate that the project complies with the minimum illumination levels. The following data is required for input: total regularly occupied space area (sq ft), total regularly occupied space area that achieves a simulated minimum of 25 footcandles. Provide copies of the applicable project drawings showing the illumination simulation results.	
		OR DAYLIGHT MEASUREMENT METHOD Complete a calculation spreadsheet to demonstrate that the project complies with the minimum illumination levels.	
		The following data is required for input: - total regularly occupied space area (sq ft); - total regularly occupied space area that achieves a measured minimum of 25 footcandles. Provide copies of the applicable project drawings showing the illumination simulation results.	
		Provide a narrative describing any special occupancy areas that have been excluded from compliance. The narrative should include a detailed description of the space function and an explanation as to why the inclusion of views would hinder the normal tasks/function of each exclusion area.	
		For projects that have used computer simulation or physical measurements, please include detailed information describing the method used to determine the daylighting contributions in the building. Include specific information regarding the actual or simulated time of day and weather conditions, measurement equipment or software used, and the calculation method for determining the final daylighting area.	
1	**EQ Credit 8.2**	**Daylight & Views, Views for 90% of Spaces**	
		Complete a calculation spreadsheet to demonstrate overall access to views from occupied spaces. The following data is required for input: - occupied space identification, - occupied space area (sq ft), - and area (sq ft) of each occupied space with direct access to views.	
		Provide copies of the applicable project drawings showing the line of sight from interior spaces through exterior windows in both plan and sectional views.	
		Provide a narrative describing any special occupancy areas that have been excluded from compliance. The narrative should include a detailed description of the space function and an explanation as to why the inclusion of views would hinder the normal tasks/function of each excluded area.	

Possible Points	Credit	Description	Points Earned
5 points	**Innovation & Design Process**		
1	**ID Credit 1.1**	**Innovation in Design, Provide Specific Title**	
		Provide the specific title for the ID credit being pursued. Provide a narrative statement of the Credit Intent. Provide a narrative statement describing the Credit Requirements.	
		Provide a detailed narrative describing the project's approach to achievement of the credit. This narrative should include a description of the quantifiable environmental benefits of the credit proposal.	
		Provide copies of any specific construction drawings or exhibits that will serve to illustrate the project's approach to the credit.	
1	**ID Credit 1.2**	**Innovation in Design, Provide Specific Title**	
		Same as Credit 1.1	
1	**ID Credit 1.3**	**Innovation in Design, Provide Specific Title**	
		Same as Credit 1.1	
1	**ID Credit 1.4**	**Innovation in Design, Provide Specific Title**	
		Same as Credit 1.1	
1	**ID Credit 2**	**LEED Accredited Professional**	
		Provide the namd of the LEED AP. Provide the name of the LEED AP's company. Provide a brief description of the LEED AP's project role(s). Provide a copy of the LEED AP's certificate.	
		TOTAL POINTS EARNED	
	Certified 26-32 points; **Silver** 33-38 points; **Gold** 39-51 points; **Platinum** 52-69 points		

APPENDIX D. SAMPLE FACILITY TYPES

APPENDIX D. FACILITY TYPE GUIDANCE

1.0 Office Buildings 3
2.0 Training Facility 7
3.0 Conference Facility 10
4.0 Warehouse Facility 11
5.0 Parking Facilities 14
6.0 Place of Worship 17
7.0 Youth Center 19
8.0 Physical Fitness Center 20

The information contained in Appendix D is from the Whole Building Design Guide website:

- http://www.wbdg.org/design/buildingtypes.php
- http://www.wbdg.org/design/spacetypes.php

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1.0 Office Buildings

Federal Building—Oakland, CA
(Courtesy of Kaplan McLaughlin Diaz)

1.1 Functional/Operational

1.1.1 Tenant Requirements

The building design must consider the integrated requirements of the intended tenants. This includes their desired image, degree of public access, operating hours, growth demands, security issues and vulnerability assessment results, organization and group sizes, growth potential, long-term consistency of need, group assembly requirements, electronic equipment and technology requirements, acoustical requirements, special floor loading and filing/storage requirements, special utility services, any material handling or operational process flows, special health hazards, use of vehicles and types of vehicles used, and economic objectives.

1.1.2 Flexibility

The high-performance office must easily and economically accommodate frequent renovation and alteration, sometimes referred to as "churn." These modifications may be due to management reorganization, personnel shifts, changes in business models, or the advent of technological innovation, but the office infrastructure, interior systems, and furnishings must be up to the challenge.

- Consider raised floors to allow for easy access to cabling and power distribution, as well as advanced air distribution capabilities to address individual occupant comfort.
- Incorporate features such as plug-and-play floor boxes for power, data, voice and fiber, modular and harnessed wiring and buses, and conferencing hubs to allow for daily flexibility at work as well as future reorganization of office workstations.

1.2 Urban Planning

The concentration of a large number of workers within one building can have a significant impact on neighborhoods. Office structures can vitalize neighborhoods with the retail, food service, and interrelated business links the office brings to the neighborhood. Consideration of transportation issues must also be given when developing office structures. Office buildings are often impacted by urban planning and municipal zoning, which attempt to promote compatible land use and vibrant neighborhoods.

- Consideration should be given when selecting office locations to the distance the majority of occupants will have to travel to reach the office. Studies including zip code origination should be conducted to determine the best location of the office. The development of new office locations will often necessitate relocation of employees, particularly if the office is moved or opened in a new geographical area. Consideration of the municipal resources should include housing costs and availability, traffic congestion, school system quality, cultural resources such as museums, sports teams and institutions of higher education, natural attractions such as coastal areas, mountains and public parks, availability of educated labor, crime rate and law enforcement, and civic infrastructure capacity such as water, waste water and waste processing.
- Once a building has been constructed and occupied, it is critical that long-term performance be confirmed through an aggressive process of metering, monitoring and reporting. The results of this feedback should inform maintenance operations and be available as input to new design efforts.

1.3 Productive

1.3.1 Worker Satisfaction, Health, and Comfort

In office environments, by far the single greatest cost to employers is the salaries of the employees occupying the space. It generally exceeds the lease and energy costs of a facility by a factor of ten on a square foot basis. For this reason, the health, safety, and comfort of employees in a high-performance office are of paramount concern.

- Utilize strategies such as increased fresh air ventilation rates, the specification of non-toxic and low-polluting materials and systems, and indoor air quality monitoring.
- Provide individualized climate control that permits users to set their own, localized temperature, ventilation rate, and air movement preferences.
- While difficult to quantify, it is widely accepted that worker satisfaction and performance is increased when office workers are provided stimulating, dynamic working environments. Access to windows and view, opportunities for interaction, and control of one's immediate environment are some of the factors that contribute to improved workplace satisfaction. See also the Psychosocial Value of Space.

- Natural light is important to the health and psychological well-being of office workers. The design of office environments must place emphasis on providing each occupant with access to natural light and views to the outside. A minimum of 30 foot candles per square foot of diffused indirect natural light is desirable.
- The acoustical environment of the office must be designed and integrated with the other architectural systems and furnishings of the office. Special consideration must be given to noise control in open office settings, with absorptive finish materials, masking white noise, and sufficient separation of individual occupants.

1.4 Technical Connectivity

Technology has become an indispensable tool for business, industry, and education. Given that technology is driving a variety of changes in the organizational and architectural forms of office buildings, consider the following issues when incorporating it, particularly information technology (IT), into an office:

- Plan new office buildings to have a distributed, robust, and flexible IT infrastructure, which would allow technological access in virtually all the spaces.
- During the planning stage, identify all necessary technological systems (e.g., voice/cable/data systems such as audio/visual systems, speaker systems, Internet access, and Local Area Networks [LAN] / Wide-Area Networks [WAN] / Wireless Fidelity [WI-FI]), and provide adequate equipment rooms and conduit runs for them.
- Consider and accommodate for wireless technologies, as appropriate.
- For existing office buildings, consider improving access to the IT infrastructure as renovations are undertaken.

See WBDG Productive—Design for the Changing Workplace and Productive—Integrate Technological Tools for more information about incorporating IT into facility design.

1.5 Secure / Safe

Terrorist attacks of the last decade have focused design on protection of occupants and assets against violent attack. Through comprehensive threat assessment, vulnerability assessment, and risk analysis, security requirements for individual buildings are identified, and appropriate reasonable design responses are identified for integration into the office buildings design.

- Consider entrances that do not face uncontrolled vantage points with direct lines of sight to the entrance. Utilize site barriers and setbacks, perimeter barriers and blast resistances, access control and intrusion detection, entrance screening, package screening and control, open areas that allow for easy visual detection

by occupants, and minimized glazing. See WBDG Safe—Provide Security for Building Occupants and Assets.

- First-time visitors, unfamiliar with their surroundings, may have trouble navigating the safest exit route from the building. Consider using increased signage and/or providing safety information and a building directory in welcome brochures. Also, review and evaluate safety plans on a regular basis. See WBDG Safe—Plan for Fire Protection and Safe—Ensure Occupant Safety and Health.

1.6 Sustainable

1.6.1 Energy Efficiency

Depending on the office's size, local climate, use profile, and utility rates, strategies for minimizing energy consumption involve: 1) reducing the load (by integrating the building with the site, optimizing the building envelope [decreasing infiltration, increasing insulation], etc.); 2) correctly sizing the heating, ventilating, and air-conditioning systems; and 3) installing high-efficiency equipment, lighting, and appliances.

Consideration should be given to the application of renewable energy systems such as building-integrated photovoltaic systems that generate building electricity, solar thermal systems that produce hot water for domestic hot water (DHW) or space conditioning, or geothermal heat pump systems that draw on the thermal capacitance of the earth to improve HVAC system performance.

Additional consideration should be given to the applications of other distributed energy sources, including microturbines, fuel cells, etc., that provide reliability (emergency and mission critical power) and grid-independence, and reduce reliance on fossil fuel grid power.

1.7 Modernization

The extensive inventory of facilities that are over 25 years of age present a significant recapitalization challenge. For GSA, its first impressions program addresses the quality of the entrance and lobby areas of its older facility portfolio. Key areas of concern for modernization include upgrading the exterior envelope, mechanical systems, telecommunications infrastructure, security, and interior finishes. Improving the workplace quality, energy performance, security, flexibility to accommodate tenant churn, maintenance overhead and life-cycle expectancy are important objectives for modernizing these facilities, Appropriate preservation for buildings on or eligible to be on the historic registry is part of the modernization effort.

Federal Office Building, San Francisco, California

2.0 Training Facility

2.1 Flexibility

At some training facilities, programs and schedules vary frequently. Furthermore, instructors have different and evolving training methods. As such, flexibility within the building's design is critical to the success of an enduring training program. The following strategies can be used to meet the challenge of designing a training facility around evolving teaching styles and emerging technologies:

- Cluster instructional areas around central, shared support and resource spaces. Shared resource spaces may include informal gathering spaces, shared seminar rooms, computer kiosks, and trainer offices.
- Use an appropriate combination of stand-alone movable partitions, movable modular furnishings, and large double doors between classrooms and shared spaces.
- Create classrooms of various sizes. Equip larger rooms with movable partitions to accommodate a wide variety of group learning sizes.
- Arrange spaces in keeping with the educational and programmatic goals of the facility.
- When connecting semi-private or enclosed spaces to more open areas, ensure moderate visual openness and acoustical privacy.
- Where possible, allow for individually controlled temperature and lighting.

See WBDG Productive—Design for the Changing Workplace and Accessible—Plan for Flexibility for more information.

A classroom in Florida Community College at Jacksonville's Advanced Technology Center. (Courtesy of KBJ Architects Inc.)

Left: A U-shaped, tiered seating configuration places participants and trainers within close proximity and promotes discussion and dialogue for case teaching.
Right: Nuclear reactor training laboratory at the Naval Nuclear Power Training Center (Photos courtesy of KBJ Architects Inc.)

2.2 Indoor Environmental Quality

All educational facilities, including training facilities, must have high-quality indoor environments to promote learning as well as productivity. The following strategies support good indoor environmental quality that can positively influence task performance and attention spans:

- *Quality Acoustics*: Trainees should be able to hear their instructors clearly, and vice versa. Ensure low ambient background noise and appropriate acoustics in classrooms and support spaces through a combination of space planning, sound absorption, and sound transmission reduction techniques. For example, avoid placing mechanical rooms next to classrooms, conference rooms, auditoriums, offices; libraries, laboratories, and computer centers may be adjacent to classrooms. Consider sound amplification and/or speaker systems for auditoriums and other appropriate spaces. Provide accommodations for hearing impaired trainees.
- *Appropriate Lighting*: A high quality, energy-efficient lighting system that utilizes both natural and electric sources as well as lighting controls is optimal for a learning environment. Ensure the lighting design is appropriate for the task at hand. Consider indirect/direct luminaries for ambient lighting in classrooms and support areas. Allow individually controlled lighting in study areas and workrooms where possible. Design appropriate exterior lighting for facilities that will be used at night.
- *Daylighting*: Use daylighting to enhance the visual environment of classrooms as well as support spaces. Coordinate the daylighting scheme with the design of interior lighting and controls as well as other energy efficiency measures. Specify energy-efficient windows. Install proper sun control and shading

devices to reduce glare (especially in computer training rooms) and allow for room darkening (for rooms with A/V equipment).

- *Environmentally Preferable Products*: Use low VOC paints and finishes for interior surfaces. Consider selecting renewable materials such as bamboo flooring. Specify no-formaldehyde panels and cabinetry. Use non-toxic cleaning products. See WBDG Evaluating and Selecting Green Products and Sustainable O&M Practices for more information.
- *Good Sightlines*: Ensure adequate and appropriate sightlines in auditoriums, conference rooms, and seminar rooms. Consider sloped floors, which promote good sightlines and are more accessible than tiered floors.
- *Comfort and Aesthetics*: Allow users to adjust seating, computer equipment placement, light levels, table or desk heights, classroom layout, and ventilation. See WBDG Productive—Provide Comfortable Environments for more information. Make a learning environment more conducive with colors.
- *Thermal Comfort and Ventilation*: Ensure fresh air intake and adequate airflow rates. Specify high-performance heating, ventilating, and air-conditioning equipment (HVAC) zoned to accommodate varying occupancy rates. Commission the system to ensure functionality. At a minimum, comply with American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 55 Thermal Environmental Conditions for Human Occupancy, and ASHRAE Standard 62-2001—Ventilation for Acceptable Indoor Air Quality (ANSI Approved). Refer to ASHRAE Applications Guide, Chapter 6 for guidance on designing HVAC systems in educational spaces. Incorporate natural ventilation, if appropriate. See WBDG Productive—Provide Comfortable Environments for more information.

Many of the topics mentioned above are discussed in more detail in the WBDG Productive Branch and Sustainable Branch.

2.3 Signage

Signage and other way finding measures help promote a welcoming and efficient training environment, especially for trainees new to the training facility.

- Signage should include posted directories for easy navigation, schedules of activities, and clear designation of classrooms and support spaces.
- Many facilities have extended hours and exist on "open" campuses. When entrances are unmonitored, post building hours, appropriate trespassing notices, and important building use policies on the exterior of the building.
- Consider the use of colors or other visual markers to facilitate way finding.
- Ensure signage is available for persons with disabilities.

2.4 Security and Occupant Safety

- Implement security measures based on the level of protection desired to protect facility occupants and assets (e.g., computer equipment). Consider standoff

distances; access control strategies; entrances that do not face uncontrolled vantage points with direct lines of sight to the entrance; open areas that allow for easy visual detection by occupants; and minimized glazing. See WBDG Secure/Safe—Provide Security for Building Occupants and Assets.

- First time visitors, unfamiliar with their surroundings, may have trouble navigating the safest exit route from the building. Consider using increased signage and/or providing safety information and a building directory in welcome brochures. Also, review and evaluate safety plans on a regular basis. See WBDG Secure/Safe—Plan for Fire Protection and Secure/Safe—Ensure Occupant Safety and Health.

2.5 Operations and Maintenance

Training facilities have varied hours and rates of occupancy, which affect the facilities' operations and maintenance schedules. Consider the following recommendations in developing an operations and maintenance plan:

- During the planning stage of the project, design a proactive facility management program to anticipate facility problems, rather than reacting to problems when they occur. This plan is essential to ensuring optimal long- and short-term use of the facility.
- Appropriate planning decisions can support custodial care, ease of maintenance of facility grounds and building equipment, materials and surfaces, as well as support the flexible scheduling of space for future programs.
- Ensure that program schedules and maintenance schedules are cohesive and compatible.

See WBDG Sustainable—Optimize Operational and Maintenance Practices, Sustainable O&M Practices, and Reliability-Centered Maintenance (RCM) for more information.

3.0 Conference Facility

3.1 Functional / Operational

3.1.1 Flexibility

The Conference/Classroom needs to be adaptable as occupant needs will change daily. These spaces generally will contain modular furniture that is light and easily rearranged. These spaces are generally located in areas with standard column grids and single story levels with flat floors. Movable partitions typically help to further subdivide the space as well as provide added projection surfaces.

3.1.2 Special HVAC and Utility Requirements

A conference center will typically have a separate AHU, which requires a 15% increase in cooling capacity. HVAC, electrical, and security systems are generally designed to operate after hours on a regular basis. Toilet requirements are often exceeded to accommodate additional occupancy loads comfortably.

3.1.3 Occupancy

Occupancy Group Classification is Business or Assembly A3, with sprinklered protected construction, and GSA Acoustical Class B1 space where meetings are held on a regular basis. See also WBDG Secure / Safe—Plan for Fire Protection.

4.0 Warehouse Facility

4.1 Durable/Functional

Warehouse facilities should be planned to accommodate loads of stored materials as well as associated handling equipment.

- Design of warehouses is to be based on the dead and live load requirements of the structure as it will be built. Snow, wind, and seismic loads shall be considered where they are applicable. Racking in seismic areas must be built stronger and be better braced.
- Wind uplift can cause great damage to roofs and metal roof copings at the roof edge. Building codes recognize that wind velocity is greater across open areas, typical for warehouse zones.
- Wind-driven rain can easily penetrate the vast surface areas of the warehouse walls. Design walls to permit any infiltrating water to evaporate harmlessly without collecting in the wall cavities or damaging stored product.
- Proper floor types are an important consideration in the design. General warehouse space should be floored with a concrete slab to carry wheel loads and withstand the abrasion generated by the continual use of hard rubber and steel-wheeled forklift trucks. Consider

adding hardeners and dustproofers to protect the concrete. Consider using epoxy coating on concrete floors near battery charging areas.

- Floor flatness and levelness requirements are critical, especially for high ceilinged space and safe operation of high-lifting equipment.
- Adequate space must be provided on-site for truck maneuvering, truck storage if the business owns a fleet, car parking for employees and future office space/population expansion (which might be driven by higher rent for center-city office space), and landscaped areas.

4.2 Energy-Efficient

- Be designed with passive solar concepts, solar geometry, and building load requirements in mind.
- Possess light colored roof to reflect a large percentage of solar radiation, reducing HVAC loads, and energy consumption. First cost is also reduced, due to the smaller plant size required. When a large roof area is anticipated, this effect can be significant, especially for temperature controlled warehouses. Greater heat reflection will increase wroker productivity in the summer.
- Be planned with interior dock space in colder climates to reduce energy consumption and provide more tolerable winter working conditions for dock workers.
- Use ceiling mounted fans to reduce heat stratification and provide air movement, thus increasing worker comfort in both summer and winter. Mount fans above highest forklift level for worker safety.
- Consider specifying white painted metal roof decking, thereby increasing ceiling surface reflectivity, lighting efficiency, and worker comfort without any added energy cost.
- Use energy-efficient fixtures, systems, and appliances, e.g., motion sensor instant-on lighting systems, wherever feasible.

4.3 Safety/Security of Personnel and Material

- Address the traditional life-safety and health concerns common to all buildings, including measures to prevent occupational injuries and illnesses (work-related musculoskeletal disorders (WMSD), trips, falls, etc.), ensure electrical safety, and

eliminate exposure to hazardous materials. The following operations have historically contributed to significant numbers of warehouse injuries and are considered to be the most hazardous: docks, powered industrial trucks, conveyors, materials storage, manual lifting/handling, roof ladders and hatches, and charging stations. Other serious operational safety problems include inadequate fire safety provisions, improper blocking of exits and egress paths, chemical exposure, improper use of lockout procedures, lack of ergonomics, and failure to wear personal protective equipment.

- Incorporate proper signage to clearly warn of hazards or to direct personnel to take precaution. The specific strategy for the warehouses signs must be determined early in the facility design process.
- Possess non-slip surface treatments on floors subject to wetting, such as outdoor docks, to eliminate slips and falls to personnel.
- Be designed with fire sprinkler systems engineered to cover the specific commodity classification in the specific storage configuration for the planned warehouse. The adequacy of the sprinkler system must be evaluated when changes occur that can increase the hazard classification, such as introducing a new product line, using a different packaging material, or changing from wood pallets to plastic pallets.
- Include appropriate security systems incorporated into the overall warehouse design.

4.4 Health/Comfort

- Provide proper ventilation under all circumstances.
- Provide local exhaust for restrooms, kitchens, janitor's closets, copy rooms, battery-charging areas, etc.
- Consider installing CO_2 sensors to provide real time monitoring of air quality.
- Integrate daylighting with the electric lighting system.
- Allow for natural lighting where possible. Provide lighting controls that turn off lights when sufficient daylight exists. Consider dimming controls that continuously adjust lighting levels to respond to daylight conditions.
- Consider the different natural lighting designs for warehouses.
- Minimize HVAC system noise in occupied space.
- Use furnishings, chairs, and equipment that are ergonomically designed and approved for that use.
- Design equipment and furnishings reflective of healthy work practices in an effort to eliminate repetitive motions as well as prevent strains and sprains.
- Strive to create a 'sense of place' such that the warehouse has a unique character that engenders a sense of pride, purpose, and dedication for individual workers and the workplace community.

5.0 Parking Facilities

Hermosa Beach Parking Structure
(Courtesy of Gordon H. Chong & Partners Architecture)

5.1 Functional Requirements

- Optimizing site potential, by choice of site and its relationship to walking, driving, other transportation linkages and good design opportunities.
- Ventilation is an issue within some types and some areas of parking garage design. New technologies are increasing the effectiveness in design and monitoring of these areas for concern. Natural ventilation is always a good method however detailed study is required in some areas and types of parking garage design to determine its effectiveness.
- Provide space for bicycle parking and storage.

5.2 Safety and Security

Safety and security of the people using the garage are of paramount importance:

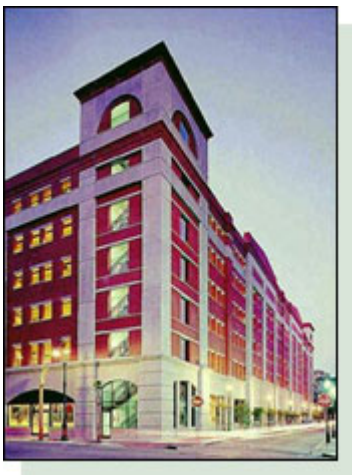
- Open, glass stairwells and glass-backed elevators.
- Security devices such as video, audio and emergency buttons that call into the booth or local police station.
- Public telephones
- Eliminate potential hiding places, such as under open stairs.
- Handicap accessibility with vehicles close to stair and elevator cores having a direct path to key movement patterns of the garage.
- To avoid carbon monoxide build-up, air flow is adequately designed for through mechanical and/or natural ventilation.
- Non-slip floor surface
- Cleanliness
- Design for the points of intersection between man and the automobile for adequate safety of movement.
- Energy efficient lighting is very important in garage safety but can pose problems with spillage out of the garage onto neighboring communities. A balance between daylighting, interior lighting and exterior control can be addressed in many ways on the exterior design of the façade while providing adequate lighting within. Lights should be vandal resistant and easy to maintain.

- Use CPTED (Crime Prevention Through Environmental Design) whenever appropriate along with technological equipment.

5.3 Aesthetics

Aesthetics of garage design has become very important to communities across the country:

- Recently garage design has become part of an architectural style of the surrounding architecture, respecting the language of design and using the design process.
- The historic preservation movement was one of the key issues in garage design as garages were needed to revitalize dense older urban fabrics without destroying the architectural context. Many excellent examples can be found across the country solving these contextual issues.
- The Parking garage itself is now also part of the historic preservation movement as some older existing structures can and should be designated for preservation.
- The Parking Facility has played an important role in design evolution throughout its history often being the leader in many crucial design issues; it is truly a unique and important civic building. Perhaps one of the most important design laboratories of the 20th century it has become the gateway to our buildings and cities.



Bryan Street Garage
(Courtesy of Carl Walker, Inc.)

- Maintain the urban street front by having the sidewalk condition of the garage contain stores or provide a safe and pleasant walk experience.
- Using landscaping and changes in architectural materials forms, and scales to enhance the garage façade along the street. Use landscaping to shied and enhance parking lot design.
- Architecturally breaking down the scale of the large structure along its façade.
- Designing beautiful stairs and elevator cores to enhance the community and walking experience.
- Most costly solution is to "hide" the garage by placing below ground

Left: Queensway Bay Facility
(Courtesy of International Parking Design, Inc. and Erhard Pfeiffer, photographer)
*And Right:*Landscaped rooftop of Northpark Town Center
(Courtesy of John Portman & Associates and Michael Portman, photographer)

5.4 Integrated and Mixed-Use Design

Garages are often connected to other uses:

- The garage has always been a mixed-use structure combining and often connected with all other building types.
- Plan for any loading or unloading conditions required by mixed-use, so as not to interfere with garage traffic.
- Separate roofing and structural system for any human-occupied space within garage.
- Provide for simple and well-designed movement systems for pedestrian and automobiles.
- Many garages are combined with almost any use imaginable such as a playing surface on the roof requiring green architecture, so enjoy the possibilities of integrating a fully functional structure requiring many technological advances.
- Surface parking lots can be designed to become mixed-use plaza spaces.
- The garage has often in its history been part of a multi-modal system linking different forms of transportation.

Center Street Park and Ride
(Courtesy of Herbert Lewis Kruse Blunck, Architects and Assassi Productions©2002)

5.5 Sustainable Design

The parking garage in and of itself is a better land-use choice in attempting to create a more sustainable built environment by increasing the amount of parking within a limited land area or making the connection to other forms of transportation reducing traffic and congestion issues. The actual construction of the garage can begin to meet the LEED (Leadership in Energy and Environmental Design) Green Building Rating System® criteria and a new Federal Green Construction Guide for Specifiers will soon be available, also refer to Sustainable Design Objectives. New advanced material choices both in steel and concrete can contribute to the overall score while site sensitivity is also crucial. Lighting can be handled from both a passive design approach as well as technological solutions to just provide light when needed. While solar technology can also be used to handle energy needs. Also since the parking garage is such an integrative building typology many other solutions can contribute to sustainable design such as the now common for underground parking garages the green roof. Due to its integrative nature with other building typologies it can also help to support them in sustainable solutions designing the parking facility to become part of an energy generating solution. The parking garage has often been at the forefront of design advancements due to its ability to be transformed both inside and outside to meet changing practical needs. As the automobile and our energy sources change over the next century, a symbiotic relationship between the building, the automobile, and energy can occur, each providing energy and power to each other creating a totally sustainable solution. Water conservation, sun control shading and other passive devices can be integrated into parking facilities.

6.0 Place of Worship

A flag presentation was held during the dedication ceremony of new stained glass window at the Pentagon Chapel on September 11, 2003. The new windows in the Chapel are dedicated to the memory of those who died in the Pentagon on September 11, 2001.
(DoD photo by Tech. Sgt. Andy Dunaway, U.S. Air Force.)

6.1 Aesthetics

- ***Character:*** Utilize appropriate finishes, furniture, signage, and art to reflect the public nature of the space. See also WBDG Style.
- ***Verticality:*** Highlight or soften the verticality of the space by delineating horizontal bands with windows, lighting, and wall coverings. A spatial compression/release experience can enhance the aesthetic experience.
- ***Lighting:*** According to the Department of Defense's UFC Design: Chapels and Religious Education Facilities, good places of worship may be dimly lit like

medieval buildings or brightly lit like Christopher Wren's churches. The light may be filtered through colored glass or come through clear glass. Colored glass may supply an exotic character, but clear glass brings a consciousness of the surrounding world. The important thing to remember is that no factor in the design of a place of worship is more important than the nature of its light. Designers should be not be limited by stereotypes.

- ***Transition:*** Provide an entry space in order to allow visitors to transition from a busy institutional environment to a calmer, warmer, and more welcoming one.
- ***Glazing:*** Include glazing system materials or detailing that emits natural light, but prevents glare and light reflection. Consider using clerestory windows to let natural light into the space when desirable views are not available or when available views are considered to distracting.

6.2 Functional / Operational

- ***Location and Adjacencies:*** Preferred locations for places of worship are those readily accessible to primary users (i.e. patients if the place of worship is located in a hospital) and at high traffic locations. Sound control is to be considered, as well as visual privacy.

6.3 Productive

- ***Plan for Flexibility:*** The Place of Worship is generally a single volume of basically simple geometry. Design features such as dominating axialities, implied focus, hierarchical progressions of space or imperious bisymmetry should be avoided because these features limit flexibility of arrangements and use. To promote flexibility, seating may be interlocking and stackable, but also comfortable and attractive.
- ***Acoustics:*** If the space will be used for formal meetings or religious services, study its acoustic properties and include sound absorptive materials as the program requires. An electronic speaker system should not be necessary in most small places of worship if proper consideration is given to room shapes and surfaces.
- ***Audiovisual Equipment in Hospital Facilities:*** In some facilities, an electronic sound and video system is necessary so that the sound may be enhanced for the hearing impaired and so that the events of services can be transmitted to bedside television sets. See also WBDG Productive—Integrate Technological Tools.
- ***Special Lighting:*** Establish lighting zones at the beginning of the design process. Differentiate between the lighting needs for private reflection spaces, counseling spaces, storage spaces and support offices. Consider energy-efficient lighting.
- ***Comfort:*** Specify HVAC equipment that will ensure a comfortable and reliable temperature. For more information see WBDG High Performance HVAC [Link to http://wbdg.org/design/hvac.php]. Air and motor sounds in ventilating systems should be reduced aggressively by duct lining, bends, sound traps and

velocity control. See also WBDG Productive—Provide Comfortable Environments.

6.4 Sustainable

- ***Daylighting:*** For places of worship spaces at the exterior of a building, utilize daylighting to reduce electric lighting needs. If sufficient daylight is provided so that artificial lighting is not required during daylight hours, an advantage is gained, but large areas of glass, even when triple glazed, are expensive in terms of the energy used. Skylights can distribute light well and do no leak if carefully detailed.

7.0 Youth Center

7.1 Create a Homelike Environment

While meeting the durability requirements for a public facility, the finishes, furnishings, fixtures, and equipment in Youth Centers should be comfortable and have a homelike quality:

- Provide ample natural light
- Provide a sense of welcome and arrival at the entrance, lobby, and control desk
- Use residential-style doors and windows
- Use indirect lighting as main ambient lighting, and
- Avoid institutional, unnatural finishes, textures, and colors.

7.2 Encourage Creativity

Part of the facility's mission is to encourage creative development. The project development process and final design can help accomplish this in several ways:

- Carefully consider interior colors and textures. Design the Youth Center to communicate a sense of fun, but use restraint (e.g., neutral tones for backgrounds and ceilings, with warm colors for accents). Consider wall murals in some common areas.
- Particularly for the teen room, consider guiding a teen focus group to select an interior color scheme
- Provide space and consider various techniques to display and celebrate youth artwork, and
- Design display areas to be easily changed and updated, minimize permanent graphics.

7.3 Maintain a Safe and Healthy Environment

Design the facility to accommodate equipment and operational strategies to both protect the youth and maintain a healthy environment. Consider the following critical elements:

- Prevent unauthorized access by potentially dangerous personnel
- Provide visual access to all spaces to monitor potential child abuse situations
- Provide easily-cleaned finishes
- Use non-toxic building materials and improved maintenance practices
- Ensure good indoor air quality and abundant natural light, and
- Ensure that equipment, furnishings, and finishes do not contain asbestos or lead.

8.0 Physical Fitness Center

8.1 Functional / Operational

- ***Spatial Requirements of Equipment and Exercise Activities:*** A minimum 12' ceiling height is generally required in this space type to accommodate the clearances needed for daily equipment usage. Special surfaces are also required for many athletic activities such as cushioned training surfaces, mirror walls, or impact-resistant walls. Anticipate circulation, in particular controlled circulation, using a flow diagram at the beginning of the design process.
- ***Durability of Structure and Finishes:*** Increased structural steel is typically provided to reduce vibration transmission. Exercise and weight rooms, including equipment storage rooms, should be designed for a 150 LB/SF live load. Finishes should be durable and easy to maintain in anticipation of maximum use. See also WBDG—Wall Systems.
- ***Acoustical Control:*** Reduce noise impact generated by physical activity, by including sound baffles at all acoustically rated partitions, in particular exercise and weight rooms and tenant demising partitions.
- ***Occupancy:*** Occupancy Group Classification is Business Occupancy B, with sprinklered protected construction and GSA Acoustical Class X space where noisy operations are located.

8.2 Sustainable

- ***Special HVAC:*** Employ measures to reduce moisture and odor migration to other spaces—assume this space type requires a 20% increase in cooling capacity above the overall building shell and core. Provide a separate AHU for exercise areas. Fitness centers will typically have negative air pressure relative to other areas of the building.