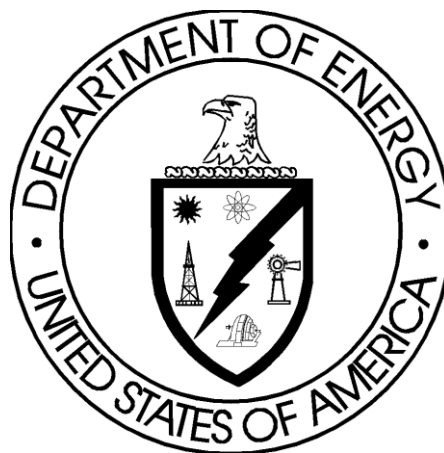


**NOT
MEASUREMENT
SENSITIVE**

**DOE G 413.3-6A
11-9-11**

High Performance Sustainable Building

[This Guide describes suggested nonmandatory approaches for meeting requirements. Guides are not requirements documents and are not to be construed as requirements in any audit or appraisal for compliance with the parent Policy, Order, Notice, or Manual.]



U.S. Department of Energy
Washington, D.C.

AVAILABLE ONLINE AT:
www.directives.doe.gov

INITIATED BY:
Office of Management

FOREWORD

This Department of Energy (DOE) Guide is for use by all DOE Elements. This Guide provides approaches for implementing the High Performance Sustainable Building (HPSB) requirements of DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*. DOE Guides, which are part of the DOE Directives System, provide supplemental information for fulfilling requirements contained in rules, regulatory standards, and DOE directives. Guides do not establish or invoke new requirements nor are they substitutes for requirements.

TABLE OF CONTENTS

1.	Background	1
2.	Purpose.....	1
3.	Guide Scope	1
4.	Drivers for Incorporating HPSB into Critical Decisions 1 through 4.....	2
	A. DOE Directives pertaining to HPSB include the following:	2
	B. Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding	3
	C. Executive Order (EO) 13423, <i>Strengthening Federal Environmental, Energy and Transportation Management and its Implementing Instructions</i>	3
	D. Executive Order (EO) 13514, <i>Federal Leadership in Environmental, Energy, and Economic Performance</i>	3
	E. Energy Policy Act (EPA) of 2005, Pub. L. No. 109-58	4
	F. Energy Independence and Security Act (EISA) of 2007, Pub. L. No. 110-140 4	4
	G. Office of Management and Budget Circular A-11 Guidance	4
5.	Guide Methodology	4
6.	Incorporating HPSB Requirements in to the Critical Decision Process.....	5
	A. Critical Decision-1 , Approve Alternative Selection and Cost Range: Implementing HPSB requirements in the Conceptual Design Report and Acquisition Strategy.....	5
	B. Critical Decision-2 , Approve Performance Baseline: Implementing HPSB requirements into the Preliminary Design Review.	6
	C. Critical Decision-3 , Approve Start of Construction: Implementing HPSB requirements into the Final Design and the External Independent Review (EIR).	7
	D. Critical Decision-4 , Approve Start of Operations or Project Completion: Implementing HPSB requirements into Issuing a Checkout, Testing, and Commissioning Plan.....	7
	E. Project Closeout , Provides a determination of the overall closure status of the project, contracts, regulatory drivers, and fiscal condition.	7
7.	Acronyms	9
8.	References	10
	Attachment A: SUSTAINABLE DESIGN REPORT EXAMPLE	1

HIGH PERFORMANCE SUSTAINABLE BUILDING

1. Background

- a. DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, provides Department of Energy, including the National Nuclear Security Administration, with project management direction for the acquisition of capital assets. The goal of this Order is to deliver projects on schedule, within budget, and fully capable of meeting mission performance, safeguards and security, and environmental, safety, and health standards. It contains specific provisions for the application of high performance sustainable building (HPSB) principles to the siting, design, construction, and commissioning of new facilities and major renovations of existing facilities.
- b. Through the application of HPSB principles pursuant to the Order, a number of mission, energy security, and environmental benefits will be realized, including:
 - reduced total (life-cycle) ownership cost of facilities;
 - improved energy efficiency and water conservation;
 - safe, healthy, and productively built environments; and
 - inherent protection of the natural environment.

2. Purpose

This Guide highlights the DOE O 413.3B drivers for incorporating HPSB principles into Critical Decisions 1 through 4 and provides guidance for implementing the Order's HPSB requirements.

3. Guide Scope

- a. DOE O 413.3B specifies implementation of HPSB requirements into applicable capital asset acquisitions, and its Contractor Requirements Document (CRD) specifically requires the application of the HPSB principles to the siting, design, construction, and commissioning of new facilities and major renovations of existing facilities.
- b. The HPSB principles derive from a 24, January, 2006 Memorandum of Understanding on *Federal Leadership in High Performance and Sustainable Buildings*, in which signatory agencies committed to follow a set of principles in the siting, design, construction and commissioning of federal buildings. The HPSB principles, which form the core of the Guide, are as follows:

- Employ integrated design Principles;
 - Optimize energy performance;
 - Protect and conserve water;
 - Enhance indoor environmental quality; and
 - Reduce environmental impact of materials.
- c. Complete descriptions of the HPSB principles are found at:
https://powerpedia.energy.gov/wiki/High_Performance_Sustainable_Buildings.
- d. Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, requires Federal agencies to comply with the HPSB principles in new construction and major renovation of agency buildings.
- e. Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, requires Federal agencies to implement high performance sustainable Federal building design, construction, operation and management, maintenance, and deconstruction.
- f. Although this Guide pertains to DOE O 413.3B capital asset projects, it may also provide useful information on the incorporation of HPSB principles into building-related General Plant Projects and Institutional General Plant Projects at DOE sites.
- g. This Guide provides recommendations and options for Federal Project Directors (FPDs) to consider when implementing HPSB requirements during the capital asset acquisition process; none of these recommendations are to be construed as a requirement.

4. Drivers for Incorporating HPSB into Critical Decisions 1 through 4

The following sections contain information on six key drivers for incorporating HPSB into the DOE O 413.3B Critical Decisions 1 through 4:

- A. DOE Directives pertaining to HPSB include the following:
- (1) DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*. This Order, along with its contractor requirements document, requires incorporating the HPSB principles in the project management of capital asset acquisitions involving the siting, design, construction, and commissioning of new facilities and major renovations of existing facilities.

- (2) DOE O 436.1, *Departmental Sustainability*. The purpose of this Order is to provide requirements and responsibilities for managing sustainability within DOE. This Order implements sustainable practices for enhancing environmental, energy, and transportation management performance.
- (3) The Department of Energy Acquisition Regulations (DEAR). The DEAR supplements the Federal Acquisition Regulation, which codifies uniform policies for acquisition of supplies and services by executive agencies, and contains clauses for inclusion in contracts. Several clauses support HPSB principles in the acquisition of capital assets. For *Sustainable Acquisition Program*: DEAR 952.223-78 and DEAR 970.5223-7. For *Integration of Environment, Safety, and Health into Work Planning and Execution* DEAR 952.223-71 and DEAR 970.5223-1.

B. Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding

This January 24, 2006, Memorandum of Understanding states that the Federal government is committed to designing, constructing, and operating its facilities in an energy-efficient and environmentally sustainable manner, consistent with Federal agency missions. The Memorandum of Understanding encourages the use of life-cycle concepts, consensus-based standards, and performance measurement and verification methods that lead to sustainable buildings. The Memorandum of Understanding establishes five HPSB principles that all agencies are to follow in the design, construction, and commissioning of federal buildings (see Table 1 and Attachment A).

C. Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy and Transportation Management and its Implementing Instructions*

EO 13423 consolidates prior “Greening the Government” Executive Orders and integrates the sustainable practices of those Orders into a cohesive approach to environmental, energy, and transportation management. EO 13423 requires Federal agencies to lead by example in advancing the nation’s energy security and environmental performance. One of the sustainable environmental and energy practices of Executive Order 13423 is compliance with the HPSB principles of the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding in the design, construction and/or major renovation, and commissioning of Federal buildings.

D. Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*

EO 13514 requires Federal agencies to implement high performance sustainable federal building design, construction, operation and management, maintenance, and deconstruction.

E. Energy Policy Act (EPAct) of 2005, Pub. L. No. 109-58

Section 109 of the Energy Policy Act of 2005, *Federal Building Performance Standards*, states that life-cycle cost-effective, “sustainable design principles are to be applied to the siting, design, and construction of all new and replacement Federal buildings.” DOE has issued regulations (10 CFR Parts 433, 434, and 435) as required by Section 109 of the EPAct that establish revised energy efficiency performance standards for new Federal buildings.

F. Energy Independence and Security Act (EISA) of 2007, Pub. L. No. 110-140

The Energy Independence and Security Act of 2007, Title IV, Subtitle C *High-Performance Federal Buildings*, contains annual energy reduction goals for Federal buildings for the years 2006 through 2015. The law requires the Secretary of Energy to identify a green building certification system and level applicable to Federal buildings, and provide input to semi-annual Office of Management and Budget (OMB) scorecards for energy management activities.

G. Office of Management and Budget Circular A-11 Guidance

OMB Circular A-11 addresses, among other things, the planning, budgeting, and acquisition of capital assets. Part 7 (Section 300) of this Circular requires Federal agencies to report whether “sustainable design principles” have been incorporated into the project.

5. Guide Methodology

- a. The following sections provide FPDs with a systematic approach for integrating the HPSB requirements in Critical Decisions 1 through 4 of their projects. FPDs can fulfill these requirements by incorporating the HPSB principles in the design, construction, and commissioning of new DOE facilities and major renovation of existing facilities.
- b. FPDs should also be aware that a variety of background, technical, and other HPSB resource information is available from the *Whole Building Design Guide*’s (WBDG’s) EO 13423 *Technical Guidance for Implementing the Five Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* webpage <http://www.wbdg.org/sustainableEO/index.php>. The WBDG is maintained by the National Institute of Building Sciences, with support from over 25 Federal agencies (including the Department of Energy), private-sector companies, and non-profit organizations.

6. Incorporating HPSB Requirements in to the Critical Decision Process

A. Critical Decision-1, Approve Alternative Selection and Cost Range: Implementing HPSB requirements in the Conceptual Design Report and Acquisition Strategy.

- i. Critical Decision-1 requirement pertaining to HPSB is defined in Table 2.1 of DOE O 413.3B as follows:

Document High Performance and Sustainable Building provisions per EO 13423, Section 2(f), EO 13514, Section 2, as amended, in the Conceptual Design Report, Acquisition Strategy, and/or PEP, as appropriate. (Refer to DOE G 413.3-6)

- ii. DOE O 413.3B requires the FPD to identify in the Conceptual Design Report and the Acquisition Strategy how the project will meet or contribute to meeting the HPSB principles. The key to successfully incorporating HPSB into a project is to use integrated design principles, as early as possible, and throughout the life of the project to both establish expectations up front and provide the framework for tracking progress throughout the project.
- iii. Establishing an Integrated Project Team (IPT) so that it includes members with HPSB experience, including a Leadership in Energy and Environmental Design (LEED) accredited professional, Facility and Infrastructure professional, Energy and Water Professional, Contracting Officer, and a designated commissioning authority, is highly recommended. A designated commissioning authority should remain with the project through occupancy. It is also highly recommended that the architecture and engineering firms and construction firms chosen for the project have experience in constructing sustainable buildings. For a list of LEED accredited professionals, see The Green Building Certification Institute's "LEED Professional Directory" at <https://ssl10.cyzap.net/gbcicertonline/onlinedirectory>.
- iv. The FPD can use the LEED building rating system to certify the project's conformance with the HPSB principles. If the project is intended to achieve a specific LEED rating level the Conceptual Design Report and the Acquisition Strategy should identify the rating level. Crosswalks between the LEED New Construction and Major Renovation Certification Rating System criteria and the HPSB principles can be found in at https://powerpedia.energy.gov/wiki/High_Performance_Sustainable_Buildings.
- v. Discussion of HPSB is recommended as a separate section or document in the Conceptual Design Report. One best practice is to prepare a Sustainable Design Report to identify the sustainable building features envisioned in the preliminary design. As the project progresses, the FPD will update the

Sustainable Design Report to track the documentation required to certify the project under the LEED rating system. The Sustainable Design Report thus serves as a key organizing tool to facilitate the FPD in tracking the project's Sustainable Building features. An example of a sustainable design report prepared for the Critical Decision-1.

- vi. FPD may also want to take advantage of the WBDG's Technical Guidance website, regarding EO 13423, <http://www.wbdg.org/sustainableEO/index.php> during the Critical Decision-1 process, and throughout the life of the project. This website offers online access to sustainable design resources organized around the implementation of the EO's sustainable building requirements and HPSB principles, including analytical tools, model contract and specification language, and reports and evaluations of construction products, processes, and materials.
- vii. Exemptions: The FPD should explain, in the Conceptual Design Report and the Acquisition Strategy, the rationale for claiming any exemptions to incorporating LEED Gold and some if not all of the HPSB principles into the project. This includes buildings categorically excluded under the Energy Policy Act of 2005 for energy performance requirements, projects that are waived by the acquisition executive or building components and practices determined and documented by the IPT as not being life-cycle cost-effective.

B. Critical Decision-2, Approve Performance Baseline: Implementing HPSB requirements into the Preliminary Design Review.

- i. The Critical Decision-2 requirement pertaining to HPSB in Table 2.2 of DOE O 413.3B is as follows:

Incorporate the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings per EO 13423, Section 2(f), EO 13514, Section 2, into the preliminary design and design review. (Refer to DOE G 413.3-6.)

- ii. During the Critical Decision-2 process, the FPD and the IPT should evaluate and document how the HPSB principles have been integrated into the preliminary design. The FPD and IPT should determine the sustainable building features that can be achieved, making tradeoffs between desired features and project realities. If the project is intended to achieve a particular LEED rating level, the FPD should ensure that the documentation is updated to identify the level to be achieved, including a checklist identifying the sustainable building features that contribute to achieving the certification. If the FPD is adopting the best practice of preparing a Sustainable Design Report, that report should be updated to validate the sustainable building features of the preliminary project design.

C. Critical Decision-3, Approve Start of Construction: Implementing HPSB requirements into the Final Design and the External Independent Review (EIR).

- i. The Critical Decision-3 requirement pertaining to HPSB in Table 2.3 of DOE O 413.3B is as follows:

Incorporate the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings per EO 13423, Section 2(f), EO 13514, Section 2, into the Final Design and the EIR. (Refer to DOE G 413.3-6.)

- ii. The FPD should ensure that the sustainable building provisions have been incorporated into the final design and the solicitation for construction to enable the project to successfully incorporate the HPSB principles and achieve the desired LEED rating. The FPD should identify potential challenges, either technical or financial, that could eliminate or lessen the project's sustainable features, making sure the final design has HPSB-related specifications, such as procurement and use of environmentally preferable products including construction materials, energy-efficient systems, and a plan for recycling of construction debris and surplus materials.
- iii. The FPD should request that the EIR or independent project review addresses the sustainable building features of the project by identifying sustainable design as a specific line of inquiry for the review team.
- iv. As appropriate, the FPD should update the Sustainable Design Report to reflect any changes made during the final design process that might impact the project's ability to incorporate the HPSB principles and achieve the LEED rating.

D. Critical Decision-4, Approve Start of Operations or Project Completion: Implementing HPSB requirements into Issuing a Checkout, Testing, and Commissioning Plan.

- i. In Critical Decision-4, the FPD should confirm that the HPSB-related systems were included in the project's Checkout, Testing, and Commissioning Plan, and that these sustainable building features were installed correctly and are operating properly.

E. Project Closeout, Provides a determination of the overall closure status of the project, contracts, regulatory drivers, and fiscal condition.

- i. Project Closeout requirement pertaining to HPSB in Table 2.5 of DOE O 413.3B is as follows:

Complete and document achievement of Facility Sustainment goals (e.g., LEED Gold, LEED Silver, etc.), as applicable, via an independent third-party entity within one year of facility occupancy in accordance with EO 13423, Section 2(f), and EO 13514, Section 2.

- ii. In the Project Closeout, the FPD should compile the data and documentation needed to establish that the HPSB principles have been successfully incorporated into the project. If the project is intended to achieve a LEED rating level, the FPD will document how each “point” has been obtained on the checklist in order to achieve the LEED rating. If the FPD is adopting the best practice of preparing a Sustainable Design Report, this report should be finalized by documenting how each sustainable design feature has been tested and validated, including any commissioning requirements. An example of a Sustainable Design Report can be found in Attachment A.

7. Acronyms

ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
DEAR	Department of Energy Acquisition Regulations
EIR	External Independent Review
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
FEMP	Federal Energy Management Program
FPD	Federal Project Director
FSRIA	Farm Security and Rural Investment Act
IESNA	Illuminating Engineering Society of North America
IPT	Integrated Project Team
HPSB	High Performance and Sustainable Building
LEED	Leadership in Energy and Environmental Design
OMB	Office of Management and Budget
RCRA	Resource Conservation and Recovery Act
WBDG	Whole Building Design Guide

8. References

- a. 10 CFR Parts 433, 434, and 435, *Energy Conservation Standards for New Federal Commercial and Multi-Family High-Rise Residential Buildings and New Federal Low-Rise Residential Buildings*. Available at http://www1.eere.energy.gov/femp/pdfs/fr_notice_cfr433_434_435.pdf
- b. DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.
- c. DOE O 436.1, *Departmental Sustainability*.
- d. EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management*, January 26, 2007, Available at <http://edocket.access.gpo.gov/2007/pdf/07-374.pdf>.
- e. Instructions for Implementing EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management*, March 29, 2007. Available at http://www.wbdg.org/pdfs/eo13423_instructions.pdf
- f. EO 13423 *Technical Guidance for Implementing the Five Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings*, available at <http://www.wbdg.org/sustainableEO/index.php>. This technical guidance also includes model contract and specification language per the *Federal Green Construction Guide for Specifiers*, available at <http://www.wbdg.org/design/greenspec.php>. The Technical Guidance is updated periodically; therefore, it is recommended that FPDs and IPTs monitor the WBDG website for new HPSB-related resources.
- g. EO 13514, *Federal Leadership in Environment, Energy, and Economic Performance*, October 5, 2009, Available at <http://edocket.access.gpo.gov/2009/pdf/E9-24518.pdf>.
- h. *Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding*, Available at http://www.wbdg.org/pdfs/sustainable_mou.pdf.
- i. Energy Star website, new building design guidance, available at http://www.energystar.gov/index.cfm?c=new_bldg_design.new_bldg_design.
- j. *Office of Management and Budget Circular A-11*, Part 7, available at http://www.whitehouse.gov/omb/circulars/a11/current_year/s300.pdf.
- k. US Green Buildings Council, *Leadership in Energy and Environmental Design (LEED)*, available at <http://www.usgbc.org>.
- l. Energy Policy Act (EPAct) of 2005, Pub. L. No. 109-58. Available at http://fossil.energy.gov/epact/epact_final.pdf.

- m. Energy Independence and Security Act of 2007, Pub. L. No. 110-140, available at <http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf>
- n. High Performance Sustainable Buildings Powerpedia page, https://powerpedia.energy.gov/wiki/High_Performance_Sustainable_Buildings

SUSTAINABLE DESIGN REPORT EXAMPLE

1. A sustainable design report is a living document that describes and tracks the sustainability goals of the project and provides a list of its sustainable design features. It serves as a key organizing tool that the Federal project director and integrated project team can use to monitor the project's sustainability criteria. Sites can use this best practice throughout the project to track the goals, progress towards achieving the goals, and final accomplishments with respect to the facility's sustainable design strategies and/or features in Critical Decision-1 through Critical Decision-4.
2. If the project is expected to obtain a LEED rating, the Federal project director can use the sustainable design report in Critical Decision-1 to identify the sustainable design features envisioned in the conceptual design, included in the preliminary design and then incorporated into the final design. As the project progresses, the Federal project director will update the sustainable design report to track the progress of the design documentation required to establish each point obtained under the LEED rating system.
3. When a Federal project director adopts the best practice of preparing a sustainable design report, the first iteration of this report would be developed during the Critical Decision-1 phase.
 - a. The report would reflect the sustainable design features that emerge during the conceptual design process.
 - b. The Federal project director would update the report in Critical Decision-2 to reflect the sustainable features of the preliminary project design, and again during Critical Decision-3 to track progress in implementing the sustainability features in the final design and external independent review.
 - c. The Federal project director would finalize the sustainable design report in Critical Decision-4 to verify the incorporation of the HPSB elements in the completed project.
4. A sustainable design report contains three primary components:
 - a. an introduction and overview,
 - b. a matrix of the project's sustainable design features, and
 - c. an evaluation of the project's LEED certification status (if the project is intended to achieve a LEED rating).
5. This attachment contains excerpts from a sample sustainable design report derived from the Experimental Sciences Complex at Sandia National Laboratory-New Mexico. The attachment is for illustrative purposes only. The Experimental Sciences Complex is a laboratory facility, so many of the specific requirements, actions, and features may not apply to office or other non-laboratory sites. The Experimental Sciences Complex project

was initially designed to achieve a LEED Gold certification level, and the excerpts in this attachment reflect the sustainable design report at the end of the Critical Decision-1 process. The matrix and LEED checklist are intended to provide helpful examples, but the actual sustainable design categories and design features should be developed and tracked for the specific building under construction. The excerpts in this attachment are presented in the following four tables:

- a. Table C-1, Excerpts from Experimental Sciences Complex Sustainable Design Features Matrix. This table replicates portions of the matrix that helps ensure that the sustainable design measures identified are integrated into the project's design and can be tracked as the project progresses. Table C-1 shows the requirements for sustainable sites and energy and atmosphere —two of the five categories of design requirements for this project; the matrix in the actual sustainable design report contains the requirements for all five categories. The requirements were identified during a sustainable design planning process conducted as part of the project kickoff activities. The objectives of the matrix are the following:
 - (1) Track those sustainable design features and LEED prerequisites and credits considered applicable to the project.
 - (2) Track progress of the project in meeting requirements of applicable LEED prerequisites and credits.
 - (3) Facilitate development of the LEED certification design phase documentation submittal so that the project can achieve the desired LEED rating.
- b. Table C-2 contains excerpts from the Experimental Sciences Complex sustainable design report's LEED Certification Discussion. These include background information, a discussion of the certification status, and potential LEED points.
- c. Table C-3 is the Experimental Sciences Complex LEED-NC Score Checklist. The LEED-NC Score Checklist shows each prerequisite and credit in the LEED-NC program and a determination for application to the Experimental Sciences Complex project of either "yes", "no", or "potentially."
- d. Table C-4, Potentially Applicable Experimental Sciences Complex LEED Credits, lists 21 additional "potential" LEED credit points. This listing helps the Experimental Sciences Complex project team evaluate the project's ability to achieve a LEED Gold certification level and to determine which potential LEED credit points warrant further evaluation for application to Experimental Sciences Complex.

Table C-1: Excerpts from Experimental Sciences Complex Matrix of Sustainable Design Features

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
Sustainable Sites (SS)	<i>Erosion & Sedimentation Control (SSp-1)</i>	Erosion and Sediment Control Plan	Construction Contractor	Sandia Specification 01065 will be included as part of the ESC construction documents and requires the development and implementation of an erosion and sediment control plan according to U.S. EPA document no. EPA 832/R-92-005, "Storm Water Management for Construction Activities," Chapter 3. This specification will ensure satisfaction of the LEED SS prerequisite, construction activity pollution prevention (SSp-1). The plan will be prepared by the construction contractor and referenced as applicable. The plan will be summarized and referenced in the final SD Report.
	<i>Site Selection (SSc-1)</i>	Avoid development of inappropriate sites	SNL	The site selected for the ESC project is a previously developed area within Technical Area 1. This site meets the criteria for the LEED SS credit, site selection (SSc-1)
	<i>Development Density & Community Connectivity (SSc-2)</i>	Meet a 60,000 square feet per acre development density	SNL	<ul style="list-style-type: none"> Selection of the ESC project location within TA 1 definitely meets the intent of this credit, as defined in the LEED-NC Application Guide for Multiple Buildings and On-Campus Buildings. Documentation requirements will include: 1) showing ESC was located in a previously developed area with existing development and infrastructure; 2) verifying the project location is within a designated dense campus growth area; and 3) that the project is resulting in increased development density that meets or contributes to the goals of the campus master plan.
	<i>Brownfield Redevelopment (SSc-3)</i>	Rehabilitate and develop an environmentally damaged site	SNL	The ESC project site has no history of environmental contamination requiring restoration or rehabilitation. Although the building previously occupying the ESC project site may have required removal of materials that posed potential risk to the environment (such as asbestos or PCBs) prior to demolition, no environment damage to the site surface or subsurface is known to have occurred. This LEED credit will not apply to the ESC project

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
Sustainable Sites (SS)	<i>Alternative Transportation (SSc-4.1/4.4)</i>	Adopted features that promote the use of alternative transportation.	SNL	<p>Access to Public Transportation (SSc-4.1): Although there are Albuquerque City Bus Transit System stops all around Tech Area 1, the location of the ESC project appears to be just beyond the ¼ mile requirement of the credit. There are a total of 5 bus routes with one or more stops outside Tech Area 1 in the vicinity of the ESC project site. A more detailed distance assessment will be required to make a final determination for the applicability of this credit to the ESC project.</p> <p>Bicycle Commuter Provisions (SSc-4.2): The ESC design will incorporate a bicycle storage rack located near the entrance to the building (see ESC 100% Title 1 Dwg 748AS4001) and provide a single shower facility in both the women's and men's restrooms (see ESC 100% Title 1 Dwg 748AE1101) .</p> <p>Low-Emitting Vehicle Availability (SSc-4.3): The ESC design will incorporate parking and recharging stations for (2) SNL electric vehicles (see ESC 100% Title 1 Dwg 748AS1001).</p> <p>Parking Capacity (SSc-4.4): The ESC design will not provide new parking for personal owned vehicles and will therefore satisfy the Option 4 requirements for this credit.</p> <p>The ESC design will achieve at least three of the four LEED Alternative Transportation credits (SSc-4.1/4.4)</p>

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
	<i>Storm water Management (SSc-6.1/6.2)</i>	Approaches and implemented measures that mitigate storm water flow or improve storm water quality relative to site development.	Civil and Landscape Design	Due to the limited landscape area associated with the ESC project, there is limited opportunity to manage storm water on site. Currently, roof-top runoff is direct to the east side of the ESC building. The landscape plan includes a storm water retention feature (4" to 6" deep) in the south east corner of the site (see ESC 100% Title 1 Dwg 748CG1001 and Dwg 748LI1001). However, the majority of site runoff is directed to storm drain inlets located on H and G Avenues. The capacity of the retention feature is currently be evaluated relative to the pre- and post-development runoff quantities and rates. In addition, treatment of storm water runoff using a chambered storm water manhole to remove suspended solids is under consideration.
Sustainable Sites (SS)	<i>Heat Island (SSc-7.1/7.2)</i>	Landscape and exterior design features that reduce the heat island effect	Architecture/Landscape Design	<p>The ESC project has limited exterior areas available to shade exterior hardscape surfaces such as walkways, services roadways and parking area. Landscape trees and building structure features will shade the hardscape surfaces surrounding the ESC building to some extent. Evaluation of the LEED Heat Island credit for shading site hardscape surfaces (SSc-7.1) is ongoing. ESC 100% Title 1 Dwg 748LP1001 illustrates the landscape design for ESC and Dwg 748CS1002 illustrates the development footprint and associated hardscape surfaces for ESC.</p> <p>The ESC design will incorporate a white, cool-roof membrane meeting the Solar Reflectance Index (SRI) requirement of 78 or greater over much of the laboratory spaces. In addition, the standing seam metal roof system over the high bay area will also meet the SRI requirement.</p> <p>Since the entire roofing system will meet the SRI requirement, an Innovation Credit point may also be obtained due to the resulting 100% roof coverage meeting the SRI requirement.</p>

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
	<i>Light Pollution Reduction (SSc-8)</i>	Adopted measures that reduce the amount of light leaving the site at night.	Electrical Design	The ESC design has limited exterior lighting requirements, due to the absence of a parking area and limited area surrounding the building. The LEED light pollution reduction credit (SSc-8) should be relatively straight forward to achieve. The exterior lighting design for ESC remains under evaluation for LEED credit compliance. The ESC 100% Title 1 design indicates night sky compliant wall-pak metal halide fixtures will be installed over exterior doors.
<i>Energy & Atmosphere (EA)</i>	<i>Fundamental Commissioning (EAp-1)</i>	Verify the building's energy related systems are installed, calibrated and operate as intended	Commissioning Authority	Although commissioning specifications have been included in the 100% Title I design phase documents, a commissioning authority has not been identified and the start of commissioning activities has not been established. However, fundamental commissioning of ESC has been identified as an activity to be performed. The LEED fundamental commissioning credit (EAp-1) should be relatively straight forward to achieve.

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
	<p><i>Minimum Energy Performance (EAp-2)</i></p> <p><i>Optimize Energy Performance (EAc-1.1/1.10)</i></p>	<p>Comply with mandatory provisions and prescriptive requirements of ASHRAE 90.1-2004</p> <p>1) Results of energy analysis, including projected energy use index (BTU/GSF/yr) of selected design.</p> <p>2) Performance metrics (such as lighting watts/SF, AFUE, CFM/peak fan kW).</p> <p>3) Cross Reference with the design basis and design analysis.</p> <p>4) Summary and Recommendations</p>	Mechanical Design	<p>The ESC 100% Title 1 design identifies a number of energy efficiency measures incorporating into the building design, including:</p> <ul style="list-style-type: none"> • HVAC system design with two partial load boilers that match heating capacities; full economizer controls to allow seasonal free-cooling; and high efficiency motors. • Heat pipe heat recovery system to recovery heat from exhaust air for preheating outside air entering the building. • Building envelope design with specification of R-19 wall cavity insulation, R-30 roof insulation; and insulating glass units with thermally broken frames. • Building fenestration design with horizontal mullion extension shading devices. • Occupancy sensors for lighting control in corridors, bathrooms, conference room, break room, and throughout the interior office spaces. <p>An energy conservation report will be prepared for ESC and will be included as an appendix once available. An energy simulation model for ESC has been developed to evaluate energy efficiency opportunities as well as energy performance relative to ASHRAE 90.1-2004 for LEED Optimize Energy Use credit (EAc-1.1/1.10) results. Currently ESC building simulation results (using Trane Trace 700) indicates a 32% reduction compared to ASHRAE 90.1, resulting in 7 of 10 possible LEED points for energy efficiency.</p> <p>The LEED Minimum Energy Efficiency prerequisite (EAp-2) should be relatively straight forward to achieve as ASHRAE 90.1-2004 compliance is a project requirement.</p>

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
Energy & Atmosphere (EA)	<i>Refrigerant Management (EAp-3)</i>	Reduce use of ozone depleting refrigerants	Mechanical Design	No CFC refrigerants will be specified for ESC HVAC&R systems. As a result, the LEED Refrigerant Management prerequisite (EAp-3) should be straight forward to achieve.
	<i>Enhanced Refrigerant Management (EAc-4)</i>			The chillers specified for ESC at the 100% Title I design phase will use either R-407-C or R-134A refrigerants. The fire suppression system for ESC is water based. As a result, the Enhanced Refrigerant Management credit (EAc-4) will also be straight forward to achieve. However, calculations demonstrating credit compliance will be required.
	<i>On-Site Renewable Energy (EAc-2.1/2.3)</i>	Implement renewable energy sources	Mechanical Design	<p>The ESC mechanical design team is evaluating the feasibility of implementing a solar hot water heating system for domestic hot water. Details for this evaluation will be included when available. Initial evaluations indicated unfavorable economics; however, a more detailed analysis is ongoing.</p> <p>The LEED On-Site Renewable Energy credit (EAp-2.1/2.3) will not likely be satisfied, as the renewable energy source must account for a minimum of 2.5% of the building energy cost (as determined for EAc-1).</p>

	SD Category	Description of Requirement	Responsible Discipline/ Actions Required/ Status	Features Included in Design
<i>Energy & Atmosphere (EA)</i>	<i>Enhanced Commissioning (EAc-3)</i>	Initiate commissioning activities early in the design process and perform additional commissioning activities.	Commissioning Authority	Although commissioning specifications have been included in the 100% Title I design phase documents, a commissioning authority has not been identified and the start of commissioning activities has not been established. Although fundamental commissioning of ESC has been identified as an activity to be performed, initiating commissioning activities prior to development of the construction documents has been identified as an excessive cost element. The ESC design team is currently evaluating the cost associated with enhanced commissioning and the potential for Sandia to perform the enhanced commissioning activities. The LEED Enhanced Commissioning credit (EAc-3) is not likely to be achieved as of 100% Title I design phase.
	<i>Measurement and Verification (EAc-5)</i>	Provide for ongoing accountability of building energy consumption over time	Mechanical Controls Design	<p>Continuous monitoring and control equipment have not yet been defined for such systems as lighting; constant and variable motor loads; variable frequency drive operation; chiller efficiency at variable loads; air and water economizer and heat recovery cycles; air distribution static pressures and ventilation air volumes; boiler efficiencies; building-related process energy systems and equipment; indoor water risers and outdoor irrigation systems.</p> <p>The LEED Measurement and Verification credit (EAc-5) requires development and implementation of an M&V Plan following the International Performance Measurement & Verification Protocol, Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003. M&V details for ESC are under development and the requirements for this LEED credit should be evaluated further as the ESC design progresses.</p>

Table C-2. Excerpts from Experimental Sciences Complex's LEED Certification Discussion

Introduction

The Leadership in Energy and Environmental Design for New Construction (LEED-NC) Green Building Rating System™ has become the industry standard for design, construction, and operation of high performance green buildings. The Experimental Sciences Complex project has been registered with the US Green Building Council (USGBC) for certification under version 2.2 of the LEED-NC rating system. The Experimental Sciences Complex project has committed to achieving a minimum certification level of LEED Silver, and to strive for a certification level of LEED Gold. This section of the Sustainable Design report provides the status of progress towards LEED certification for the Experimental Sciences Complex project.

Certification Status

The LEED-NC rating system is a point-based approach to assign a score to a building. A LEED-NC Score Checklist has been developed for the Experimental Sciences Complex project; this will be maintained throughout the design process to track each LEED prerequisite and credit considered applicable to the Experimental Sciences Complex building project (see Table C-3 of this attachment). The LEED-NC Score Checklist shows each prerequisite and credit in the LEED-NC program and a determination for application to the Experimental Sciences Complex project of either “yes”, “no”, or “potentially” (indicated by a question mark, “?”, on the checklist). A “yes” determination indicates all the requirements associated with the credit or prerequisite can and will be satisfied. A “no” determination indicates that one or more specific aspects of the requirements associated with the credit or pre-requisite is either not applicable or simply will not be satisfied by the Experimental Sciences Complex project. A “potentially” (?) determination indicates that the credit or prerequisite could potentially be satisfied, but requires additional evaluation for applicability to Experimental Sciences Complex and ability to satisfy the credit or prerequisite requirements.

***Discussion:** Table C-3 contains the LEED-NC Score Checklist for the Experimental Sciences Complex*

Potential LEED Points

The Experimental Sciences Complex LEED-NC Score Checklist indicates that a total of 33 points are considered achievable at the 100% Title I design phase of the Experimental Sciences Complex project. The checklist also indicates that another 21 points are considered to be potentially achievable. Although 33 points would achieve a LEED Silver certification level, loss of any credit points due to unforeseen future circumstances (such as changes to the project scope or value engineering measures) could jeopardize the certification level achievable by the project. In addition, the Experimental Sciences Complex project is striving to attain a LEED Gold certification level. Therefore, satisfying at least some of the 21 LEED credit points designated as “potentially” achievable is important to preserving the LEED Silver certification level and essential to obtaining the LEED Gold certification level.

Discussion: Table C-4 of this attachment lists the additional 21 “potential” LEED credit points and provides an evaluation of the 21 “potential” LEED credit points to determine those considered more likely (greater than 50% probability) to be applicable and achievable by the Experimental Sciences Complex project and those considered unlikely (less than 50% probability) to be applicable and achievable by the Experimental Sciences Complex project. This information helps the Experimental Sciences Complex project team evaluate the ability to achieve a LEED Gold certification level and to determine which potential LEED credit points warrant further evaluation for application and benefit to Experimental Sciences Complex. The information provided in the Sustainable Design Result Matrix. (Table C-1 of this attachment provides the basis for these determinations.)

TABLE C-3: LEED-NC Checklist



LEED-NC

Experimental Sciences Complex LEED-NC (Ver 2.2) Score Checklist

Experimental Sciences Complex
Sandia National Laboratories/New Mexico

Yes ? No

6	5	3	Sustainable Sites		14 Points
Y			Prereq 1	Construction Activity Pollution Prevention	Required
1			Credit 1	Site Selection	1
	1		Credit 2	Development Density & Community Connectivity	1
		1	Credit 3	Brownfield Redevelopment	1
	1		Credit 4.1	Alternative Transportation, Public Transportation Access	1
1			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	Alternative Transportation, Parking Capacity	1
		1	Credit 5.1	Site Development, Protect or Restore Habitat	1
		1	Credit 5.2	Site Development, Maximize Open Space	1
	1		Credit 6.1	Stormwater Design, Quantity Control	1
	1		Credit 6.2	Stormwater Design, Quality Control	1
	1		Credit 7.1	Heat Island Effect, Non-Roof	1
1			Credit 7.2	Heat Island Effect, Roof	1
1			Credit 8	Light Pollution Reduction	1

Yes ? No

3		2	Water Efficiency		5 Points
1			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
		1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
		1	Credit 2	Innovative Wastewater Technologies	1
1			Credit 3.1	Water Use Reduction, 20% Reduction	1
1			Credit 3.2	Water Use Reduction, 30% Reduction	1

Yes ? No

8	5	4	Energy & Atmosphere		17 Points
Y			Prereq 1	Fundamental Commissioning of the Building	Required

Continued...

Yes	?	No		
5	3	5	Materials & Resources	
Y			Prereq 1	Storage & Collection of Recyclables
		1	Credit 1.1	Building Reuse , Maintain 75% of Existing Walls, Floors & Roof
		1	Credit 1.2	Building Reuse , Maintain 100% of Existing Walls, Floors & Roof
		1	Credit 1.3	Building Reuse , Maintain 50% of Interior Non-Structural Elements
1			Credit 2.1	Construction Waste Management , Divert 50% from Disposal
1			Credit 2.2	Construction Waste Management , Divert 75% from Disposal
		1	Credit 3.1	Materials Reuse , 5%
		1	Credit 3.2	Materials Reuse , 10%
1			Credit 4.1	Recycled Content , 10% (post-consumer + ½ pre-consumer)
1			Credit 4.2	Recycled Content , 20% (post-consumer + ½ pre-consumer)
	1		Credit 5.1	Regional Materials , 10% Extracted, Processed & Manufactured Regionally
	1		Credit 5.2	Regional Materials , 20% Extracted, Processed & Manufactured Regionally
	1		Credit 6	Rapidly Renewable Materials
1			Credit 7	Certified Wood

Yes	?	No		
10	4	2	Indoor Environmental Quality	
Y			Prereq 1	Minimum IAQ Performance
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control
	1		Credit 1	Outdoor Air Delivery Monitoring

1			Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan, During Construction	1
1			Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
1			Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
1			Credit 4.3	Low-Emitting Materials, Carpet Systems	1
1			Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
1			Credit 5	Indoor Chemical & Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems, Lighting	1
	1		Credit 6.2	Controllability of Systems, Thermal Comfort	1
	1		Credit 7.1	Thermal Comfort, Design	1
1			Credit 7.2	Thermal Comfort, Verification	1
	1		Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
		1	Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

Yes ? No

1	4		Innovation & Design Process		5 Points
	1		Credit 1.1	Innovation in Design: Provide Specific Title	1
	1		Credit 1.2	Innovation in Design: Provide Specific Title	1
	1		Credit 1.3	Innovation in Design: Provide Specific Title	1
	1		Credit 1.4	Innovation in Design: Provide Specific Title	1
1			Credit 2	LEED® Accredited Professional	1

Yes ? No

33	21	16	Project Totals (pre-certification estimates)			69 Points
-----------	-----------	-----------	---	--	--	------------------

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

TABLE C-4: “Potentially” Applicable Experimental Sciences Complex LEED Credits

LEED-NC Credits Identified as Potentially (“?”) Applicable to Experimental Sciences Complex	Probability of Credit Applicability	
	Likely (>50% Possibility)	Unlikely (<50% Possibility)
SSc-2: Development Density & Community Connectivity	1	
SSc-4.1: Alternative Transportation, Public Transportation Access	1	
SSc-6.1: Storm Water Management, Quantity Control		1
SSc-6.2: Storm Water Management, Quality Control		1
SSc-7.1: Heat Island, Non-Roofs	1	
EAc-1.8/1.10: Optimize Energy Performance		2
EAc-2.1: On-Site Renewable Energy		1
EAc-3: Enhanced Commissioning		1
EAc-5: Measurement and Verification		1
MRc-5.1: Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1	
MRc-5.2: Regional Materials, 20% Extracted, Processed & Manufactured Regionally		1
MRc-6: Rapidly Renewable Material		1
EQc-1: Outdoor Air Delivery Monitoring	1	
EQc-6.2: Controllability of Systems: Thermal Comfort	1	
EQc-7.1: Thermal Comfort, Design	1	
EQc-8.1: Daylight & Views: Daylight 75% of Spaces	1	
IDc-1.1/1.4: Innovation in Design	4	
Total	12	9

Note: This table indicates 12 of the 21 “potentially” applicable LEED-NC credit points are considered to have a greater than 50% probability of being satisfied by the Experimental Sciences Complex project. This assumes the Experimental Sciences Complex project will be able to establish all four credits for innovation in design. An additional 12 points would increase the overall score for Experimental Sciences Complex to a total of 45, resulting in a LEED Gold certification level. A target LEED-NC score of 45 points for Experimental Sciences Complex also provides a 6-point cushion for maintaining a Gold certification level in the event unforeseen circumstances eliminate credit points. See Table C-1 of this Attachment for further discussion of each credit point.