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UNIFIED FACILITIES CRITERIA (UFC)

HIGH PERFORMANCE AND SUSTAINABLE BUILDING REQUIREMENTS

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UNIFIED FACILITIES CRITERIA (UFC)

HIGH PERFORMANCE AND SUSTAINABLE BUILDING REQUIREMENTS

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U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER CENTER

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	**Date**	**Location**

This UFC supersedes UFC 1-200-02, dated 1 March 2013, with Changes 1-3.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DOD Field Activities in accordance with USD (AT&L) Memorandum dated 29 May 2002. UFC will be used for all DOD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFCs are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DOD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request. The form is also accessible from the Internet sites listed below.

UFCs are effective upon issuance and are distributed only in electronic media from the following source

- Whole Building Design Guide web site: http://www.wbdg.org/.

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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UNIFIED FACILITIES CRITERIA (UFC)
REVISION SUMMARY SHEET

Document: UFC 1-200-02, *High Performance and Sustainable Building Requirements*

Superseding: UFC 1-200-02, dated 1 March 2013, with Changes 1-3.

Description: This document is a complete update to UFC 1-200-02, continues to maintain uniformity across the DOD Components, and:

- Drives transformation in the performance of the DOD facility inventory
- Requires greater energy and water efficiency measures that are supported by a life-cycle cost analysis
- Balances building performance with occupant comfort, health and wellness, safety and productivity
- Covers planning, designing and acquiring new building construction, existing buildings, and installations
- Guides compliance with higher level mandates, policies and standards
- Provides companion document to UFC 1-200-01 *DOD Building Code (General Building Requirements)*
- Clarifies requirements, thresholds for compliance, and means of compliance
- Is organized around the “Guiding Principles for Sustainable Federal Buildings and Associated Instructions”, February 2016, which is the revision to “Guiding Principles for Federal High Performance and Sustainable Buildings”, 2008.
- Includes requirements for consideration of resiliency for energy, water and climate change, related to mission execution.

Reasons for Document: This document provides minimum unified requirements, and guidance for planning, designing, constructing, renovating, and maintaining, high performance and sustainable buildings that will enhance DOD mission capability by reducing total ownership costs.

Impact: Improved mission capability through:

- Reduced total ownership costs of buildings
- Improved energy and water efficiency
- Enhanced building and installation performance and sustainability
- Promoting sustainable resource and environmental stewardship
- Enhanced energy and water security

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CHAPTER 1 INTRODUCTION

1-1 BACKGROUND.

The Energy Policy Act of 2005, Energy and Independence Security Act of 2007, and Executive Order (EO) 13693 mandate Federal agencies to lead by example, promoting sustainable Federal buildings through environmentally-sound, economically-sound, and fiscally-sound design, construction, and operating decisions. The Federal requirements collectively are referred to as the "Guiding Principles", and are detailed in "Guiding Principles for Sustainable Federal Buildings and Associated Instructions", February 2016, which replaces "Guiding Principles for Federal High Performance and Sustainable Buildings", 2008. Consistent with UFC program requirements, this UFC integrates DOD requirements (DODI 4170.11 and other DOD Policies) with High Performance and Sustainable Building (HPSB) Guiding Principles and industry standards for high performance and sustainable buildings.

1-2 PURPOSE AND SCOPE.

This UFC provides minimum requirements and guidance to achieve high performance and sustainable buildings that comply with the *Energy Policy Act of 2005*, the *Energy Independence and Security Act of 2007*, *EO 13693*, and the implementation requirements found in *"Guiding Principles for Sustainable Federal Buildings and Associated Instructions"* (HPSB Guiding Principles). This UFC is organized around the HPSB Guiding Principles. Per DOD *Sustainable Buildings Policy*, when a building meets the requirements of this UFC, it is considered compliant with the HPSB Guiding Principles.

ASHRAE 90.1 *Energy Standard for Buildings Except Low-Rise Residential Buildings* applies to all projects (except low-rise residential which must comply with IECC) in its entirety. ASHRAE 189.1 *Standard for the Design of High-Performance Green Buildings* is an industry standard created to consolidate and address sustainability and energy requirements. This UFC incorporates the sections of ASHRAE 189.1 mentioned herein when appropriate and determined to be life cycle cost effective. Where the provisions of ASHRAE 189.1 meet the intent of the HPSB Guiding Principles, the provisions of ASHRAE 189.1 are referenced as a means of compliance or provided as an alternative compliance pathway. When other standards are referenced in ASHRAE 189.1, use the publication date of the standard referenced in Appendix A of this document.

1-3 ORGANIZATION.

Chapter 2 provides requirements for building design and construction activities. Chapter 3 details Federal HPSB Guiding Principles Existing Building Assessment requirements that must be met in order for an existing building to be reported as a High Performance and Sustainable Building (HPSB). Chapter 4 provides HPSB tracking and reporting and third-party certification procedures. Chapter 5 highlights the more holistic vision of sustainability at the Installation level.

1-4 UFC APPLICABILITY.

This UFC applies to all planning, design and construction, renovation, repair, operations and maintenance, and affixed equipment installation in new and existing buildings, regardless of funding source, that result in DOD real property assets. Table 1-1 "Compliance/Requirements Thresholds" is applicable to all methods of project delivery and levels of construction (as defined in UFC 1-200-01, paragraph 1-4.)

Apply this UFC to the following construction activities to the greatest extent practical:

- Buildings outside of United States and U.S. territories.
- Buildings supporting contingency operations (Refer to UFCs 1-201-01, 1-201-02, and 1-202-01).
- Non-permanent buildings.
- Projects with DD1391 marked "austere".

This UFC does not apply to:

- Buildings to be demolished or deconstructed, except for demolition waste diversion.
- Buildings that have a status of Report of Excess (ROE) submitted, ROE accepted, or Determination to Dispose.
- Unoccupied buildings, which are occupied one hour or less per person per day on average; AND have total building energy consumption from all sources less than 10.9 BTU/ SF/ Yr.; AND have annual average water consumption less than 2 gallons per day for the building.

Comply with Table 1-1:

Table 1-1 Compliance Requirement/Thresholds

Requirement	Thresholds
Chapter 1	All design and construction activity[1]; and assessments of existing buildings larger than 5,000 SF.
Chapter 2	All design and construction activity[1]
Chapter 3	Assessments of existing building assets larger than 5,000 SF.
Chapter 4 Tracking and Reporting	1. Each new building larger than 5,000 SF 2. Each renovation[2] in an existing building larger than 5,000 SF, with construction cost greater than $3M[3] and 50% ERC[4], and with comprehensive replacement[2] (include additions that are part of the building renovation) 3. Assessments of existing building assets over 5,000 SF.
Tracking Only	New buildings 5,000 SF and under; and additions.
Third Party Certification	1. Each new building larger than 5,000 SF, with construction cost greater than $3M[3], unless Component policy is more stringent[5]. 2. Each renovation[2] in an existing building larger than 5,000 SF, with construction cost greater than $3M[3] and 50% ERC[4], and with comprehensive replacement[2] (include additions that are part of the building renovation).
Chapter 5	Installation planning, affecting all projects.
Appendices	All projects as applicable.

[1] New work over 5000 SF must comply with UFC requirements. New work under 5000 SF, additions, sustainment, modernization, and restoration building improvements must comply with UFC requirements relevant to the scope of the project/work. Structures that are part of any of these projects must comply with UFC requirements relevant to the scope of the project/work.
[2] Includes changes to a building that provide significant opportunities for comprehensive replacement, and improvement in: energy and water efficiency (such as HVAC, lighting, building envelope and other building components) indoor air quality, and other requirements in this UFC.
[3] Aligns with thresholds of both USC Title 10 Section 2805(a) and USC Title 42 Section 6834(a) (adjusted from 2007 dollars)
[4] Estimated Replacement Cost (ERC) is the cost listed in the project's DD1391 "Economic Analysis", and is exclusive of the cost to bring the existing building into compliance with all criteria.
[5] Army threshold is based on designated Third Party Certifier's minimum requirements.

1-5 GENERAL REQUIREMENTS.

Comply with UFC 1-200-01. UFC 1-200-01 provides applicability of model building codes and government-unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, HPSB, and safety. Use UFC 1-200-02, in addition to UFC 1-200-01, and the UFCs and government criteria referenced therein.

If any conflict occurs between this UFC and UFC 3-600-01, the requirements in UFC 3-600-01 take precedence. In case of conflict between industry standards and military criteria, use the military requirements.

1-6 HISTORIC REQUIREMENTS.

See Appendix D for project requirements impacted by historic buildings, historic districts and those near historic facilities, view sheds and other designated cultural resources.

1-7 LIFE-CYCLE COST ANALYSIS (LCCA).

Life-cycle cost-effectiveness (LCCE) as defined in CFR Title 10 Part 436, applies to this entire document unless otherwise stated. In addition to energy, water and renewables, LCCE may be applied to other materials, and building construction types. The purpose of the LCCE is to deliver buildings that meet mission needs at the lowest total ownership cost.

1-7.1 LCCA Format.

Prepare the LCCA in accordance with CFR Title 10 Part 436, Subpart A and NIST Handbook 135 "*Life-Cycle Costing Manual for the Federal Energy Management Program*". The LCCA must be prepared using the Building Life-Cycle Costing (BLCC) program, available from the National Institute of Standards and Technology (http://energy.gov/eere/femp/building-life-cycle-cost-programs). The implied long-term inflation rate and discount rates identified in the Annual supplement to NIST Handbook 135 must be used. A link to BLCC can also be found at the Department of Energy's building energy tools web site:
http://energy.gov/eere/femp/building-life-cycle-cost-programs When needed, refer to UFC 3-410-01 for requirements to obtain weather data.

1-7.2 LCCA Calculation.

Any building-level LCCA must be calculated using a maximum of a 40-year building life and equipment lives based on accepted industry averages. Individual components or systems life expectancies must be reflected by inclusion of appropriate replacement and salvage values in the appropriate year of the analysis.

1-7.3 LCCA Comparison.

LCCAs comparing individual component or system alternatives must use the estimated life of the mutually exclusive alternative having the longest life, not to exceed 40 years

from the beginning of beneficial use or the lowest common multiple of the expected lives of the alternatives. Include the appropriate replacement and salvage values for each of the other alternatives. A number of tools comparing energy system alternatives and evaluating specific efficiency measures may be of benefit in performing energy efficiency calculations. Additional information can be found at: http://www.energy.gov/eere/femp/building-life-cycle-cost-programs.

Perform analysis based on the actual conditions expected over the life of the facility including anticipated occupancies, scheduled hours of operation and process loads. Include realistic energy usage and efficiencies, maintenance cost and repairs renovations, all costs or savings associated with the utilization of recovered energy, solar heat, solar photovoltaic energy and other renewable or waste heat applications. Credit any alternative funding such as rebates in the LCCA.

1-8 CYBERSECURITY.

All control systems (including systems separate from an energy management control system) must be planned, designed, acquired, executed, and maintained in accordance with UFC 4-010-06 *Cyber Security of Facility-Related Control Systems* and as required by individual Service Implementation Policy.

1-9 REFERENCES.

Appendix A contains a list of references used in this document.

1-10 GLOSSARY.

Appendix C contains acronyms, abbreviations, and terms.

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CHAPTER 2 BUILDING DESIGN AND CONSTRUCTION

2-1 OVERVIEW.

The requirements of this chapter apply to all building design and construction. Refer to Table 1-1 for thresholds for compliance.

2-1.1 New Construction and Renovation.

New construction and renovation projects must comply with all requirements; or must clearly identify and provide justification when requirements are not applicable or fully achievable. Refer to 4-2 COMPLIANCE WITH FEDERAL REQUIREMENTS for additional guidance and requirement applicability.

2-1.2 Work in Existing Buildings.

In some of the paragraphs that follow, there are specific requirements provided for renovations. For existing building renovation, operations and maintenance; sustainment, restoration, and modernization, the goal is to improve the performance of the existing building inventory with every investment. Project teams must meet the requirements of this UFC relative to systems and components included in the project scope of work, by providing the most resource-efficient solutions for the requirements of this UFC.

2-2 EMPLOY INTEGRATED DESIGN PRINCIPLES.

Integrated design is the most important requirement in achieving a high performance building. A design team must have strong, consistent representation from all stake-holders throughout the project phases to maximize opportunities to improve building performance and to fully realize increased savings potential.

2-2.1 Integrated Design.

Incorporate the following planning and evaluation into the integrated design, as described in ASHRAE 189.1 Informative Appendix F (Integrated Design). Follow the steps of design optimization, as applicable, in ASHRAE 189.1 Section F1.1.1 (Charrette Process).

2-2.1.1 Integrated Planning.

Use a collaborative, integrated planning and design team, composed of user, government support staff, and appropriate professionals, to identify requirements and to establish performance goals for siting, energy, water, materials, indoor environmental quality, and other comprehensive design goals. Ensure incorporation of these goals throughout the design and lifecycle of the building, including deconstruction.

2-2.1.2 Evaluation for Design Strategies.

Evaluate the site and building components to determine whether passive and natural design strategies and features are cost effectively incorporated before the active and mechanical systems are designed. Incorporate these features where applicable.

Take into account site attributes, including climate and local and regional context, which impact the design of the building.

2-2.1.3 Evaluation of the Site.

During the site selection process, meet the requirements of UFC 2-100-01. See Appendix B "Best Practices" for desirable site characteristics.

2-2.1.4 Site Integration and Design of the Building.

During the planning and design process meet the requirements of applicable UFCs, and use the following site development considerations and passive strategies:

- Site design elements that ensure safe and convenient pedestrian access.
- Meet the requirements of UFC 3-201-02.
- Incorporate results of site analysis, in order to design the building, focusing on orientation, configuration and massing.
- Orient building to maximize energy efficiency, passive solar and daylighting potential.
- Select, design and integrate into the overall building, high performance and sustainable systems (e.g., HVAC, plumbing, water heating systems, lighting systems, control systems, elevators, building envelope and fire protection systems).
- Promote opportunities for occupants to voluntarily increase physical movement such as making stairwells a desirable option for circulation and active workstations.

2-2.2 Commissioning.

In order to verify design and performance, and ensure that the Government requirements are met, employ commissioning practices appropriate to the size and complexity of the building and its system components. This must include an experienced commissioning provider, who should be independent of the project design and construction team, and the operations team. The choice of either contracted services or Government personnel to serve as the commissioning provider will be determined at project level.

Meet the requirements of ASHRAE 189.1 Section 10.3.1.2 (Building Project Commissioning), with the following modifications:

- For buildings and systems that are less complex[6], commissioning may be tailored as determined by the DOD Component AHJ[7].

[6] For Army projects, refer to Army policy for determination of systems to commission.
[7] For Air Force projects, the Project Delivery Team must determine the level of commissioning activities required.

- "Schematic design" is the design charrette or similar conceptual design activity.
- Documentation as described in ASHRAE 55 Section 6.2 is not required.

2-3 OPTIMIZE ENERGY PERFORMANCE.

Base energy efficiency design decisions on life-cycle cost as indicated in Chapter 1 of this UFC.

2-3.1 Energy Efficiency.

2-3.1.1 Commercial and Multi-Family High-Rise Residential Buildings.

- Meet the requirements of ASHRAE 90.1[8].
- Design the building to achieve at least 30% energy consumption reduction from ASHRAE 90.1 baseline.
- If a 30% reduction is not LCCE, modify the design of the proposed building to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.
- Determine energy consumption levels for both the ASHRAE Baseline Building and proposed building by using the Performance Rating Method found in appendix G of ASHRAE 90.1, except the formula for calculating the Performance Rating. Replace the formula in G1.2 with the following:

  Percentage improvement = 100 × ((Baseline building consumption − Receptacle and process loads) − (Proposed building consumption − Receptacle and process loads)) / (Baseline building consumption − Receptacle and process loads)[9]

2-3.1.2 Low-Rise Residential Buildings.

- Meet the requirements of International Energy Conservation Code (IECC).
- Design the building to achieve at least 30% energy consumption reduction from the IECC baseline using the Simulated Performance Alternative found in Section 405 of the IECC.
- If a 30% reduction is not LCCE, modify the design of the proposed building to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.

[8]Use ASHRAE 90.1(2010) for all projects with design starts before November 6, 2016. Use ASHRAE 90.1(2013) thereafter.

[9] Energy consumption for the purposes of calculating the 30 percent savings requirements in CFR Title 10 Part 433, §433.100 shall include the building envelope and energy consuming systems normally specified as part of the building design by ASHRAE 90.1 such as space heating, space cooling, ventilation, service water heating, and lighting, but shall not include receptacle and process loads not within the scope of ASHRAE 90.1 such as specialized medical or research equipment and equipment used in manufacturing processes.

2-3.1.3 Renovations.

- Renovation projects that replace everything above the foundation must either apply 2-3.1.1 or 2-3.1.2 as applicable.
- All other renovations choose one of the following options:
  1. Reduce measured building energy use by at least 30%, below FY 2003 energy use baseline.
  2. Reduce measured building energy use by at least 20% below FY 2015 energy use baseline.
  3. Reduce modeled energy use (from all sources including renewable energy) by 20% compared to the ASRHAE 90.1 baseline building design.
- If none of the reduction choices is life-cycle cost-effective, modify the design of the proposed building system(s) to achieve an energy consumption level at the highest level of energy efficiency that is life-cycle cost-effective.

2-3.1.4 Energy Efficient Products.

Per EISA 2007 Section 525, acquire products that are ENERGY STAR®-qualified or meet FEMP-designated efficiency requirements in all covered product categories. Select products based on life cycle cost, not initial cost. Link to EPA sites: http://www.energystar.gov/ or http://www1.eere.energy.gov/femp/ .

2-3.1.5 Standby Powered Devices.

Per EISA 2007 Section 524, provide commercially available, off-the-shelf products that use no more than 1 watt in their standby mode.

2-3.2 On-Site Renewable Energy.

Provide on-site renewable energy systems in accordance with ASHRAE 189.1 Section 7.4.1.1 (On-Site Renewable Energy Systems) and UFC 3-440-01 where LCCE, considering climate, infrastructure condition, mission compatibility, and effects on base wide electrical system (grid) power quality. Exception: Do not use purchase of renewable energy certificates (RECs) as a substitute for the Section 7.4.1.1 new building requirement.

- For Army projects, if not LCCE, utilize ASHRAE 189.1 Section 7.3.2 (On-Site Renewable Energy Systems) for future installation of on-site renewable energy systems.
- Navy and Air Force will utilize an installation-level solution to renewable energy systems and will not require ASHRAE 189.1 Section 7.3.2 if a building-level solution is not LCCE.

- Components may choose centralized renewable energy development in lieu of building by building application. Meet the requirements of UFC 3-540-08.

2-3.2.1 Solar Domestic Hot Water (SDHW).

Per EISA 2007 Section 523, meet at least 30% of the annual domestic hot water requirement through the installation of solar water heating unless SDHW is not LCCE. If 30% is not LCCE, modify the design of the proposed system to achieve the highest level of solar water heating that is LCCE.

2-3.3 Energy Compliance Analysis (ECA).

The ECA must include all required LCCA studies and narratives. The ECA must be provided and updated with each design submittal.

2-3.3.1 ECA Requirements.

In the design analysis, include an ECA which demonstrates compliance with all energy related requirements in this UFC. Identify the specific energy efficiency criteria that apply to the project, the software used to prepare the necessary calculations, a summary of all input to and output from the calculations, and the calculated baseline and as-designed building energy consumption of the proposed design. The ECA must include a completed “Performance Rating Report” as shown in Appendix G of the ASHRAE 90.1 “User’s Manual.” Building-level energy consumption calculations must be performed using a computer program or programs that integrate architectural features such as windows for daylighting, air-conditioning, heating, lighting, and other energy producing or consuming systems. These programs must be capable of simulating the features, systems, and thermal loads used in the design. The energy savings and any parasitic energy loads associated with the utilization of recovered energy, solar heat, solar photovoltaic energy and other renewable or waste heat applications must be included. The program must be capable of performing 8,760 hourly calculations. The Department of Energy (DoE) maintains a list of building energy tools for design (such as eQuest).

2-3.3.2 Narrative Requirements.

LCCA narrative must be prepared by each of the following individuals: the Lead Project Architect, Lead Project Mechanical Engineer, and the Lead Project Electrical Engineer. Each of the three narratives must list the conservation features considered for that discipline, a list of conservation measures adopted in the design, and any supporting LCCA calculations. Use the results of this analysis for design decision-making in reducing total Life Cycle Cost, while meeting mission objectives.

2-3.4 Metering.

A utility meter must be installed at each building, for each utility serving the building (e.g., district steam, district hot and chilled water, electricity, natural gas, fuel oil, etc.) in the standard units of the measure. Meters must be connected to a base wide energy

and utility monitoring and control system using the installation's advanced metering protocols. The installation of meters is required per DODI 4170.11, and as amended by DOD *Utilities Meter Policy*, 16 April 2013.

2-4 PROTECT AND CONSERVE WATER.

Base water efficiency design decisions on life-cycle cost as indicated in Chapter 1 of this UFC.

2-4.1 Indoor Water.

- Meet the requirements of ASHRAE 189.1 Section 6.3.2 (Building Water Use Reduction), which incorporates USEPA WaterSense-labeled products. Water closet replacements in renovations may have a flush value of up to 1.6 GPF (6.1 LPF) to accommodate existing plumbing capacity.
- Meet the requirements of ASHRAE 189.1 Section 6.4.2 (Building Water Use Reduction).
- Meet the requirements of ASHRAE 189.1 Section 6.4.3 (Special Water Features).

2-4.1.1 Indoor Water Metering.

Install advanced water meters to monitor building indoor potable water consumption, as required by DOD *Utilities Meter Policy*, 16 April 2013.

2-4.2 Outdoor Water.

2-4.2.1 Water for Landscaping.

- Limit potable irrigation water use by 50% compared to the conventional methods, and when LCCE, by using the methodologies in ASHRAE 189.1: Section 6.3.1 (Mandatory Provisions: Site Water Use Reduction) and either Section 6.4.1 (Prescriptive Option: Site Water Use Reduction) or Section 6.5.1 (Performance Option: Site Water Use Reduction).
- For existing systems, if a building has a single water meter, reduce indoor and outdoor potable water use combined by at least 20% compared to building water use in 2007. Compare results to a baseline building, using the EPA WaterSense landscape water budget tool version 1.01 or later, or a Component approved tool.
- Show preference for irrigation contractors who are certified through a WaterSense labeled program, or other industry-recognized credentialing programs.
- Refer to UFC 3-201-02 for additional requirements.

2-4.2.2 Outdoor Water Metering.

When potable water is used, provide water meters for irrigation systems serving more than 25,000 square feet of landscape, when life-cycle cost-effective. Install advanced water meters to monitor outdoor potable water consumption, as required by DOD *Utilities Meter Policy*, 16 April 2013.

For all other irrigation systems, separate water meters for locations with outdoor water use are encouraged.

2-4.3 Alternative Water.

Where life-cycle is cost-effective and permitted by local laws and regulations, use alternative water sources, such as harvested rainwater (UFC 3-210-10), treated wastewater, air handler condensate capture, grey water, and reclaimed water.

2-4.3.1 Stormwater Management.

Meet the requirements of UFC 3-210-10.

2-5 ENHANCE INDOOR ENVIRONMENTAL QUALITY.

2-5.1 Ventilation and Thermal Comfort.

Meet the requirements of ASHRAE 55 and 62.1 (62.2 for low-rise residential.). Compliance with standards by providing passive (non-mechanical) thermal comfort methods are allowed and encouraged as described in paragraph entitled, “Integrated Design” in this UFC.

Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for ventilation and thermal comfort criteria.

2-5.2 Daylighting.

All regularly occupied spaces located on the exterior wall must have vision fenestration. Where mission precludes vision fenestration for regularly occupied spaces located on the exterior wall, daylighting is still required. All classrooms and offices must have daylighting. Meet the requirements of ASHRAE 189.1 Section 8.4.1.2 (Minimum Sidelighting effective Aperture for Office Spaces and Classrooms) or Section 8.5.1.2 (Usable Daylight Illuminance in Office Spaces and Classrooms). Provide automated lighting controls in accordance with UFC 3-530-01.

Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for additional daylighting criteria.

2-5.3 Indoor Air Quality.

2-5.3.1 Moisture Control.

Establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage, minimize mold contamination, and reduce health risks related to moisture. Meet the requirements of ASHRAE 189.1 Section 10.3.1.5 (Moisture Control), UFC 3-410-01, Chapter 3, Sections 3-2 and 3-3 (Ventilation Air), and UFC 3-101-01 Chapter 3 (Building Envelope Requirements). Refer to Appendix B "Protect Indoor Air Quality" for best practices.

2-5.3.2 Reduce Volatile Organic Compounds (VOC) (Low-Emitting Materials).

Specify materials and products with low or no pollutant emissions, including composite wood products, adhesives, sealants, interior paints and finishes, carpet systems, and furnishings. Meet the requirements of ASHRAE 189.1 Section 8.4.2 (Prescriptive Option: Materials)

Exception: Exclude compliance with 8.4.2, first sentence.

2-5.3.3 Protect Indoor Air Quality during Construction.

For new construction and for renovation of unoccupied existing buildings, comply with ASHRAE 189.1 Section 10.3.1.4 (Indoor Air Quality (IAQ) Construction Management), with maximum outdoor air consistent with achieving relative humidity no greater than 60%.

For renovation of occupied existing buildings, comply with ANSI/SMACNA 008-2008, 2nd Edition, *SMACNA IAQ Guidelines for Occupied Buildings Under Construction*.

2-5.3.4 Environmental Tobacco Smoke Control.

Prohibit smoking[10] within the building and within a minimum of 50 feet (15.24 meters) of all building entrances, operable windows, and building ventilation intakes. Verify if more stringent facility criteria or Installation policy applies.

2-5.4 Occupant Health and Wellness.

Promote opportunities for occupants to voluntarily increase physical movement such as making stairwells a desirable option for circulation, active workstations, fitness centers, and bicycle commuter facilities. Support occupant health by considering options such as providing convenient access to healthy dining options, potable water, daylight, plants, and exterior views. Indicate in the Integrated Design Process how these efforts were evaluated.

[10] Refer to Service-specific policies: Army: http://www.army.mil/usapa/epubs/pdf/r600_63.pdf ; Navy: https://doni.daps.dla.mil/Directives/05000%20General%20Management%20Security%20and%20Safety%20Services/05-100%20Safety%20and%20Occupational%20Health%20Services/5100.13E.pdf Air Force: http://static.e-publishing.af.mil/production/1/af_sg/publication/afi40-102/afi40-102.pdf

2-6 REDUCE ENVIRONMENTAL IMPACT OF MATERIALS.

2-6.1 Environmentally Preferable Products.

The following requirements require procurement of construction materials and building supplies that have a lesser or reduced effect on human health and the environment over their lifecycle, when compared with competing products or services that serve the same purpose.

2-6.1.1 Recycled Content.

Use RCRA Section 6002 compliant products that meet or exceed EPA's recycled content recommendations, available on EPA's Comprehensive Procurement Guideline web site at http://www.epa.gov/ .

2-6.1.2 Biologically-Based Products.

Per Section 9002 of the Farm Security and Rural Investment Act, specify products composed of the highest percentage of biobased content consistent with the USDA BioPreferred Program, if products meet performance requirements and are available at a reasonable cost. Exceptions taken to biobased product procurement must be documented. A preference for purchasing products with the highest biobased content per USDA recommendations for designated product categories must be included in all applicable solicitations. USDA's biobased product designations and biobased content (which includes certified sustainably-harvested and rapidly renewable resources) recommendations are available on USDA's BioPreferred web site at http://www.biopreferred.gov/.

2-6.1.3 Other Sustainable Products.

Purchase products that meet Federally Recommended Specifications; Standards and Ecolabels: https://www.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels ; or are on the Federal Green Procurement Compilation: sftool.gov/greenprocurement.

2-6.1.4 Ozone Depleting Substances.

Meet the requirements of ASHRAE 189.1 Section 9.3.3 (Refrigerants), if equipment or systems using ozone depleting substances are included in the project. Do not use ozone depleting substances (ODS) or high Global Warming Potential (GWP) chemicals where EPAs Significant New Alternative Policy (SNAP) has identified acceptable substitutes or where other environmentally preferable products are available for use in construction, repair or end-of-life replacements: www.epa.gov/snap.

Exceptions: Refer to UFC 3-600-01 for fire protection system requirements.

2-6.2 Waste and Materials Management.

2-6.2.1 Storage and Collection of Recyclables.

Meet the requirements of ASHRAE 189.1 Section 9.3.4.1 (Storage and Collection of Recyclables – Recyclables), where markets or onsite recycling exist.

2-6.2.2 Waste Diversion.

Divert minimum 60% of nonhazardous construction and demolition waste material from landfills.

2-7 ADDRESS CLIMATE CHANGE RISK.

Provide building design solutions responsive to any Government-provided projections of climate change projection and determination of acceptable risk.

For a building located in a floodplain of concern, provide design solutions which mitigate both impact on the floodplain, and impact of the design flood event on building function and occupants, consistent with mission criticality.

CHAPTER 3 ASSESSMENT OF EXISTING BUILDINGS FOR HIGH PERFORMANCE AND SUSTAINABLE BUILDING (HPSB) COMPLIANCE

3-1 OVERVIEW.

Use this chapter to assess the HPSB Guiding Principles compliance status of an existing building, and to assist in identifying opportunities to increase performance of the building until it reaches full compliance. This assessment can also be used to inform future design and construction activities in the building. Refer to Table 1-1 for requirements for compliance. HPSB reporting procedures are covered in Chapter 4, paragraph entitled, “Compliance Reporting”.

Some HPSB Guiding Principles can be addressed at the Installation, Component, or DOD Agency level, versus the building level (e.g., no smoking policy). For guidance refer to Chapter 4 paragraph entitled “Compliance Strategies for Aligning Energy and Water Investments with Sustainability”.

3-2 EMPLOY INTEGRATED ASSESSMENT, OPERATION, AND MANAGEMENT PRINCIPLES.

3-2.1 Integrated Assessment, Operation, and Management.

Through an integrated process and team, identify and implement operations and maintenance policies that improve building environmental performance, protect natural, historic, and cultural resources, support occupant health and wellness, and improve the climate resiliency of facilities and operations.

- Assess existing condition and operational procedures of the building and major building systems, consideration of electric vehicle charging infrastructure, and consideration of appropriate energy resiliency measures, in accordance with applicable laws and regulations, and identify areas for improvement.
- Establish operational performance goals for energy and water; product compliance goals for material use, recycling and indoor environmental quality; and ensure incorporation of these goals throughout the remaining life cycle of the building and establish verification process.
- Incorporate goals into building management to ensure that operating decisions and tenant education are carried out with regard to integrated building operations and maintenance.
- Engage building occupants with building environmental performance information. Augment building operations and maintenance as needed using occupant feedback on work space satisfaction.

3-2.2 Re-Commissioning and Retro-Commissioning.

In order to verify performance and ensure that the Government requirements are met, employ retro-commissioning and recommissioning, tailored to the size and complexity of

the existing building and its system components. Recommissioning must be led by an experienced commissioning agent who should be independent of the facility operations team.

Meet the requirements of ASHRAE 189.1 Section 10.3.1.2 (Building Project Commissioning), with the following modifications:

- For buildings and systems that are less complex[11], commissioning may be tailored as determined by the DOD Component AHJ[12].
- "Schematic design" is the design charrette or similar conceptual design activity.
- Documentation as described in ASHRAE 55 Section 6.2 is not required.

3-3 OPTIMIZE ENERGY PERFORMANCE.

3-3.1 Energy Efficiency.

3-3.1.1 Commercial and Multi-Family High-Rise Residential Buildings.

Meet the requirements of ASHRAE 90.1.

Use one of the following options to optimize and measure energy efficiency performance:

- Option 1: Reduce measured building energy use by at least 30% below the FY 2003 energy use baseline.
- Option 2: Reduce modeled building energy use (from all sources including renewable energy) by at least 20% below the FY 2015 energy use baseline.
- Option 3: Energy efficiency is 30% better than the current ASHRAE 90.1 standard.

If none of the reduction choices is LCCE, modify the design of the proposed system to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.

3-3.1.2 Low-Rise Residential Buildings.

Meet the requirements of IECC.

Design the building system to achieve at least 30% energy consumption reduction from the IECC baseline using the Simulated Performance Alternative found in Section 405 of the IECC.

[11] For Army projects, refer to Army policy for determination of systems to commission.
[12] For Air Force projects, the Project Delivery Team must determine the level of commissioning activities required.

If a 30% reduction is not LCCE, modify the design of the proposed building to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.

3-3.1.3 Energy Efficient Products.

Per EISA 2007 Section 525, acquire products that are ENERGY STAR®-qualified or meet FEMP-designated efficiency requirements in all covered product categories. Select products based on life cycle cost, not initial cost. Link to EPA sites: http://www.energystar.gov/ or http://www1.eere.energy.gov/femp/.

3-3.2 On-Site Renewable Energy.

Implement renewable energy generation projects on agency property for agency use, where lifecycle cost effective and when there are no adverse effects on base wide electrical system (grid) power quality or mission. Implementation must comply with the requirements in UFC 3-440-01.

Components may choose centralized renewable energy development in lieu of building by building application. Meet the requirements of UFC 3-540-08.

3-3.3 Metering.

Install a utility meter for each utility serving the building (e.g., district steam, district hot and chilled water, electricity, natural gas, fuel oil, etc.) in the normal units of the measure. Connect all meters to a base wide energy and utility monitoring and control system using the installation's advanced metering protocols. The installation of meters is required per DODI 4170.11, and as amended by DOD *Utilities Meter Policy*, 16 April 2013.

3-3.4 Benchmarking (Verification).

Compare annual performance data with previous years' performance data, by entering annual performance data in a measurement and tracking tool such as EPA's ENERGY STAR®, Portfolio Manager.

3-4 PROTECT AND CONSERVE WATER.

3-4.1.1 Indoor Water.

Use one of the following options to reduce indoor potable water use reduction:

- Option 1: Reduce building potable water use to a level equal to or lower than a baseline that assumes 100% of the plumbing fixtures and fittings meet the *Uniform Plumbing Code* (UPC) 2006 or the *International Plumbing Code* (IPC) 2006 fixture and fitting performance requirements. The baseline for plumbing fixtures and fittings installed before 1994 is allowed to be calculated at 140% of the UPC or IPC performance requirements, or

- Option 2: Reduce building measured potable water use by 20% compared to building water use in 2003 or a year thereafter with metered water data. If a building has a single water meter, reduce indoor and outdoor potable water use combined by at least 20% compared to building water use in 2003 or a year thereafter with metered water data.

3-4.1.2 Indoor Water Metering.

Install advanced water meters to monitor building indoor potable water consumption, as required by DOD Utilities Meter Policy, 16 April 2013.

3-4.2 Outdoor Water.

3-4.2.1 Water for landscaping.

- Limit potable irrigation water use by 50% compared to the conventional methods, and when LCCE, by using the methodologies in ASHRAE 189.1: Section 6.3.1 (Mandatory Provisions: Site Water Use Reduction) and either Section 6.4.1 (Prescriptive Option: Site Water Use Reduction) or Section 6.5.1 (Performance Option: Site Water Use Reduction).
- For existing systems, if a building has a single water meter, reduce indoor and outdoor potable water use combined by at least 20% compared to building water use in 2007. Compare results to a baseline building, using the EPA WaterSense landscape water budget tool version 1.01 or later, or a Component approved tool.
- Show preference for irrigation contractors who are certified through a WaterSense labeled program, or other industry-recognized credentialing programs.
- Refer to UFC 3-201-02 for additional requirements.

3-4.2.2 Outdoor Water Metering.

Install advanced water meters to monitor outdoor potable water consumption, as required by DOD *Utilities Meter Policy*, 16 April 2013.

When potable water is used, provide water meters for irrigation systems serving more than 25,000 square feet of landscape, when life-cycle cost-effective. For all other irrigation systems, separate water meters for locations with outdoor water use are encouraged.

3-4.3 Alternative Water.

Where life-cycle is cost-effective and permitted by local laws and regulations, use alternative water sources, such as harvested rainwater (UFC 3-210-10), treated wastewater, air handler condensate capture, grey water, and reclaimed water.

3-4.4 Stormwater Management.

Meet the requirements of UFC 3-210-10.

3-5 ENHANCE INDOOR ENVIRONMENTAL QUALITY.

3-5.1 Ventilation and Thermal Comfort.

At a minimum, meet ASHRAE 55 and ASHRAE 62.1 (62.2 for low-rise residential.) Documentation as described in ASHRAE 55 Section 6.2 is not required.

Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for ventilation and thermal comfort criteria.

3-5.2 Daylighting and Lighting Controls.

Maximize opportunities for daylighting within the existing structure except where not appropriate because of building function, mission, or structural constraints. Maximize the use of automatic dimming controls or accessible manual lighting controls, task lighting where life cycle cost-effective, and appropriate shade and glare control.

Provide automated lighting controls in accordance with UFC 3-530-01.

Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 for additional daylighting criteria.

3-5.3 Indoor Air Quality.

3-5.3.1 Moisture Control.

Establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage, minimize mold contamination, and reduce health risks related to moisture. Meet the requirements of ASHRAE 189.1 Section 10.3.1.5 (Moisture Control) and UFC 3-101-01 Chapter 3, Building Envelope Requirements.

Refer to Appendix B “Protect Indoor Air Quality” for best practices.

3-5.3.2 Reduce Volatile Organic Compounds (VOC) (Low-Emitting Materials).

Use reduced volatile organic compounds (VOC) (low emitting materials) for building modifications, maintenance, and cleaning. In particular, specify the following materials and products to have low or no pollutant emissions: composite wood products, adhesives, sealants, interior paints and finishes, solvents, carpet systems, janitorial supplies, and furnishings.

3-5.3.3 Integrated Pest Management.

Use integrated pest management techniques as appropriate to minimize pesticide usage. When pesticides are needed, only use EPA-registered pesticides.

3-5.3.4 Environmental Tobacco Smoke Control.

Prohibit smoking[13] within the building and within a minimum of 50 feet (15.24 meters) of all building entrances, operable windows, and building ventilation intakes. Verify if more stringent facility criteria or Installation policy applies.

3-5.4 Occupant Health and Wellness.

Promote opportunities for occupants to voluntarily increase physical movement such as making stairwells a desirable option for circulation, active workstations, fitness centers, and bicycle commuter facilities. Support occupant health by considering options such as providing convenient access to healthy dining options, potable water, daylight, plants, and exterior views. Indicate in the Integrated Assessment, Operation, and Management, Process how these efforts were evaluated.

3-6 REDUCE ENVIRONMENTAL IMPACT OF MATERIALS.

3-6.1 Environmentally Preferable Products.

The following requirements require procurement of construction materials and building supplies that have a lesser or reduced effect on human health and the environment over their lifecycle when compared with competing products or services that serve the same purpose.

3-6.1.1 Recycled Content.

Use RCRA Section 6002 compliant products that meet or exceed EPA's recycled content recommendations, available on EPA's Comprehensive Procurement Guideline web site at http://www.epa.gov/.

Encourage reuse of building materials, components, and furnishings that are in refurbishable condition and meet the quality standards of the government.

3-6.1.2 Biologically-Based Products.

Per Section 9002 of the Farm Security and Rural Investment Act, use products composed of the highest percentage of biobased content consistent with the USDA BioPreferred Program, if products meet performance requirements and are available at a reasonable cost. Exceptions taken to biobased product procurement must be documented. A preference for purchasing products with the highest biobased content

[13] Refer to Service-specific policies: Army: http://www.army.mil/usapa/epubs/pdf/r600_63.pdf ; Navy: https://doni.daps.dla.mil/Directives/05000%20General%20Management%20Security%20and%20Safety%20Services/05-100%20Safety%20and%20Occupational%20Health%20Services/5100.13E.pdf Air Force: http://static.e-publishing.af.mil/production/1/af_sg/publication/afi40-102/afi40-102.pdf

per USDA recommendations for designated product categories must be included in all applicable solicitations for building modifications, operations and maintenance, and cleaning. USDA's biobased product designations and biobased content (which includes certified sustainably-harvested wood products and rapidly renewable resources) recommendations are available on USDA's BioPreferred website at http://www.biopreferred.gov/.

3-6.1.3 Other Sustainable Products.

Purchase products that meet Federally Recommended Specifications; Standards and Ecolabels: https://www.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels ; or are on the Federal Green Procurement Compilation: https://sftool.gov/greenprocurement

3-6.1.4 Ozone Depleting Substances.

Eliminate the use of ozone depleting substances (ODS) and high Global Warming Potential (GWP) chemicals where EPA's Significant New Alternative Policy (SNAP) has identified acceptable substitutes or where other environmentally preferable products are available. www.epa.gov/ozone/snap/. Exception: Refer to UFC 3-600-01 for fire protection system requirements.

3-6.2 Waste and Materials Management.

3-6.2.1 Storage and Collection of Recyclables.

Provide salvage, reuse and recycling services for waste generated from building operations, maintenance, repair and minor renovations, where markets or on-site recycling exist.

3-6.2.2 Waste Diversion.

Divert minimum 60% of nonhazardous construction and demolition waste material from landfills. Provide recycling services for paper, corrugated cardboard, glass, plastics, and metals, at a minimum, where markets or on-site recycling exist.

3-7 ADDRESS CLIMATE CHANGE RISK.

Provide building design solutions responsive to any Government-provided projections of climate change projection and determination of acceptable risk.

For a building located in a floodplain of concern, provide design solutions which mitigate both impact on the floodplain, and impact of the design flood event on building function and occupants, consistent with mission criticality.

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CHAPTER 4 FEDERAL HPSB COMPLIANCE, REPORTING, AND SUSTAINABILITY POLICIES

4-1 OVERVIEW.

Federal agencies are required to target and report annual progress toward HPSB Guiding Principles compliance, with the ultimate goal of 15% compliance of the existing building inventory by 2025.

4-2 COMPLIANCE WITH FEDERAL REQUIREMENTS.

The focus of compliance with the HPSB Guiding Principles is to meet the requirements of Table 1-1 "Compliance Requirements/Thresholds". Checklist requirements are met when each requirement demonstrates one of the following:

- Fully compliant – the requirement is in full compliance and is marked “Yes”.
- Partially compliant – the requirement is compliant to the greatest degree possible, based on LCCE (e.g., SDHW serves only 20% of water use, per LCCE); mission restriction (e.g., 24/7 operation); location/regional restriction (e.g., availability of high-efficiency equipment service); or locale restriction (e.g., proximity of existing buildings restricts daylighting), and is marked “Yes" with justification.
- Not applicable – the requirement is not applicable, based on LCCE (e.g., LCCE excludes use of Alternate Water); mission exclusion (e.g., no daylighting in a theater or a SCIF); location/regional exclusion (e.g., Host Nation Agreement or no local recycling facility); or locale exclusion (e.g., there is no steam to meter), and is marked “Not Applicable” with justification.

Per Department of Defense “Sustainable Buildings Policy”, 10 November 2013, if a newly constructed building or renovated existing building complies with all the requirements of this UFC, it can be considered compliant with all federal sustainability requirements.

4-2.1 Compliance Checklists.

Use the following DOD Component-level High Performance and Sustainable Building (HPSB) checklists to track compliance with the requirements of this UFC.

- Air Force – *Air Force MILCON Sustainability Requirements Scoresheet*, Attachment 3 of “AF Sustainable Design Development Implementing Guidance Memo” http://www.wbdg.org/ccb/browse_cat.php?c=265
- Army – *ENERGY & SUSTAINABILITY RECORD CARD* http://www.wbdg.org/ccb/browse_cat.php?c=275
- Navy – *NAVFAC High Performance and Sustainable Building Checklist [also known as Sustainability & Energy Data Record Card]*

https://www.wbdg.org/FFC/NAVFAC/navfac_sustainable_energy_data_record_card.pdf

Use the Checklist of the Component who will maintain the building asset in their Real Property Record. Check with the user Command for additional requirements.

4-2.2 Existing Buildings, HPSB Assessment.

In a DOD installation setting, many of the HPSB Guiding Principles requirements for existing buildings are addressed by DOD, Agency, and installation-wide policies, programs, contracts, and specifications. Generally, the "installation-wide" HPSB Guiding Principles response to a specific requirement will be the same for all buildings on an installation. The remaining HPSB Guiding Principles are building specific and linked to energy and water consumption.

For reporting requirements, refer to the paragraph entitled, "Compliance Reporting".

4-2.3 Compliance Strategies for Aligning Energy and Water Investments with Sustainability.

Align DOD Component programs that target building energy and water efficiency improvements with the requirements of this UFC. Include consideration of whole building, maintainability, energy and water efficiency solutions.

4-2.4 Compliance Reporting.

Compliance with this UFC is considered compliance with the HPSB Guiding Principles. DOD Components report their compliance with HPSB Guiding Principles via the Real Property Inventory Submission, as provided in guidance promulgated by the Office of the Assistant Secretary of Defense (OASD) Energy, Installations & Environment (EI&E), Business System Integration Directorate (BSI). Policy regarding this reporting requirement can be found in DODI 4165.14.

BSI maintains the real property inventory data standards needed for the Enterprise Energy Information Management capability in the Real Property Information Model. The specific data element identified with this reporting requirement is "RPA Sustainability Code". The Air Force[14], Army[15], and Navy are responsible for reporting this information.

The reporting codes are:

- Yes (1) – asset has been evaluated and meets HPSB Guiding Principles
- No (2) – asset has been evaluated and does not meet HPSB Guiding Principles

[14] The Air Force utilizes the Automated Civil Engineer System, Real Property Module (ACES-RP), RPA Sustainability Code field.
[15] The Army utilizes the Headquarters Installation Information System (HQIIS).

- Not Yet Evaluated (3) – asset has not yet been evaluated on whether or not it meets HPSB Guiding Principles
- Not Applicable (4) – One of the following:
  - Buildings that have a status of Report of Excess (ROE) submitted, ROE accepted, or Determination to Dispose:
    OR ARE
  - Unoccupied: The building is occupied one hour or less per person per day on average;
    AND
    Low/ No Energy Use: The total building energy consumption from all sources is less than 10.9 BTU/ SF/ Yr.;
    AND
    Low/ No Water Use: Annual average water consumption is less than 2 gallons per day for the building.

Existing buildings greater than 5,000 SF (465 SM) that have not had an HPSB Guiding Principles assessment must be coded “Not yet evaluated (3)”. Existing buildings greater than 5,000 SF (465 SM) that have had an HPSB Guiding Principles assessment are be coded either “Yes (1)” or “No (2)” using the guidance herein. Existing buildings that are less than 5,000 SF (465 SM) are not subject to Existing building HPSB Guiding Principles Assessment Federal reporting.

4-2.5 Compliance Tracking and Reporting.

Refer to Table 1-1 for thresholds for requirement compliance. During the project definition, design, and construction phases of a project, compliance with requirements is tracked using DOD Component checklists referenced in the paragraph entitled, “Compliance Checklists”. Individual building performance is included in the Annual Energy Management Report to Congress. Refer to each DOD Component for guidance on reporting systems and instructions.

Once the project is complete, the final status for each building’s compliance is tracked in each Service’s reporting system as detailed above. A new building or renovation meeting the HPSB Guiding Principles also meets the existing building HPSB Guiding Principles and can be coded as “Yes (1)”. Indicating the appropriate sustainability status must be accomplished at the completion of the project when the asset record is created or updated.

4-3 DEPARTMENT OF DEFENSE SUSTAINABILITY POLICY REQUIREMENTS.

4-3.1 Office of Secretary of Defense Guidance.

OUSD AT&L Memorandum, “Department of Defense Sustainable Buildings Policy”, 10 November 2013, https://www.denix.osd.mil/sustainability/DODPolicy.cfm, requires compliance with UFC 1-200-02, in alignment with Federal policy. The memo also requires the use of auditable processes to track this compliance.

4-3.2 Sustainable Third Party Certification.

Per "Department of Defense Sustainable Building Policy", 10 November 2013, DOD projects must "…include green-building certification of those buildings through any of the systems approved for federal use…" The green-building rating system is also known as Third Party Certification, and is an additional requirement to UFC 1-200-02 compliance and tracking. Third Party Certification (TPC) is required for applicable DOD component buildings in the US and US territories. For all other DOD building locations, apply TPC to the greatest extent practical. Apply TPC to each applicable building in a project that has a construction cost of greater than $3M[16].

- See individual Component policy for more stringent Component thresholds for applying TPC.
- See individual Component policy for TPC guidance on industrial buildings (e.g., hangars, maintenance buildings and other buildings) and non-vertical construction.
- TPC is not required for projects in countries where the United States contributes a portion of the construction cost but does not control the design criteria (e.g., NATO funded projects). Incorporate sustainable development strategies and features to the greatest extent practical.
- TPC is not required for buildings being constructed by or for use by the United States under the laws, codes, rules and regulations of a Host Nation, but may need to comply with similar requirements of the Host Nation, as applicable international agreements provide. Incorporate sustainable development strategies and features to the greatest extent practical.

4-3.3 Sharing Whole-Building Energy and Water Usage Data Exemption for Third Party Rating Systems.

No energy or water data sharing with private, sustainable third party certification vendors is allowed for any Department of Defense project. The DOD has complete exemption from sharing energy or water with any third party certifier. Some certifiers have specific procedure for registering projects to include waiver language. Contact DOD component or Third Party Certification provider for specific procedures.

4-3.4 Air Force Guidance.

"Air Force sustainability implementing guidance documents may be viewed at: http://www.wbdg.org/ccb/browse_cat.php?c=265.

[16] Aligns with thresholds of both USC Title 10 Section 2805(a) and USC Title 42 Section 6834(a) (adjusted from 2007 dollars.)

4-3.5 Army Guidance.

Army Supplemental Guidance to Designers and Policy Statements may be viewed at: http://www.wbdg.org/ccb/browse_org.php?o=31 .

4-3.6 Navy and Marine Corps Guidance.

NAVFAC ECB is No. 2014-02 “NAVFAC Sustainability and Energy Building Requirements”, Revised 23 March 2016, http://www.wbdg.org/ccb/browse_cat.php?c=268.

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CHAPTER 5 SUSTAINABLE INSTALLATIONS

5-1 OVERVIEW.

Projects are not stand alone initiatives but are part of a comprehensive sustainable installation master plan that defines the holistic vision for planning and development of the installation. The value of planning is to look beyond the individual project to create synergies within the larger area, campus, neighborhood and the entire installation. The master plan provides the vision, goals and objectives for sustainable base development. It sets specific planning and site parameters that all projects must follow. It also provides documentation of the collaborative process involving military and civilian stakeholders, functional advocates such as environmental, natural, historical and cultural experts, force protection officers, transportation, energy, water, and local and regional planning managers. The vision, goals and objectives for sustainable base development must be compatible with the military mission.

- For integrated design team participants, it is essential to understand that DOD installation planning has embraced the strategies of sustainable planning. Projects that comply with installation master plans may be solutions that promote compact, in-fill development and will promote mixed use (vertical or horizontal) alternatives. Project delivery teams must consider multi-story solutions that are narrower in shape when mission requirements allow.

- Project delivery teams must consider transportation connectivity and must ensure such aspects as connected sidewalks, pedestrian spaces, and bike paths are incorporated. Appropriate sustainable landscaping features must be included. Teams must also evaluate mission requirements and incorporate military equipment use into transportation planning.

- Projects must meet the requirements of the installation master plan and/or studies, including neighborhood or campus plans as applicable.

- Incorporate the key principles of sustainable planning identified in UFC 2-100-01, as well as the DOD Component's individual policies and guidance, in master plans, area development plans, and other planning products.

- Transportation: Consider the Installation transportation plan. Also evaluate the use of electric vehicle charging infrastructure, and bicycle commuter facilities.

5-2 INSTALLATION-WIDE HPSB GUIDING PRINCIPLES COMPLIANCE.

Department of Defense and Military Component installation-wide policies can be used to demonstrate compliance with the HPSB Guiding Principles when there is also evidence that the policies are being implemented at the specific building. These policies may be used as models for crafting policies for building level operations.

The following list provides examples of HPSB Guiding Principles that may be met installation-wide:

- Stormwater: Strategies account for handling runoff associated with all buildings on a site, not just individual buildings. Coordinate with the Installation stormwater management plan where applicable, and incorporate the use of low impact development strategies.
- Outdoor water use reduction: In campus-type settings, outside open areas are often shared among buildings, making it difficult to assign water use to a particular building for calculating the outdoor water use reduction requirement.
- Renewable energy: Renewable energy generated on a contiguous campus is acceptable. Such development must be engineered to eliminate any adverse effects to electric grid frequency stability, voltage regulation, or system power factor.
- Process Water: Buildings served by the same central cooling equipment can claim compliance when the requirement is met.
- Integrated Pest Management: Use integrated pest management techniques as appropriate to minimize pesticide usage. Use EPA-registered pesticides only when needed.
- Environmental Tobacco Smoke Control: Prohibit smoking within the building and within 50 feet (15.24 meters) of all building entrances, operable windows, and building ventilation intakes.
- Climate change vulnerability assessment.

5-3 DOD STRATEGIC SUSTAINABILITY PERFORMANCE PLAN (SSPP).

EO 13693 requires each Federal agency to “develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize agency actions based on lifecycle return on investment (ROI).” The DOD SSPP provides an organized approach to meeting the requirements of the EO, including HPSB. Included in the DOD SSPP are the following:

- Sustainability goals, targets, schedules, milestones, and approaches
- Strategic planning and budgeting
- Activities, policies, plans, procedures, and practices
- Annual updates, opportunities for improvement, and evaluation of past performances
- The DOD SSPP can be found at http://www.denix.osd.mil/sustainability/dod-sspp/

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APPENDIX B BEST PRACTICES

B-1 PROMOTE SUSTAINABLE LOCATION AND SITE DEVELOPMENT.

B-1.1 Evaluation of the Site.

Sustainable site selection and site development are fundamental components of sustainable building practices. Opportunities to achieve a sustainable site through good site selection are available at the start of a project and in most cases incur no additional cost. Every opportunity should be taken to transform DOD installations into more livable, resource-efficient communities.

Coordinate site evaluation with UFC 2-100-01. Give preference to sites which possess the following characteristics when appropriate:

a. Select a sustainable site:

- Avoid building in floodplains unless the purpose of the project requires such a location.
- Assess potential vulnerabilities and associated impacts related to acute weather events, chronic climate changes, and other emergency events.
- Analyze potential sites and associated climate including local and regional context.
- Consider site-specific, long-term, climate change impacts such as drought, flood, wind, and wildfire risks.
- Avoid development of sensitive land resources (including greenfields and USDA Prime Farmland as defined in USC Title 7 Section 4201).
- Consider the use of brownfields.

b. Promote compact and Infill development:

- Before altering or adding to the building, particularly for leased buildings, evaluate options for and employ, where feasible, alternative space management and workplace arrangements.
- Employ adaptive reuse or renovation of buildings or sites (including historic buildings), or use of previously disturbed/developed areas.
- Maximize Efficient Use of Existing Workplaces. This requirement can be considered for campus-wide space utilization.
- Locate in central business districts (cantonment areas) and rural town centers (remote locations).
- For historic buildings and districts, follow Executive Order 13006, Locating Federal Facilities on Historic Properties in Our Nation's Central Cities.

- Consult with local Cultural Resource Manager to identify potential impacts to existing historic buildings, districts, or view sheds
- Consult with natural resources staff to identify potential impacts to threatened and endangered species and habitats, according to the Endangered Species Act of 1973.
- Consider proximity to housing.
- Integrate with Local and Regional Planning. A campus-wide representative could engage with local planning efforts.
- Locate in central business districts (cantonment areas) and rural town centers (remote locations).
- Mitigate the Heat Island Effect. This requirement may involve outdoor hardscapes shared by multiple buildings on a campus.
- Consider parking management strategies to encourage co-use of shared parking.
- Consider sites well served by public or other transit if available or projected to be available.
- Consider connection to transportation network including pedestrian access to sidewalks, pathways, and bicycle trails.
- Promote opportunities for occupants to voluntarily increase physical movement such as fitness centers, convenient access to healthy dining options, and bicycle commuter facilities.

c. Energy Security Planning and Resiliency:

- Provide building design solutions responsive to Government-provided projections of climate change scenarios.
- For a building located in a floodplain of concern, provide design solutions which mitigate both impact on the floodplain, and impact of the design flood event on building function and occupants, consistent with mission criticality (refer to DOD Directive 3020.40).
- Evaluate potential locations for electric vehicle charging infrastructure.

B-1.2 Mitigation of Heat Island Effect.

- For Site Hardscapes – Consider the use of ASHRAE 189.1 Section 5.3.5.1 (Site Hardscape) for sidewalks, courtyards and POV parking areas
- For Walls – Consider the use of ASHRAE 189.1 Section 5.3.5.2 (Walls).

B-2 PROTECT INDOOR AIR QUALITY.

Indoor air quality is a quality-of-life issue in every enclosed building. Due to lack of indoor air quality, occupant absenteeism and poor performance has drawn a lot of attention over the years. In addition to moisture control (refer to 2-6.2, 3-6.2 and 4-6.2),

air quality should be of concern in every project, and of particular concern in renovation projects that occur in occupied buildings.

When renovations occur in occupied buildings, include in the sequencing consideration for the occupants that remain in the building during the renovation.

- Pay additional attention to sealed edges of barriers that prevent escaping dust from the construction area into corridors and other occupied areas

- Require fans and additional ventilation when off-gassing materials are installed

- To the greatest degree possible, plan construction activities after business hours or over weekends, for demolition or installation of materials with off-gassing or dust-producing properties. Examples: all dust-producing tear-outs; painting; drywall cutting; mixing and application of adhesives, caulking, and other glues; placement of fiberglass insulation; asphalt (exterior that is near air intake louvers); poured or broadcast floor finishes; any material that takes hours or days to cure, set, or dry.

B-3 DOMESTIC SOLAR HEATING.

Implementation of solar heating for domestic hot water in the 60 to 85 percent range may be economical.

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APPENDIX C GLOSSARY

ACRONYMS

ACHP	Advisory Council on Historic Preservation
AFCEE	Air Force Center for Engineering and the Environment
AFCEC	Air Force Civil Engineer Center
AFARS	Army Federal Acquisition Regulation Supplement
AFFARS	Air Force Federal Acquisition Regulation Supplement
AHJ	Authority Having Jurisdiction
APF	Appropriated Funding
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASTM	American Society of Testing and Materials
BEAP	Base Exterior Architecture Plan
BSI	Business Systems Integration Directorate (EI&E Office)
CCB	Construction Criteria Base
cf	Cubic Feet
CFR	Code of Federal Regulations
CONUS	Continental United States
DFARS	Defense Federal Acquisition Regulation Supplement
DOE	Department of Energy
DOD	Department of Defense
DODI	Department of Defense Instruction
ECA	Energy Compliance Analysis
EEIM	Enterprise Energy Information Management
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EO	Executive Order

EPA	Environmental Protection Agency
EPAct	Energy Policy Act
EPEAT	Electronic Product Environmental Assessment Tool
ERC	Estimated Replacement Cost
FAR	Federal Acquisition Regulation
FEMP	Federal Energy Management Program
GBCI	Green Building Certification Institute
GBI	Green Building Institute
GPF	Gallons per Flush
GSA	General Services Administration
HP	Horsepower
HPSB	High Performance Sustainable Building
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HVAC	Heating, Ventilation and Air Conditioning
IAQ	Indoor Air Quality
IBC	International Building Code
ICC	International Code Council
IECC	International Energy Compliance Code
IESNA	Illuminating Engineering Society of North America
KWh	Kilowatt Hour
KW	Kilowatt
LCA	Life-Cycle Assessment
LCC	Life-Cycle Cost
LCCA	Life-Cycle Cost Analysis
LEED	Leadership in Energy and Environmental Design
LPF	Liters per Flush

M & V	Measurement and Verification
MCWB	Mean Coincident Wet-Bulb
MILCON	Military Construction
MOU	Memorandum of Understanding
NAF	Non-Appropriated Funding
NAVFAC	Naval Facilities Engineering Command
NIST	National Institute of Standards and Technology
NMCARS	Navy Marine Corps Acquisition Regulation Supplement
OCONUS	Outside Continental United States
ODS	Ozone Depleting Substances
OMB	Office of Management and Budget
PL	Public Law
RCRA	Resource Conservation and Recovery Act
ROI	Return on Investment
RPA	Real Property Accountability
SHPO	State Historic Preservation Office
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SNAP	Significant New Alternatives Policy
TPC	Third Party Certification
UFC	Unified Facilities Criteria
UMC	Unspecified Minor Construction
UFGS	Unified Facilities Guide Specifications
USGBC	U.S. Green Building Council
US	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code

USDA	United States Department of Agriculture
WBDG	Whole Building Design Guide

DEFINITION OF TERMS

Acquisition: A multi-disciplinary process encompassing a variety of functions that involve all facets of life-cycle management including determination of need, planning; design; construction, lease, or purchase; sustainment, modernization and disposal of military installations and facilities as well as other goods and services. Acquiring supplies and services is a process governed by Federal, Defense, and service branch specific Acquisition Regulations (FAR, DFARS, and AFFARS, AFARS, or NMCARS) and Public Law (PL). Together there are more than 4,000 documents controlling the acquisition process. The acquisition process depends upon: (1) who the customer is, (2) the source of the item to be acquired, and (3) what type of funds are to be used, Appropriated (APF) or Non-Appropriated (NAF). In general, the Military Construction Program process is funded by Appropriated Funds. However, projects for Non-Appropriated Funds activities (commissaries, bowling centers, etc.) use NAF funds for building construction, upgrades, special equipment, and furnishings. APF funding is used most typically for demolition and environmental work on NAF activity sites. A combination of APF and NAF funds may be used sometimes.

Authority Having Jurisdiction (AHJ): The term "Authority Having Jurisdiction" (AHJ) as used in the codes and standards referenced in this UFC mean the component office of responsibility, i.e., U.S. Army, HQ USACE/CECW-CE; U.S. Navy, NAVFACENGCOM HQ Code CHE; U.S. Marine Corps, HQMC Code LFF-1; and U.S. Air Force, AFCEC. The enforcement of the codes and standards as they pertain to facility projects can be delegated to the local Component Office's Chief Engineer's Technical Representative at the discretion of the component's aforementioned office.

Building: Per UFC 1-300-08, "A roofed and floored facility enclosed by exterior walls and consisting of one or more levels that is suitable for single or multiple functions."

Charrette: An intensive creative work session in which a design team focuses on a particular design problem and arrives at a collaborative solution with stakeholders from the project area. A charrette can be a breakthrough event that helps creates a meaningful master plan or facility design. Properly executed, this technique can produce a master plan or facility design that is more useful, better understood, and more quickly produced than one formed by any other method.

Climate Change: Per DOD Directive 4715.2, variations in average weather conditions that persist over multiple decades or longer that encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of severe weather events.

Climate Resiliency: Per E.O 13963, "…prepare for, withstand, respond to, or quickly recover from disruptions due to severe weather events and climate change for the intended life of the asset."

Commercial and Multi-Family High-Rise Residential Buildings: All buildings, other than low-rise residential buildings.

Commissioning: Per DOE Guidance 42 USC 8253(f), "The commissioning process ensures that all of the equipment and systems within a facility are currently operating and functioning properly, and identifies items that need to be fixed or adjusted, typically in a low or no cost fashion."

DD Form 1391: A programming document used by the Department of Defense to submit requirements and justifications in support of funding requests for military construction to Congress.

Energy Compliance Analysis (ECA): The ECA must identify specific energy conservation criteria that applies to the project, the software used to prepare the necessary calculations, a summary of all input to and output from the calculations, and the calculated energy consumption of the proposed design.

Energy Modeling: The process by which conceptual designs, including size, material choices, factors such as site, solar, and wind orientations, daylighting percentages, and energy system choices (solar water heat, underfloor vs. overhead air distribution systems) are analyzed to show how to optimize these factors for efficient building operation and resource consumption.

Energy Resiliency: Per DODI 4170.11, "The capability to ensure available, reliable, and quality power to continuously accomplish DOD missions from military installations and facilities."

Environmental Management System (EMS): A framework that helps to achieve environmental goals through consistent control of operations. The assumption is that this increased control will improve environmental performance.

Environmentally Preferable Products: Products or services having a lesser or reduced effect on human health and the environment when compared with competing products or services serving the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or product or service disposal.

Estimated Replacement Cost (ERC): ERC is the cost listed in the project's DD1391 "Economic Analysis". ERC is the cost of replacing the current physical plant with modern facilities built at today's construction costs using today's construction standards.

Facility: Per UFC 1-300-08, a building, structure, or linear structure out to an imaginary line surrounding a facility at a distance of five feet from the foundation that, barring specific direction to the contrary such as a utility privatization agreement, denotes what is included in the basic record for the facility (e.g., landscaping, sidewalks, utility connections). This imaginary line is what is commonly referred to as the "five-foot line."

Historic Properties: Properties that are included in the National Register of Historic Places or that meet the criteria for the National Register.

Life-Cycle Costing (LCC): An important economic analysis used in the selection of alternatives that impact both pending and future costs. It compares initial investment

options and identifies the least cost alternatives for a 40-year period. As applied to building design energy conservations measures, the process is mandated by law and is defined in 10 CFR Part 426, Subpart A: Program Rules of the Federal Energy Management Program (NIST Handbook 135). The National Institute of Standards and Technology has established the Building Life-Cycle Cost (BLCC) computer program to perform LCC analyses. The program incorporates user entered data for and compares the following: Sunk Costs, First Costs, Salvage Value, Future Investment, Residual Value, Annually Recurring Fixed Costs, Annually Recurring Escalating Costs, and Energy (Fuel Costs) Escalation Rates.

Life-Cycle Cost Analysis (LCCA): Assessment of the direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span. LCCA considers all costs (capital, operating, and decommissioning expenses for the duration of a project) for various alternative approaches, including inflation and discount rates.

Life-Cycle Cost Effectiveness (LCCE): A documented statement of costs to be incurred to complete all stages of a project from planning through acquisition, maintenance, operation, remediation, disposition, long-term stewardship, and disposal. The results of a LCCA.

Low-Rise Residential Buildings: All building three stories or less in height above grade that includes sleeping accommodations where the occupants are primarily permanent in nature (30 days or more).

Planning: Initiated by a using entity whose facility needs are driven by mission requirements. The insertion of facility projects into the official budget is based on the requirement for mission support. As mission priorities change, projects can be moved ahead of their initial scheduled fiscal year or alternately, be dropped altogether.

Process load: The load on a building resulting from energy consumed in support of a manufacturing, industrial, or commercial process. Process loads do not include energy consumed maintaining comfort and amenities for the occupants of the building (including space conditioning for human comfort).

Programming: The data collection process done by the military project management team in order to achieve a conceptual design in enough detail to prepare a viable cost estimate. Programming data is reported on DD Form 1391 for design-bid-build and design-build projects, and is scrutinized from Installation-level through the Office of Management and Budget (OMB), Congress, and signed by the President before it is approved as a project.

Project Definition: As the military programming process often predates actual design by two to five years or more, when the design services portion of a project is funded, the project design team must validate stated project requirements and personnel assignments based upon updated mission criteria. This process is sometimes referred

to as Project Definition to distinguish it from the usual private sector A/E reference to "programming".

Project Scope: Refers to the physical size, cost and mission of a project. With historical data on facilities for various missions, experienced programmers will formulate the conceptual design for the DD Form 1391 based upon the required size of a facility to accommodate mission functions. Once the scope for a project has been enacted by Congress, changing the scope of a project will bring delay a project until the revision has been justified and approved. This is true whether or not the costs have also changed. Reductions of project scope (by no more than 25%) will require Congressional notification, review, and authorization before proceeding. Increasing the project scope is not authorized without reprogramming. See USC Title 10 Section 2853 for more information.

Real Property Asset: An individual building, structure, linear structure or land parcel, owned by the Department of Defense.

Receptacle Load: The load on a building resulting from energy consumed by all equipment plugged into electrical outlets.

Recommissioning: Per DOE Guidance 42 USC 8253(f), "The process of commissioning a previously commissioned facility or system after expiration of the project development and warranty phase. The primary goal of re-commissioning is to optimize facility performance, in accordance with design or operating needs, over the useful life of the facility."

Resource-efficient solutions: Solutions that minimize energy, water, natural and human resources required.

Retrocommissioning: Per DOE Guidance 42 USC 8253(f), "The retroactive commissioning of equipment or a system that was not commissioned at the time of installation or during the warranty phase. Typically, retro-commissioning is performed long after the facility is constructed and place into service."

Structure: Per UFC 1-300-08, a facility, other than a building or linear structure (road, fence, etc.), which is constructed on or in the land.

Sustainable Site: Based on the selection process, a site is considered sustainable when it uses less energy, water, and natural resources, generates less waste, and minimizes the impact on land compared to conventional design, construction and maintenance techniques.

Total Ownership Cost (TOC): Total of all direct and indirect costs associated with an asset or acquisition over its entire life cycle.

View Shed: An area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point.

APPENDIX D PROJECTS IMPACTING A HISTORIC BUILDING OR DISTRICT

D-1 APPLICABILITY TO SUSTAINABILITY GOALS.

D-1.1 Applicability.

Many buildings listed in or eligible for listing in the National Register of Historic Places are capable of meeting the HPSB Guiding Principles and should work toward compliance. Following the National Historic Preservation Act of 1966 (NHPA) Section 106 implementing regulations, CFR Title 36 Part 800, will facilitate the consultation needed to meet sustainability goals in proposed construction/rehabilitation/repair projects. This process will also take into account indirect impacts that the project could have on other cultural resources that could trigger project delays. Early inclusion of the DOD Component -specific Installation Cultural Resource Manager who meets the Secretary of Interior Professional Standards is the best deterrent to later project delays relative to these issues.

D-1.2 Building Analysis.

Sustainably rehabilitating historic buildings conserves the invested-cost of energy and materials as well as encouraging the preservation of these resources and cultural landscapes. The design, materials, type of construction, size, shape, site orientation, surrounding landscape and climate all play a role in how buildings perform. Before implementing any energy conservation measures to enhance the sustainability of a historic building, the existing energy-efficient characteristics of the building should be assessed as historic construction methods and materials often maximized natural sources of heating, lighting and ventilation to respond to local climate conditions.

D-1.3 Coordination.

Some projects may impact directly or indirectly other cultural resources classified as historic properties. For example, new construction could be located on a site with archaeological resources, which are also covered by the NHPA. Early inclusion of the component-specific cultural resource professional will ensure all cultural resources are assessed.

D-1.4 Consultation.

For DOD's historic facilities, certain generic sustainable upgrades may not be the most appropriate solution. For such buildings, it is vital to involve trained preservation professionals and the State Historic Preservation Office (SHPO) early in the design process to achieve maximum success in the process while also taking into consideration the character-defining features of the buildings during the design process. Historic buildings represent a previous long-term investment of resources and energy and as such these buildings were often constructed using methods and materials that maximized natural sources of heating, lighting, and ventilation to respond to local climatic conditions. Work with the Installation Cultural Resource Manager and SHPO to identify these elements of historic buildings that are functional passive design components, or inherently sustainable in nature. Useful tools may also include the

Secretary of Interior's Guidelines for Rehabilitation on Sustainability for Rehabilitating Historic Buildings, the National Park Service's *Improving Energy Efficiency in Historic Buildings*, Preservation Brief 3 and the Advisory Council on Historic Preservation's *Sustainability and Historic Federal Buildings*.

D-2 NEW CONSTRUCTION AND RENOVATION PROJECTS.

Renovation of historic facilities and new construction near historic facilities must follow the Secretary of Interior's *Standards for Rehabilitation, Illustrated Guidelines for Rehabilitating Historic Buildings* with the aim of avoiding the creation of an adverse effect requiring mitigation. The Installation will be responsible for ensuring compliance with the NHPA for these renovation/repair projects. Coordinate all projects involving historic properties with the Installation Cultural Resource Manager who can facilitate consultation with the SHPO prior to design.

D-3 REPAIR AND MAINTENANCE PROJECTS.

Repair and maintenance to existing buildings must follow the Secretary of Interior's *Standards for Rehabilitation, Illustrated Guidelines for Rehabilitating Historic Buildings* with the aim of avoiding the creation of an adverse effect requiring mitigation. The Installation will be responsible for ensuring compliance with the NHPA for these renovation/repair projects. Coordinate all projects involving historic properties with the SHPO via the Installation Cultural Resource Manager prior to design. Information pertaining to historic buildings and districts is available in the Installation Cultural Resources Management Plan, as required by DODI 4715.16.

D-4 LEASED HISTORIC BUILDINGS.

Responsibilities for historic facilities that are also leased buildings must be in the terms of the lease. Renovations or repairs must follow the Secretary of Interior's *Standards for Rehabilitation, Illustrated Guidelines for Rehabilitating Historic Buildings* to avoid creating an adverse effect. Allow enough time for the proper parties including the DOD Component Installation Cultural Resource Manager, identified in the lease, to complete consultation with the SHPO and other stakeholders.

D-5 NHPA SECTION 106 PROCESS.

Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Process description is available at http://www.achp.gov/106summary.html.

Some projects may impact directly or indirectly other cultural resources classified as historic properties. For example, new construction could be located on a site with archaeological resources, which are also covered by the NHPA. Early inclusion of the component-specific cultural resource professional will ensure all cultural resources are assessed. For case studies, refer to United States Department Of Defense, Legacy Resource Management Program.

D-5.1 Initiate Process.

Determine whether or not the project involves a type of activity that could affect historic properties. If so, identify the appropriate SHPO to consult with during the process. Identify other potential consulting parties. If there are no activities that have potential to affect historic properties, no Section 106 obligations exist.

D-5.2 Identify Historic Properties.

Review background information, consult with the SHPO and others, seek information from knowledgeable parties, and conduct additional studies as necessary. Districts, sites, buildings, structures, and objects listed in the National Register are considered; unlisted properties are evaluated against the National Park Service's published criteria, in consultation with the SHPO and any Indian tribe or Native Hawaiian organization that may attach religious or cultural importance to them. If questions arise about the eligibility of a given property, the agency may seek a formal determination of eligibility from the National Park Service.

If there are no historic properties present or affected provide documentation to the SHPO and, barring any objection in 30-days, proceed with the project. If there are historic properties present, proceed to assess possible adverse effects.

D-5.3 Assess Adverse Effects.

In consultation with the SHPO, make an assessment of adverse effects on the identified historic properties based on criteria found in Advisory Council on Historic Preservation's (ACHP) regulations.

a. If they agree that there will be no adverse effect, proceed with the project and any agreed-upon conditions.

b. If they find that there is an adverse effect, or if the parties cannot agree and ACHP determines within 15-days that there is an adverse effect, begin consultation to seek ways to avoid, minimize, or mitigate the adverse effects.

D-5.4 Resolve Adverse Effects.

Consult to resolve adverse effects with the SHPO and others, who may include Indian tribes and Native Hawaiian organizations, local governments, permit or license applicants, and members of the public. The ACHP may participate in consultation when there are substantial impacts to important historic properties, when a case presents important questions of policy or interpretation, when there is a potential for procedural problems, or when there are issues of concern to Indian tribes or Native Hawaiian organizations.

Consultation usually results in a Memorandum of Agreement (MOA), which outlines agreed-upon measures that the agency will take to avoid, minimize, or mitigate the adverse effects. In some cases, the consulting parties may agree that no such

measures are possible, but that the adverse effects must be accepted in the public interest.

D-5.5 Implementation.

If an MOA is executed, proceed with the undertaking under the terms of the MOA.

D-5.6 Failure to Resolve Adverse Effects.

If consultation proves unproductive, the Agency or the SHPO, or ACHP itself, may terminate consultation. If a SHPO terminates consultation, the Agency and ACHP may conclude an MOA without SHPO involvement. Submit appropriate documentation to ACHP and request ACHP's written comments. Take into account ACHP's written comments in deciding how to proceed.

D-5.7 Tribes, Native Hawaiians, and the Public.

Major emphasis is placed on consultation with Indian tribes and Native Hawaiian organizations, in keeping with the 1992 amendments to NHPA. Consultation with an Indian tribe must respect tribal sovereignty and the government-to-government relationship between the Federal Government and Indian tribes. Even if an Indian tribe has not been certified by the National Park Service (NPS) to have a Tribal Historic Preservation Officer who can act for the SHPO on its lands, it must be consulted about undertakings on or affecting its lands on the same basis and in addition to the SHPO.

D-6 SPECIAL CONSIDERATIONS.

D-6.1 Daylighting.

If windows, skylights and other elements allowing for daylighting are character defining features on the historic building, discuss options with the Installation Cultural Resource Manager.

If daylighting principles do not cause an adverse effect to the historic facilities, then employ to the fullest extent practicable.

D-6.2 Solar Panel Installation.

The following website provides advice on projects from solar panel installation to heating and air conditioning upgrades to weatherization and insulation in a sensitive and cost effective manner: http://www.nrel.gov/docs/fy11osti/51297.pdf

D-6.3 Infill.

Infill is appropriate within historic districts or neighborhoods if carried out in consultation with all stakeholders and sensitively executed. Spatial information on installation historic resources is available in the Integrated Cultural Resources Management Plan as required by DODI 4715.16.

D-6.4 Cistern Use.

The use of cisterns, either sub-grade or above-ground, were a frequent mechanism for water storage in many historic buildings and structures and may be an appropriate addition when undertaking a building renovation.

If a historic cistern is available at the site, reuse the location and equipment, as practical.

D-6.5 Replacement of Materials.

Rehabilitation of historical buildings must allow in-kind replacement of materials where an adverse effect will result if not done.

D-6.6 Reclaimed/Salvaged Materials.

When repairing or renovating historic buildings, reclamation of salvaged materials must be used instead of procurement or repair to obtain assets to meet current requirements, when timely and economical to do so (DODI 4715.16 Paragraph 6.1). Monetary value may not be considered a limitation if reclamation will satisfy critical item requirements or if new procurement/production is impractical. The DOD Component Installation Cultural Resource Manager can assist in this assessment. See DOD 4160.21-M Chapter 13 (Reclamation) for more information.

D-7 LIFE-CYCLE COST ANALYSIS CONSIDERATIONS.

Ensure costs related to the mitigation of adverse effects to historical properties are included in the Life-Cycle Cost Analysis (LCCA).

D-8 HISTORICAL LANDSCAPES.

Consider historic landscapes when planning water efficient landscapes and irrigation systems. See Secretary of Interior’s Guidelines for the Treatment of Cultural Landscapes for additional information.