



DEPARTMENT OF DEFENSE
GUIDING PRINCIPLES COMPLIANCE FOR
**NEW CONSTRUCTION
& MODERNIZATION**
TECHNICAL REFERENCE MANUAL

GUIDING PRINCIPLES COMPLIANCE VERIFICATION PER UNIFIED FACILITIES CRITERIA 1-200-02

VERSION 1.3

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Guiding Principles Compliance Department of Defense Overview

Introduction

Green Building Initiative's (GBI) Department of Defense Guiding Principles Compliance for New Construction & Modernization (DOD GPC NC) is a program designed specifically for DOD construction and major modernization projects undergoing Third-Party Certification (TPC) for the federal Guiding Principles. The DOD GPC NC program does not apply to existing buildings undergoing certification for the Guiding Principles – to learn more about the GPC Existing Buildings (GPC EB) program, please visit <http://www.thegbi.org/guiding-principles-compliance-certification/existing-buildings/>.

Developed with and for the Department of Defense, the DOD GPC NC program validates compliance with *Unified Facilities Criteria (UFC) 1-200-02 High Performance and Sustainable Building Requirements*¹. When a building meets the requirements of UFC 1-200-02, it is considered compliant with the *Guiding Principles for Sustainable Federal Buildings*² (HPSB Guiding Principles).

DOD GPC NC Program Materials

The Green Building Initiative's (GBI) DOD GPC NC program includes the following materials:

1. **DOD GPC NC Scoping Checklist:** An initial document used in the planning process for determining scope and funding for projects, in advance of official registration with Guiding Principles Compliance assessment program.
2. **DOD GPC NC Survey:** The primary document utilized by design and construction project teams, in addition to the assigned third-party assessor, to track and determine compliance throughout the construction or modernization project undergoing GPC NC DoD assessment.
3. **DOD GPC NC Technical Manual:** A reference supplemental to the survey, the Technical Manual includes guidance for criteria, references, and links to pertinent websites.

Environmental Topic Areas

There is a total of six (6) environmental topic areas within the Guiding Principles:

- I. Employ Integrated Design Principles
- II. Optimize Energy Performance
- III. Protect and Conserve Water
- IV. Enhance Indoor Environmental Quality
- V. Reduce the Environmental Impact of Materials
- VI. Assess and Consider Climate Change Risks

UFC Applicability

UFC 1-200-02, *High Performance and Sustainable Building Requirements* is effective for all DOD projects. To obtain the latest version of UFC 1-200-02, visit the Whole Building Design Guide's web page:

¹ U.S. Department of Defense (DOD). *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Latest version available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

² U.S. Council on Environmental Quality (CEQ). *Guiding Principles for Sustainable Federal Buildings and Associated Instructions*. March 2, 2016. Available from: <https://energy.gov/eere/femp/guiding-principles-sustainable-federal-buildings>

<http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

Projects that have a delay - either planned or unintentional - of more than 18 months between design completion and the solicitation of offers for construction **must be re-evaluated** to determine if any design revision is necessary due to changes in criteria (including codes and standards) or site infrastructure (e.g. water supply for fire department vehicle access).

For Air Force projects only: Review of applicable UFC requirements relevant to scope of the project is accomplished at each design submittal by emailing the AF Sustainability Requirements Scoresheet and the Design Analysis to AFCEC.CF.Sustainable.Rpt@us.af.mil.

Compliance Validation

A third-party assessment conducted by a GBI-trained assessor is required to validate compliance with the Guiding Principles as part of the DOD GPC NC assessment program. An assessor with expertise in green building design, engineering, and construction interfaces with project teams and building owners during the assessment process by reviewing and evaluating documentation, conducting a site visit, and creating a comprehensive assessment report for each building assessed.

For the purposes of compliance validation, the “HPSB Guiding Principles” are met when the requirements of UFC 1-200-02 are met, as applicable, during the third-party assessor’s final review.

DOD GPC NC Survey and Process

The DOD GPC NC assessment includes a third-party review of the completed DOD GPC NC Survey and supporting documentation as part of the Design Submittal phase as well as one of two final assessment options; 1) a Post-Construction Document Review or 2) an On-site Assessment. Supplementary reviews can be purchased for an additional fee if the team prefers more than one design review. The survey and assessments aid the Integrated Design Process (IDP) team throughout the design process per the unique goals and needs of each project.

DOD GPC NC Scoping Checklist

The DOD GPC NC Scoping Checklist is provided free of charge to assist Contracting Officers with creating the scope for funding DoD building projects. The Scoping Checklist guides teams in identifying non-applicable criteria (if any) for their project so that all remaining items become part of the overall scope for the project as requirements for GP compliance. It is used in advance of official registration with GBI’s Guiding Principles Compliance assessment program. To receive a copy of the DOD GPC NC Scoping Checklist, please contact GBI at 503-274-0448 or info@thegbi.org.

DOD GPC NC Survey

Registering and ordering a third-party assessment from GBI allows access to the DOD GPC NC Survey. Upon receipt of payment, GBI provides the survey to the project manager who, with the help of the project IDP team, will complete it. The DOD GPC NC Survey identifies all requirements from UFC 1-200-02, which are the basis for determining compliance with the HBSP Guiding Principles.

Survey - Compliance Criteria, Specific Requirements, Life Cycle Cost Analysis (LCCA), and Tracking

Immediately below each Guiding Principle on the survey are requirements, as well as Life-Cycle Cost Analysis and Tracking fields (if applicable). Many requirements refer to ASHRAE 189.1 while others require the submission of specific documents or adherence to certain criteria. Underneath requirements for each Guiding Principle additional instructions are provided for

agencies as necessary. Unless otherwise specified, instructions and requirements in the DOD GPC NC Survey apply to all DOD agencies.

Within the DOD GPC NC Survey, simply select the pink cell and pick from the drop-down list that appears for each requirement as applicable. For Life-Cycle Cost Analysis and Tracking (if applicable), enter the desired data in the open field blue cells. Specify answers according to the current construction phase. For example, during design select answers according to the goals, scope, and current progress (if any) towards meeting the requirement.

How to Answer Requirements

Next to every requirement is a drop-down list with two available answers:

1. **"Yes"** means an element is fully achieved, or highest resource efficiency is achieved with LCCA supporting documentation, or partial compliance is achieved with justification (with identified percentages), each of which is equivalent to "yes." Per UFC 1-200-02, **"partially compliant"** means:

"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)."
2. **"Not Applicable"** ("N/A") is to be used **only when**:
 - a. **Mission** precludes the element (e.g. facility mission prohibits the use of windows);
 - b. **Location of installation** restricts or precludes achievement of element (e.g. there is no local recycling);
 - c. **Location conditions** mean that the element is not part of the project (e.g. there is no meter for steam because there is no steam);
 - d. **Safety** (e.g. building orientation restriction for anti-terrorism due to existing infrastructure); or
 - e. **LCCA does not support** any compliance with this requirement.

How to Answer Life-Cycle Cost Analysis (LCCA)

Life-Cycle Cost Analysis is required for several energy, water, and renewable Guiding Principles, as well as for any other requirements where first cost is higher but life cycle cost effectiveness is applicable to design decision. Simply enter in all applicable details within the open text fields (in blue) supplied for Life-Cycle Cost Analysis within the survey.

Justification must be entered in the Survey's "Required Documentation & Comments" field for each element marked "N/A", including any LCCA supporting partial compliance (based on a percentage) or no compliance to a requirement. The project's achievement will not be negatively impacted because of indicating "N/A," or where LCCA supports partial compliance (with percentages) or no compliance to a requirement. The intent is for the project team to determine if any of the Guiding Principles are not applicable, and that the remaining requirements must be fully met including partial compliance with LCCA allowance.

Required Documentation & Comments

After selecting an answer, provide supporting documentation and comments in the yellow box to the right of the answer selection within the survey. These comments (and supplied supporting documentation) are required for the third-party assessment of the project.

All data and documentation indicated in ToolTips within the DOD GPC NC Survey must be supplied (pending the construction phase) unless otherwise specified.

Design Submittal Review

The third-party assessment of the project's contract documents³ occurs during design submittals. This review is required as part of the assessment process. It can take place at any point during the process as contract documents become available. The Project Execution Phases as specified within the DOD GPC NC Survey are:

- 1 – 30% Design Submittals
- 31 – 60% Design Submittals
- 61 – 90% Design Submittals
- 91 – 100% Design Submittals
- 100% Construction

If the project team desires, the review may happen prior to the 100% contract documents set is complete. When the DOD GPC NC Survey and supporting documentation are ready for assessor review, the project manager submits the completed survey to GBI, who assigns a third-party assessor to perform the Design Review. The project team works with the assigned assessor to deliver all needed documentation. The assessor reviews the survey and submitted documentation to verify progress towards compliance.

When the review is complete, the assessor writes a Design Review Report containing their findings. The report includes all requirements completed, requirements in progress, actions required for compliance, justifications for any partial or non-applicable criteria, projected compliance, and recommendations for the project. GBI reviews the report and, when approved, sends it to the project manager as well as uploads it to their GBI account (<https://www.thegbi.org/login>). The project team will review the report. The Design Review is a non-binding assessment, meaning the results are preliminary not final. To be validated as Compliant, a project must complete one of the two final assessment options and address all UFC requirements as "Yes" – completely compliant, partially compliant, or not applicable.

Final Assessment Options

There are two options for the final assessment: Post-Construction Document Review or On-Site Assessment. The project must undergo one of these options as part of the assessment process.

Final Assessment Option 1: Post-Construction Document Review

The Post-Construction Document Review is a third-party assessment of the project's completed construction. A completed Design Review is required prior to a Post-Construction Document Review. Final validation of compliance is based upon the assessor's review of additional supporting documentation such as submittals, cut sheets, commissioning reports and inspection reports. If there are any changes made to construction since the completion of the Design Review Report, the project team must update the DOD GPC NC Survey and provide any additional verification documentation as needed.

When construction is essentially complete (through the punch list) and the team has the post construction documentation available for review, the project manager submits the updated DOD GPC NC Survey and contacts GBI to schedule the review. GBI schedules a third-party assessor to perform the final review and issues a formal scheduling letter to the project manager and assessor. The letter includes the contact information for both parties to facilitate direct contact. Whenever possible, GBI assigns the same assessor for both the Design Review(s) and Post-Construction Document Review.

The assessor will create a report of their findings along with verification of compliance, including partial compliance (with percentages) and non-applicable requirements. GBI will review the report and, when approved, issue it to the project manager.

³ **contract documents:** all of the written and graphic documents (including BIM, CAD, and other electronic files) prepared or assembled by the architect/engineer for communicating the design, requirements, and administration of the project. The term "Contract documents" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications, as well as documentation of all modifications made after the construction agreements are signed.

After reviewing the report, the project manager may order recognition items (if not pre-ordered) to help celebrate and market the achievement.

Final Assessment Option 2: On-Site Assessment

The On-site Assessment is a third-party assessment of the project's completed construction. A completed Design Review is required prior to an On-site Assessment. Final validation of compliance is based upon the assessor's site visit results, including review of additional supporting documentation as necessary. If there are any changes made to construction since the completion of the Design Review Report, the project team must update the DOD GPC NC Survey and provide any additional verification documentation as needed.

When construction is essentially complete (through the punch list) and the team is ready to schedule the site visit, the project manager submits the updated DOD GPC NC Survey and contacts GBI to discuss the preferred timing of the site visit. GBI schedules a third-party assessor to perform the On-site Assessment and issues a formal scheduling letter to the project manager and assessor. The letter includes the contact information for both parties to facilitate direct contact. Whenever possible, GBI assigns the same assessor for both the Design Review(s) and On-site Assessment. Please note that the site visit typically requires 30 days of advance notice. In the weeks leading up to the site visit, the assigned assessor contacts the project manager to discuss the itinerary and specific details of the assessment.

Typically, the On-site Assessment begins with an introductory meeting in which the assessor interviews the key project players (Architect, MEP Engineers, Project Manager, General Contractor, etc.). Afterwards, one or two people can guide the assessor through the building. The government project manager must be present at all meetings and site visits to ensure the assessor receives the information needed to verify any outstanding criteria. If any follow-up documentation is requested during the site visit, it must be sent to the assessor within one week.

After the visit, the assessor will create a report of their findings along with verification of compliance, including partial compliance (with percentages) and non-applicable requirements. GBI will review the report and, when approved, issue it to the project manager. After reviewing the report, the project manager may order recognition items (if not pre-ordered) to help celebrate and market the achievement.

The duration of the site visit varies considerably based on the scope and size of the completed new construction project. Please allow approximately three to six hours for the assessor to review new documentation onsite, conduct a thorough walk-through of the interior space, and interview personnel.

i. LIFE-CYCLE COST ANALYSIS (LCCA)

i.a LCCA Format

i.a.1 UFC 1-200-02, Paragraph 1-7: Life-Cycle Cost Analysis (LCCA):

"The purpose of the LCCA methodology as detailed in CFR Title 10 Part 436 Subpart A is to identify and compare life-cycle cost-effective (LCCE) building energy and water systems that will in total achieve the energy and water requirements stated in this document. An LCCA is required for the following:

1. Energy consuming systems (e.g.: HVAC systems)
2. Renewable energy generating systems (ex: photovoltaic panels)
3. When LCCE is selected as the reason any requirement of this document is "Partially compliant" or "Not Applicable" (reference paragraph 4-2).

*The LCCA methodology may also be used to evaluate multiple options, such as selecting the building construction type and comparing compliant materials; and is at the discretion of the project team."*⁴

Requirements:

i.a.1.1: 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."

i.a.1.2: Prepare the LCCA using the Building Life-Cycle Costing (BLCC) program from NIST. Use the implied long-term inflation rate and discount rates identified in the Annual supplement to NIST Handbook 135.

i.a.1.3: LCCAs comparing individual component or system alternatives comply with UFC 1-200-02, Paragraph 1-7.3 (LCCA Individual Component or System Alternatives Analysis).

Required Documentation:

- LCCA report from Building Life Cycle Costing (BLCC) program;
- Narrative describing estimated building life.

Reference Material:

- UFC 1-200-02, Paragraph 1-7: Life Cycle Cost Analysis (LCCA)
- 10 CFR Part 436, Subpart A
- NIST Handbook 135, "Life-Cycle Costing Manual for the Federal Energy Management Program"
- UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems

External Hyperlinks:

- <http://energy.gov/eere/femp/building-life-cycle-cost-programs>
- <https://www.ecfr.gov/cgi-bin/text-idx?SID=1772217352e2b3956b37b48739ebd676&mc=true&node=pt10.3.436&rgn=div5>
- <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-410-01>

⁴ U.S. Department of Defense (DOD). *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

1. EMPLOY INTEGRATED DESIGN PRINCIPLES

1.a Sustainable Locations

1.a.1 UFC 1-200-02, Paragraph 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.”⁵

Requirements:

1.a.1.1: Evaluate site and building components for determination on passive &/or natural design strategies.

LCCA: What was the finding of the Life-Cycle Cost Analysis (LCCA)?

Required Documentation:

- NIST BLCC report indicating the natural and/or passive design strategies compared to conventional construction techniques.

Assessment Guidance:

Passive and natural design strategies and features are subject to Life Cycle Cost Effectiveness (LCCE), and must be determined for inclusion prior to active and mechanical systems are designed. Incorporate features where applicable.

1.a.2 UFC 1-200-02, Paragraph 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.”⁵

Requirements:

1.a.2.1: Meet requirements of **UFC 2-100-01 Installation Master Planning**.

Required Documentation:

- Copy of Master Plan sections that identify relevant site;
- Copy of Design Charrette minutes that identify evaluation of building’s site in accordance with the Master Plan.

Assessment Guidance:

See UFC 2-100-01 Appendix B “Best Practices” for desirable site characteristics.

⁵ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

External Hyperlinks:

- *UFC 2-100-01 Installation Master Planning:* <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-2-100-01>

1.a.3 UFC 1-200-02, Paragraph 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 activity.”*⁶

Requirements:

1.a.3.1: Site design elements ensure safe and convenient pedestrian access.

1.a.3.2: Incorporate results of site analysis into design, with focus on orientation, configuration, and massing.

1.a.3.3: Orient building to maximize energy efficiency, passive solar, and daylighting potential.

1.a.3.4: Incorporate high performance and sustainable systems into design.

1.a.3.5: Design promotes opportunities for occupants to voluntarily increase physical activity.

Required Documentation:

- Copy of Design Charrette meeting minutes that identify each of the required elements.

External Hyperlinks:

- UFC 3-201-02 Landscape Architecture, With Change 1: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-201-02>

⁶ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

1.b Integrated Design

1.b.1 UFC 1-200-02, Paragraph 2-2.1 Integrated Design

“Incorporate the following planning and evaluation into the integrated design, as described in ASHRAE 189.1 Informative Appendix. Follow the steps of design optimization, as applicable, in ASHRAE 189.1 Section F1.1.1 (Charrette Process), with the exception that subparagraph b. does not apply.”⁶

Requirements:

1.b.1.1: Follow the steps of design optimization for the Integrated Design Charrette Process in ASHRAE 189.1 Section F1.1.1 (Charrette Process). Submit list of stakeholders.

Required Documentation:

- List of key project stakeholders and personnel including description of their major tasks.

Reference Material:

- ASHRAE 189.1 Section F1.1.1 (Charrette Process)

1.b.2 UFC 1-200-02, Paragraph 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 design and construction.”⁷

Requirements:

1.b.2.1: Submit meeting notes, project goals, and design charrette matrix and decisions Showing established goals for siting, energy, water, materials, indoor environmental quality, and other comprehensive design goals.

Required Documentation:

- Project meeting minutes and agendas detailing which project members were in attendance;
- Project goals and outcomes of meetings.

Reference Material:

- ASHRAE 189.1 Informative Appendix
- ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, Standard for the Design of High-Performance Green Buildings, Appendix F: Integrated Design

1.c Commissioning

1.c.1 UFC 1-200-02, Paragraph 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

⁷ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

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 complex⁸, commissioning may be tailored as determined by the DOD Component AHJ⁹.
- “Schematic design” is the design charrette or similar conceptual design activity prior to completion of 35% design.
- Documentation as described in ASHRAE 55 Section 6.2 is not required.”¹⁰

Requirements: Complete all nine (9) requirements (as applicable).

Exception: For military treatment facilities, refer to UFC 4-510-01 Military Medical Facilities for commissioning requirements.

Air Force projects only: The Project Delivery team must determine the level of commissioning activities required.

1.c.1.1: Submit the design documentation requirements of ASHRAE 189.1 Section 10.3.1.2.1 Activities Prior to Building Permit.

1.c.1.2: The CxA has conducted a focused OPR review of the contract documents at or near 50% design completion.

1.c.1.3: The CxA has conducted a second, focused OPR review of the final contract documents.

1.c.1.4: Submit the contract documentation requirements of ASHRAE 189.1 Section 10.3.1.2.2 Activities Prior to Building Occupancy.

1.c.1.5: Submit the contract documentation requirements of ASHRAE 189.1 Section 10.3.1.2.3 Post-Occupancy Activities.

1.c.1.6: Submit the contract documentation requirements of ASHRAE 189.1 Section 10.3.1.2.4 Systems.

1.c.1.7: Submit the contract documentation requirements of ASHRAE 189.1 Section 10.3.1.2.5 Building Envelope Airtightness.

1.c.1.8: Submit the contract documentation requirements of ASHRAE 189.1 Section 10.3.1.2.6 Documentation.

1.c.1.9: Submit an electronic O&M Manual (hard copy optional).

⁸ For Army projects, refer to Army policy for determination of systems to commission.

⁹ For Air Force and Navy projects, the Project Delivery Team must determine the level of commissioning activities required.

¹⁰ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

Required Documentation:

- Designated project commissioning authority (CxA);
- Owner's Project Requirements (OPR);
- Design team's Basis of Design (BOD).
- Project specifications including construction phase commissioning requirements
- Other contract documents including construction phase commissioning requirements
- Commissioning plan
- OPR Review
- Construction checklist and verification
- Preliminary commissioning report
- System manual, including O&M documentation
- Final commissioning report

Reference Material:

- *ASHRAE 189.1 Section 10.3.1.2.1 Activities Prior to Building Permit (Building Project Commissioning)*
- *ASHRAE 189.1 Section 10.3.1.2.2 Activities Prior to Building Occupancy (Building Project Commissioning)*
- *ASHRAE 189.1 Section 10.3.1.2.4 Systems (Building Project Commissioning)*
- *ASHRAE 189.1 Section 10.3.1.2.6 Documentation (Building Project Commissioning)*
- *UFC 4-510-01 Design: Military Medical Facilities:* <http://wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-4-510-01>

Assessment Guidance:

During the design phase, the CxA must review the OPR, design documents and any Basis of Design (BOD) documents assembled by the design team. The design document reviews focus on the “big picture”, focusing on operability, accessibility, maintainability, efficiency, coordination between systems and controls. Approximately one-third of commissioning field problems can be traced back to design, so this process is key. The CxA must also help prepare commissioning related specifications for the design team, develop pre-functional checklists and functional performance tests for all equipment to be commissioned, and finalize the Commissioning Plan. Specification sections related to commissioning are typically included in the Division 01 sections (listing checklists, prerequisites to testing, testing requirements and reports) and also in individual sections in Divisions 02 through 48 (stating which systems are to be commissioned and requirements for contractors to complete checklists and performance tests). The CxA will also develop training and systems manual requirements.

The construction phase is where the largest amount of commissioning work takes place. The CxA's activities will include:

- Reviewing submittals against the Commissioning Plan, OPR, and BOD
- Revise the OPR, Commissioning Plan and schedule, if necessary
- Document construction observations on site and compile these into a commissioning issues log and photo log
- Review pre-functional test checklists completed by contractors
- Conduct Functional Performance Testing of equipment and systems
- Develop a systems manual that includes operations and maintenance manuals for commissioned equipment

During this time, the CxA might also meet with the designers and contractors to review complex systems such as the BAS and sequence of operations. Once all the above activities are complete, the CxA will develop and distribute the Commissioning Report.

Close-out documents for typical new construction projects include what may be often be referred to as an Operations and Maintenance (O&M) Manual. Electronic O&M Manuals (hard copy optional) for green and sustainable buildings need to encompass all the operating aspects of the building that have an impact on its surrounding environment and occupants. Simply because a building was built green does not mean it will operate in an environmentally-friendly fashion unless thorough operating procedures are in place as soon as the building is occupied. Conventional practices may provide O&M Manuals that

include mainly HVAC equipment. Manuals of this type are useful but are not sufficient to ensure the building staff can successfully operate the building post-construction. This requirement is meant to address the building's overall operating procedures, not solely the engineered systems.

All management plans and policies should include who the responsible parties are, including any outside vendors, what actions will be taken as part of the plan, why the actions are environmentally preferable versus standard operating procedures and any tracking or verifying documentation that will be required. The Assessor will look for submission of an electronic Operations and Maintenance Manual (hard copy optional) that clearly notes each of the site management items it addresses. The Assessor will also be checking to ensure each management plan or policy is complete.

2. OPTIMIZE ENERGY PERFORMANCE

“Base energy efficiency design decisions on LCCA as indicated in Chapter 1 of (UFC 1-200-02). The LCCA includes a minimum of three energy efficient alternatives to the baseline standard (ASHRAE 90.1, IECC, etc.)”¹¹

2.a Energy Efficiency

Select the Option most applicable to your project:

- **Option A: Commercial and Multi-Family High-Rise Residential Buildings**
- **Option B: Low-Rise Residential Buildings**
- **Option C: Renovations**

OPTION A

2.a.1.A UFC 1-200-02, Paragraph 2-3.1.1 Commercial and Multi-Family High-Rise Residential Buildings

- *“Meet the requirements of ASHRAE 90.1¹².*
- *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 alternatives 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 = $100 \times ((\text{Baseline building consumption} - \text{Receptacle and process loads}) - (\text{Proposed building consumption} - \text{Receptacle and process loads})) / (\text{Baseline building consumption} - \text{Receptacle and process loads})$ ¹³”¹²

Requirements (OPTION A):

2.a.1.A.1: Meet the requirements of ASHRAE 90.1.

2.a.1.A.2: Submit energy model showing the proposed building model to achieve at least 30% - less if LCCE - energy consumption reduction from ASHRAE 90.1 baseline.

2.a.1.A.3: Determine energy consumption levels for ASHRAE Baseline Building and proposed building alternatives.

Required Documentation:

- Summary of the proposed energy model’s inputs and outputs;
- Modeling report.

¹¹ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

¹² **Use ASHRAE 90.1(2010) for all projects where design starts before November 6, 2016. Use ASHRAE 90.1(2013) thereafter.**

¹³ 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.

Reference Material:

- ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings¹³

OPTION B

2.a.1.B UFC 1-200-02, Paragraph 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 alternatives to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.

Requirements (OPTION B):

2.a.1.B.1: Meet the requirements of International Energy Conservation Code (IECC).

2.a.1.B.2: Submit energy model showing the proposed building alternatives to achieve at least 30% - less if LCCE - energy consumption reduction from IECC baseline (Section 405, Simulated Performance Alternative).

Required Documentation:

- Summary of the proposed energy model’s inputs and outputs;
- Modeling report.

Reference Material:

- International Energy Conservation Code (IECC)

OPTION C

2.a.1.C UFC 1-200-02, Paragraph 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 ASHRAE 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.

Requirements (OPTION C): *Will this renovation replace everything above the foundation?*

2.a.1.C.1: If replacing everything above the foundation:

2.a.1.C.1.i: Apply either UFC 2-3.1.1 (Commercial and Multi-Family High-Rise Residential Buildings) OR 2-3.1.2 (Low-Rise Residential Buildings) as applicable.

2.a.1.C.2: For all other renovations, choose from one of the following four (4) options:

2.a.1.C.2.i: Reduce measured building energy use by at least 30%, below FY 2003 energy use baseline.

2.a.1.C.2.ii: Reduce measured building energy use by at least 20% below FY 2015 energy use baseline.

2.a.1.C.2.iii: Reduce modeled energy use (from all sources including renewable energy) by 20% compared to the ASHRAE 90.1 baseline building design.

2.a.1.C.2.iv: If none of the above reductions are LCCE, design to achieve an energy consumption level at the highest level of energy efficiency that is LCCE.

Required Documentation:

- Summary of the proposed energy model's inputs and outputs;
- Modeling report;
- LCCA Report (if applicable).

Enter LCCA and tracking data for 2.a.1 (Energy Efficiency), regardless of OPTION selected above.

LCCA: What was the finding of the Life-Cycle Cost Analysis (LCCA)?

Tracking 1: What is the current energy consumption reduction percentage?

Tracking 2: Provide Energy Use Intensity (EUI) (kBtu/Sq. Ft./Year per building)

2.a.2 UFC 1-200-02, Paragraph 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 <https://energy.gov/eere/femp/federal-energy-management-program>." ¹⁴

Requirements:

2.a.2.1: Select energy consuming products and equipment with Energy Star or FEMP designation.

Required Documentation:

- ENERGY STAR & FEMP labeling for plug-in equipment and fixed building equipment.

¹⁴ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

Reference Material:

- UFC 1-200-02, Paragraph 1-7
- 10 CFR Part 436, Subpart A
- NIST Handbook 135, "Life-Cycle Costing Manual for the Federal Energy Management Program"

External Hyperlinks:

- ENERGY STAR® Qualified Product Lists: <http://www.energystar.gov>
- Federal Energy Management Program (FEMP) – Energy and Water Efficient Products: <http://www1.eere.energy.gov/femp>

2.a.3 UFC 1-200-02, Paragraph 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."*¹⁵

Requirements:

2.a.3.1: Provide commercially available, off-the-shelf products that use no more than 1 watt in standby mode.

Required Documentation:

- List of equipment that operates in a standby mode that includes the standby wattage;
- Cut sheets for applicable equipment that provides the standby wattage.

Reference Material:

- *Energy Independence and Security Act of 2007* (EISA 2007), Section 524

External Hyperlinks:

- H.R.6 – Energy Independence and Security Act of 2007: <https://www.congress.gov/bill/110th-congress/house-bill/6>

2.b Renewable and Clean Energy

2.b.1 UFC 1-200-02, Paragraph 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. When available, utilize Installation-specific studies to determine LCCE renewable energy systems. Studies must be dated within five years of project design start. 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.*

¹⁵ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

- *Components may choose LCCE centralized or Installation-wide renewable energy development, in lieu of building by building application. Meet the requirements of UFC 3-540-08.”¹⁶*

Requirements:

2.b.1.1: Submit Life Cycle Cost Analysis for on-site renewable energy (minimum quantity per ASHRAE 189.1 Section 7.4.1.1).

2.b.1.2: Submit documentation for on-site renewable energy system(s).

LCCA: What was the finding of the Life-Cycle Cost Analysis (LCCA)?

Tracking 1: What percentage of energy will come from the renewable energy system(s)?

Tracking 2: What is the system's total capacity for renewable electric energy?

Tracking 3: What is the system's total capacity for renewable thermal energy?

Tracking 4: List renewable energy technology.

Tracking 1 - NAVY ONLY: What is the installation-level solution to renewable energy systems for this project?

Required Documentation:

- On-site renewable energy feasibility studies or Life-Cycle Cost Analysis LCCA);
- Renewable energy design documents, plans and specifications, and sub-contract, if applicable.

Reference Material:

- UFC 3-440-01 Facility-Scale Renewable Energy Systems: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-440-01>

2.b.2 UFC 1-200-02, Paragraph 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.”¹⁷

Requirements:

2.b.2.1: Purchase and install solar domestic hot water system where life cycle cost effective.

¹⁶ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

¹⁷ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

LCCA: What was the finding of the Life-Cycle Cost Analysis (LCCA)?

Tracking 1: What percentage of the hot water demand is being met through the installation of solar hot water heaters?

Required Documentation:

- NIST BLCC that compares the use of SDHW to conventional water heating;
- Calculations that demonstrate the percent of hot water that is supplied by SDHW.

Reference Material:

- *Energy Independence and Security Act of 2007 (EISA 2007), Section 523*

2.c Metering

2.c.1 UFC 1-200-02, Paragraph 2-3.4 Metering

“A utility meter must be installed at each building, for each utility serving the building (steam, electricity, and natural gas) in the standard units of the measure. Where base wide energy and utility monitoring and control systems exist, meters must be connected 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. Meter configuration must comply with requirement of UFC 4-010-06.”¹⁸

Requirements 2.c.1.1 – 2.c.1.3: Choose “Yes” for each utility available at the project site, and “Not Applicable” for utilities not available.

Requirements 2.c.1.4 – 2.c.1.5: Select “Not Applicable” if there is no centralized system.

Requirements:

2.c.1.1: Is electricity metered at the building level?

2.c.1.2: Is natural gas metered at the building level?

2.c.1.3: Is steam metered at the building level?

2.c.1.4: Submit documentation of electric meter at each building connected to base-wide monitoring system.

2.c.1.5: Submit documentation of utility meters for all other sources at each building, connected to the base-wide monitoring system.

¹⁸ U.S. Department of Defense. *Utilities Meter Policy*. April 16, 2013. Available from:
http://www.acq.osd.mil/eie/IE/FEP_Policy_Program_Guidance.html

Required Documentation:

- Mechanical and electrical plans showing what utilities will be metered.

Reference Material:

- U.S. Department of Defense Utilities Meter Policy.
- UFC 4-010-06 Cybersecurity of Facility-Related Control Systems: <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-4-010-06>.

External Hyperlinks:

- Installation Energy Policy and Program Guidance. Office of the Assistant Secretary of Defense for Energy, Installations, and Environment: http://www.acq.osd.mil/eie/IE/FEP_Policy_Program_Guidance.html

Assessment Guidance:

“Not Applicable” is justifiable for 2.c.1.4 and 2.c.1.5 as a “location” when the base does not yet have the centralized system.

3. PROTECT AND CONSERVE WATER

“Base water efficiency design decisions on life-cycle cost as indicated in Chapter 1 of (UFC 1-200-02).”¹⁹

3.a Indoor Water Use

3.a.1 UFC 1-200-02, Paragraph 2-4.1 Indoor Water

- *“Meet the requirements of ASHRAE 189.1 Section 6.3.2 (Building Water Use Reduction), which incorporates EPA 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 infrastructure. Fixtures used for sanitizing potential biohazards are exempt from low-flow and WaterSense labeling requirements.*
- *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).”¹⁹*

Requirements:

3.a.1.1: Submit documentation of compliance with ASHRAE 189.1 Section 6.3.2 (Building Water Use Reduction), which incorporates USEPA WaterSense-labeled products.

3.a.1.2: Submit documentation of compliance with ASHRAE 189.1 Section 6.4.2 (Building Water Use Reduction).

3.a.1.3: Submit documentation of compliance with ASHRAE 189.1 Section 6.4.3 (Special Water Features).

LCCA: What was the finding of the Life-Cycle Cost Analysis (LCCA)?

Tracking 1 – NAVY ONLY: Water Use Intensity (Enter data as GAL/Sq. Ft./Year per building. Only for new construction and complete system replacement)

Required Documentation:

- Product cut sheets demonstrating compliance with ASHRAE 189.1 Section 6.3.2.1;
- Plumbing drawings documenting compliance with ASHRAE 189.1 Section 6.4.2;
- Documentation demonstrating special water features (if any) comply with ASHRAE 189.1 Section 6.4.3;
- LCCA for building water use reduction requirements

Reference Material:

- *ASHRAE 189.1 Section 6.3.2 (Building Water Use Reduction)*
- *ASHRAE 189.1 Section 6.4.2 (Building Water Use Reduction)*
- *ASHRAE 189.1 Section 6.4.3 (Special Water Features)*
- *ASME A112.19.2/CSA B45.1 Ceramic Plumbing Fixtures*
- *ASME A112.19.14 Six-Liter Water Closets Equipped With a Duel Flushing Device*

¹⁹ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

- ASME A112.19.19 Vitreous China Nonwater Urinals
- ASME A112.18.1/CSA B125.1 Plumbing Supply Fittings
- IAPMO Z124.9 Plastic Urinal Fixtures
- U.S. EPA WaterSense Tank-Type High-Efficiency Toilet Specification

3.a.2 UFC 1-200-02, Paragraph 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. Meter configuration must comply with requirements of UFC 4-010-06.”²⁰*

Requirements:

3.a.2.1: Submit documentation for water meter(s) at each building, connected to base-wide monitoring system.

Required Documentation:

- Copy of base wide monitoring plan that includes the installation of the building specific meters;
- Cut sheets for installed water meters that demonstrate connection to base wide monitoring system.

Reference Material:

- DoD Utilities Meter Policy (16 April 2013)
- UFC 4-010-06 Cybersecurity of Facility-Related Control Systems: <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-4-010-06>.

3.b Outdoor Water Use

3.b.1 UFC 1-200-02, Paragraph 2-4.2.1 Landscaping

- *“In accordance with DOD Memo “Water Use for Landscape Architecture on Department of Defense Installations/Sites”, potable water use is prohibited for irrigating new landscaping, other than for plant establishment.*
- *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.”²⁰*

Requirements:

3.b.1.1: Submit documentation showing no potable water is used for new landscaping.

3.b.1.2 For existing systems, if a building has a single water meter: Submit documentation of 20% indoor and outdoor potable water use reduction. Calculate water savings results to baseline building using EPA's WaterSense landscape water budget tool version 1.01 or later.

²⁰ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

3.b.1.3: Require irrigation contractors to be certified through a WaterSense labeled program, or by another industry-recognized, credentialing program.

LCCA: What was the finding of the Life-Cycle Cost Analysis (LCCA)?

Required Documentation:

- Copy of the WaterSense Water Budget Tool, with the following completed worksheets:
 - Part 1 – Baseline & LWA
 - Part 2 – LWR
 - Part 3 – Results
- Irrigation system design and short narrative describing that no potable water is used for irrigating new landscaping (other than for plant establishment).

Reference Material:

- *DOD Memo: Water Use for Landscape Architecture on Department of Defense Installations/Sites*
- *UFC 3-201-02 Landscape Architecture*
- EPA's WaterSense Water Budget Tool: www.epa.gov/watersense/water_budget

3.b.2 UFC 1-200-02, Paragraph 2-4.2.2 Outdoor Water Metering

"For existing irrigation system using potable water and serving more than 25,000 square feet of landscape, provide water meters, 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. Meter configuration must comply with requirements of UFC 4-010-06.

*For all other existing irrigation systems using potable water, meters are encouraged."*²¹

Requirements:

For existing irrigation systems using potable water and serving more than 25,000 sq. ft. of landscape.

3.b.2.1: Submit documentation for separate water meters for outdoor water use.

Required Documentation:

- Contract documents: plans and specifications.

Reference Material:

- UFC 4-010-06 Cybersecurity of Facility-Related Control Systems: <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-4-010-06>.

²¹ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

3.c Alternative Water

3.c.1 UFC 1-200-02, Paragraph 2-4.3 Alternative Water

*"Where life-cycle cost-effective and permitted by local laws and regulations, use alternative water sources."*²²

Requirements:

3.c.1.1: Submit documentation of water efficient landscape and irrigation strategies, such as water reuse and the use of harvested rainwater.

Required Documentation:

- NIST BLCC calculations that compare the use of alternate water sources to the use of potable water for irrigation;
 - Drawing and specifications that demonstrate the use of alternate water sources;
- OR
- A copy of local regulations that demonstrate that the use of alternate water sources is prohibited.

Reference Material:

- *UFC 3-210-10 Low Impact Development*

3.d Stormwater Management

3.d.1 UFC 1-200-02, Paragraph 2-4.3.1 Stormwater Management

*"Meet the requirements of UFC 3-210-10."*²²

Requirements:

3.d.1.1: Are the requirements of UFC 3-210-10 Low Impact Development applicable to this project?

3.d.1.2: Submit documentation (see Required Documentation below) to validate the as-built LID-integrated management practices meet the design requirements, per UFC 3-210-10 Low Impact Development.

3.d.1.3 – NAVY ONLY: Does the project require NAVY LID policy?

Required Documentation:

- Pre-development condition;
- EISA Section 438 estimated implementation costs for design and construction;
- Calculation for run-off volumes and rates in 95th percentile rainfall;
- Technical constraints;
- Stormwater features and their location(s);
- Construction cost;
- Validation documentation of constructed features.

²² U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

Reference Material:

- *FC 1-300-09N NAVY AND MARINE CORPS DESIGN PROCEDURES*, Paragraph 6-6.1
- *UFC 3-210-10 Low Impact Development*

Assessment Guidance:

Compliance with UFC 3-210-10 Low Impact Development, Technical Requirements Documentation, is required for all projects that construct or expand one or more buildings as part of its primary scope, and includes footprint greater than 5,000 gross square feet of new, impervious surfaces associated with the building(s). This includes both building area and pavement area of associated supporting facilities.

Requirement 3.d.1.3 is for **NAVFAC projects only**. Renovation projects with construction cost of greater than \$5M and with a stormwater element must comply with the requirements of FC 1-300-09N NAVY AND MARINE CORPS DESIGN PROCEDURES, Paragraph 6-6.1.

4. ENHANCE INDOOR ENVIRONMENTAL QUALITY

4.a Ventilation and Thermal Comfort

4.a.1 UFC 1-200-02, Paragraph 2-5.1 Ventilation and Thermal Comfort

“Comply with UFC 3-410-01 for ventilation and thermal comfort criteria. Consider the use of passive (non-mechanical) thermal comfort methods as described in paragraph entitled, “Integrated Design” in (UFC 1-200-02).

Exception: For Medical Treatment Facilities, refer to UFC 4-510-01 Medical Military Facilities for ventilation and thermal comfort criteria.”²³

Requirements:

4.a.1.1: Meet the requirements of UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems.

4.a.1.2 – If Medical Treatment Facility: Meet the requirements of UFC 4-510-01 Medical Military Facilities.

4.a.1.3: Show proof that passive ventilation and thermal comfort methods are allowed and encouraged.

Required Documentation:

- Operating and maintenance manual;
- HVAC controls information, including diagrams and schematics;
- Air balance report;
- Construction drawings of record, control drawings, and final design drawings;
- Design criteria and assumptions.

Reference Material:

- *UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems:* <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-410-01>
- *UFC 4-510-01 Medical Military Facilities:* <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-4-510-01>

4.b Daylighting and Lighting Controls

4.b.1 UFC 1-200-02, Paragraph 2-5.2 Daylighting and Lighting Controls

“Locate all regularly occupied spaces, such as classrooms and offices, on exterior walls or other locations where it is feasible to provide 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).”²⁴

Requirements:

²³ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

²⁴ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

4.b.1.1: All regularly occupied spaces located on the exterior wall have vision fenestration.

4.b.1.2: All classrooms and offices have daylighting.

4.b.1.3: 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).

Required Documentation:

- Minimum sidelighting effective aperture for all north-, south-, and east-facing facades;
- Combined width of the primary sidelighted areas against length of the facade wall;
- Opaque interior surfaces' visible light reflectance percentages in daylight areas for:
 - Ceilings
 - Partitions higher than 60 in. (1.8 m)
- Narrative describing any exceptions to ASHRAE 189.1 Section 8.4.1.1 Minimum Sidelighting Effective Aperture.

Reference Material:

- *ASHRAE 189.1 Section 8.4.1 Daylighting by Sidelighting*
- *ASHRAE 189.1 TABLE 8.4.1.1 Minimum Sidelighting Effective Aperture*
- *ASHRAE 189.1 Section 8.5.1.2 Usable Daylight Illuminance in Office Spaces and Classrooms*

4.b.2 UFC 1-200-02, Paragraph 2-5.2 Daylighting and Lighting Controls

“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.”²⁴

Requirements:

4.b.2.1: Provide automated lighting controls in accordance with UFC 3-530-01 Interior and Exterior Lighting Systems and Controls, Sections 2-2 Lighting Controls (Interior) and 4-3 Lighting Controls (Exterior).

4.b.2.2 If Medical Treatment Facility: Meet the requirements of UFC 4-510-01 Medical Military Facilities.

Required Documentation:

- Construction drawings, specifications, and product cut sheets that demonstrate the use of automated lighting controls.

Reference Material:

- *UFC 3-530-01 Interior and Exterior Lighting Systems and Controls:* <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-530-01>
 - Section 2-2 Lighting Controls (Interior)
 - Section 4-3 Lighting Controls (Exterior)

- UFC 4-510-01 Medical Military Facilities: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-4-510-01>

4.c Indoor Air Quality

4.c.1 UFC 1-200-02, Paragraph 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) by including and implementing these requirements in the IAQ construction management plan; 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.”²⁵

Requirements:

4.c.1.1: Meet the requirements of ASHRAE 189.1 Section 10.3.1.5. Include and implement these requirements in the IAQ construction management plan.

4.c.1.2: Meet the requirements of UFC 3-410-01, Chapter 3, Sections 3-2 and 3-3 (Ventilation Air).

4.c.1.3: Meet the requirements of UFC 3-101-01 Architecture, Chapter 3, Building Envelope Requirements. Submit design details complying with moisture control requirements.

Required Documentation:

- Sustainability Action Plan, per UFGS 01 33 29;
- Design details complying with moisture control requirements per UFC 3-101-01 Section 3-5 Moisture Barrier, including details per the following sub-sections:
 - 3-5.1 Water-Resistive Barriers (WRB)
 - 3-5.2 Vapor Retarders
 - 3-5.3 Waterproofing
 - 3-5.4 Mold Mitigation and Prevention

Reference Material:

- ASHRAE 189.1 Section 10.3.1.5 Moisture Control
- UFC 3-101-01 Architecture, Chapter 3 Building Envelope Requirements: <http://wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-101-01>
- UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems, With Change 3: <http://wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-410-01>
- UFGS 01 33 29 Sustainability Reporting Section 1.4.1 Sustainability Action Plan: <http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-01-33-29>
- **For Navy projects:** Navy Interim Technical Guide FY03-04 NAVFAC Mold Response Manual
- **For Air Force projects:** Engineering Technical Letter (ETL) 04-03 (Change 1): Design Criteria for Prevention of Mold in Air Force Facilities

²⁵ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

4.c.2 UFC 1-200-02, Paragraph 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.”²⁶

Requirements:

4.c.2.1: Meet the requirements of ASHRAE 189.1 Section 8.4.2 Materials (Prescriptive Option).

Required Documentation:

- Narrative and/or spreadsheet including reported emissions or VOC contents for each of the below:
 - Adhesives and Sealants
 - Emissions Requirements
 - VOC Content Requirements
 - Paints and Coatings
 - Floor Covering Materials
 - Composite Wood, Wood Structural Panel and Agrifiber Products
 - Office Furniture Systems and Seating
 - Ceiling and Wall Systems

Reference Material:

- *ASHRAE 189.1 Section 8.4.2 Materials (Prescriptive Option)*

4.c.3 UFC 1-200-02, Paragraph 2-5.3.3 Protect Indoor Air Quality during Construction

“For new construction and for renovation of unoccupied existing buildings, develop and implement an IAQ construction management plan that complies 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. Refer to Appendix B “Protect Indoor Air Quality” for best practices.”²⁷

Requirements:

4.c.3.1: For new construction and for renovation of unoccupied existing buildings, meet the requirements of ASHRAE 189.1 Section 10.3.1.4 Indoor Air Quality (IAQ) Construction Management.

4.c.3.2: For renovation of occupied existing buildings, meet the requirements of SMACNA IAQ Guidelines for Occupied Buildings Under Construction, 2nd edition ANSI/SMACNA 008-2008.

²⁶ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

²⁷ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

Required Documentation:

- IAQ construction procedures in an Indoor Air Quality/Indoor Environmental Quality Plan or Division 01 specifications;
- General Contractors' Environmental Management System;
- IAQ Management Plan.

Reference Material:

- ASHRAE 189.1 Table 10.3.1.4 (Maximum Concentration of Air Pollutants Relevant to IAQ)
- SMACNA IAQ Guidelines for Occupied Buildings Under Construction, 2nd edition ANSI/SMACNA 008-2008, including Appendix B "Protect Indoor Air Quality" for best practices

4.c.4 UFC 1-200-02, Paragraph 2-5.3.4 Environmental Tobacco Smoke Control

"Prohibit smoking²⁸ 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."²⁷

Requirements:

4.c.4.1: Meet the requirements of ASHRAE 189.1 Section 8.3.1 Manage environmental tobacco smoke.

Required Documentation:

- SECNAV INSTRUCTION 5100.13E Navy and Marine Corps Tobacco Policy.

Reference Material:

- ASHRAE 189.1 Table 10.3.1.4 (Maximum Concentration of Air Pollutants Relevant to IAQ).

4.d Occupant Health and Wellness

4.d.1 UFC 1-200-02, Paragraph 2-5.4 Occupant Health and Wellness

"Promote opportunities for occupants to voluntarily increase physical activity, as part of the Integrated Design Process."²⁹

Requirements:

4.d.1.1: During Integrated Design Process, identify efforts to promote opportunities for occupant physical activity.

Required Documentation:

- Meeting minutes from the design Charrette that indicate how the occupant health and wellness criteria were included in design.



²⁸ Refer to Service-specific policies: **Army:** <https://www.army.mil/e2/c/downloads/462009.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

²⁹ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

Assessment Guidance:

Efforts include, but are not limited to, designing and locating stairwells that encourage occupant use, providing convenient access to healthy dining options, potable water, daylight, plants, and exterior views. These efforts should be evaluated and documented during the Integrated Design Process.

5. REDUCE ENVIRONMENTAL IMPACT OF MATERIALS

“The following paragraphs 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.”³⁰

5.a Material Content and Performance

5.a.1 UFC 1-200-02, Paragraph 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 <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>.”³¹

Requirements:

5.a.1.1: Comply with RCRA Section 6002, per EPA’s Comprehensive Procurement Guideline website.

5.a.1.2: For EPA-designated products, specify products meeting or exceeding EPA’s recycled content recommendations.

Required Documentation:

- Bill of materials
- Calculations for materials permanently installed in the project
- List of products meeting or exceeding EPA’s CPG program
- Additional documentation as applicable:
 - LCA results and/or documentation
 - Product comparison documentation

Reference Material:

- RCRA Section 6002 Solid Waste Disposal Act
- EPA’s Comprehensive Procurement Guideline (CPG) Program: <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>
- EPA Website, Recommendations of Specifications, Standards, and Ecolabels for Federal Purchasing: <https://www.epa.gov/greenerproducts/recommendations-specifications-standards-and-ecolabels-federal-purchasing>
- SF Tool, Green Procurement Compilation: <https://sftool.gov/greenprocurement>

5.a.2 UFC 1-200-02, Paragraph 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. Deviation from using biobased product procurement must be documented. A preference for purchasing products with the highest biobased content per USDA recommendations for designated product categories

³⁰ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

³¹ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

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/>.”³⁰

Requirements:

5.a.2.1: Specify products composed of the highest percentage of biobased content consistent with the USDA BioPreferred Program if products meet performance and are available at a reasonable cost.

5.a.2.2: Provide written narrative detailing research, analysis, and final determination of exclusion or inclusion of considered bio-based products in project.

Required Documentation:

- Bill of materials
- List of biobased content products
- Narrative detailing research, analysis, and final determination of bio-based products in the project, including any deviation from using biobased product procurement

Reference Material:

- ASHRAE 189.1 Section 9.4.1.3 Biobased Products
- USDA BioPreferred® Program: www.biopreferred.gov/

5.a.3 UFC 1-200-02, Paragraph 2-6.1.3 Ozone Depleting Compounds

“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 EPA's 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.”³²

Requirements:

5.a.3.1: Provide written narrative detailing research, analysis, and final determination of exclusion or inclusion of considered environmentally preferable products in project.

5.a.3.2: Meet the requirements of ASHRAE 189.1 Section 9.3.3: Do not use CFC-based refrigerants in HVAC&R Systems.

5.a.3.3: Comply with UFC 3-600-01 Fire Protection Engineering for Facilities for allowable chemicals in fire suppression systems.

Required Documentation:

³² U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

- List of ODP products
- Submittals: manufacturer's product data and specifications
- HVAC&R System Specification
- Construction drawings (new systems or modified systems)

Reference Material:

- *ASHRAE 189.1 Section 9.3.3 Refrigerants (Construction Waste Management)*
- *UFC 3-600-01 Fire Protection Engineering for Facilities, With Change 1, Chapter 4 Fire Extinguishing Systems:*
<http://wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-3-600-01>

5.b Waste Diversion and Materials Management

5.b.1 UFC 1-200-02, Paragraph 2-6.2.1 Storage 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."*³³

Requirements:

5.b.1.1: Meet the requirements of ASHRAE 189.1 Section 9.3.4.1: Provide an area that serves the entire building and is dedicated to the collection and storage of materials for recycling.

Required Documentation:

- Drawings and plans for specific area(s) designated collection and storage of materials for recycling

Reference Material:

- *ASHRAE 189.1 Section 9.3.4.1 Recyclables (Construction Waste Management)*

5.b.2 UFC 1-200-02, Paragraph 2-6.2.2 Waste Diversion

*"Divert minimum 60% of nonhazardous construction and demolition waste material from landfills."*³²

Requirements:

5.b.2.1: Divert a minimum of 60% (DoD requirement) of non-hazardous construction and demolition waste from landfills.

Required Documentation:

- Calculations by either weight or volume (must be consistent throughout)
- Drawings and plans for specific area(s) designated for collection of recyclable and reusable materials on the construction site
- Construction Waste Management Plan, including Waste Minimization Plan

³³ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from:
<http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

6. ASSESS AND CONSIDER CLIMATE CHANGE RISKS

6.a Address Climate Change Risks

6.a.1 UFC 1-200-02, Paragraph 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.”³⁴

Requirements:

6.a.1.1: Is or will there be a climate change projection and/or determination of acceptable risk for this project?

6.a.1.2 If located in a floodplain of concern: Provide design solutions which mitigate floodplain impact and impact on building function and occupants.

Required Documentation:

- Documentation of long-term mission criticality.
- Excerpt of Charrette discussion of climate change impact evaluation (including wildfire), based on mission criticality and cost, when part of project.
- Documentation identifying implementation of actions to increase climate resilience, including building design solutions, Government-provided climate change projections, and determination of acceptable risk.
- For buildings located in a floodplain of concern: LCCA results and/or documentation.
 - Design strategies to mitigate impact on floodplain.
 - Designed flood event, including its impact on building function and occupants, consistent with mission criticality.

³⁴ U.S. DEPARTMENT OF DEFENSE. *UFC 1-200-02 High Performance and Sustainable Buildings Requirements*. Available from: <http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc/ufc-1-200-02>

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